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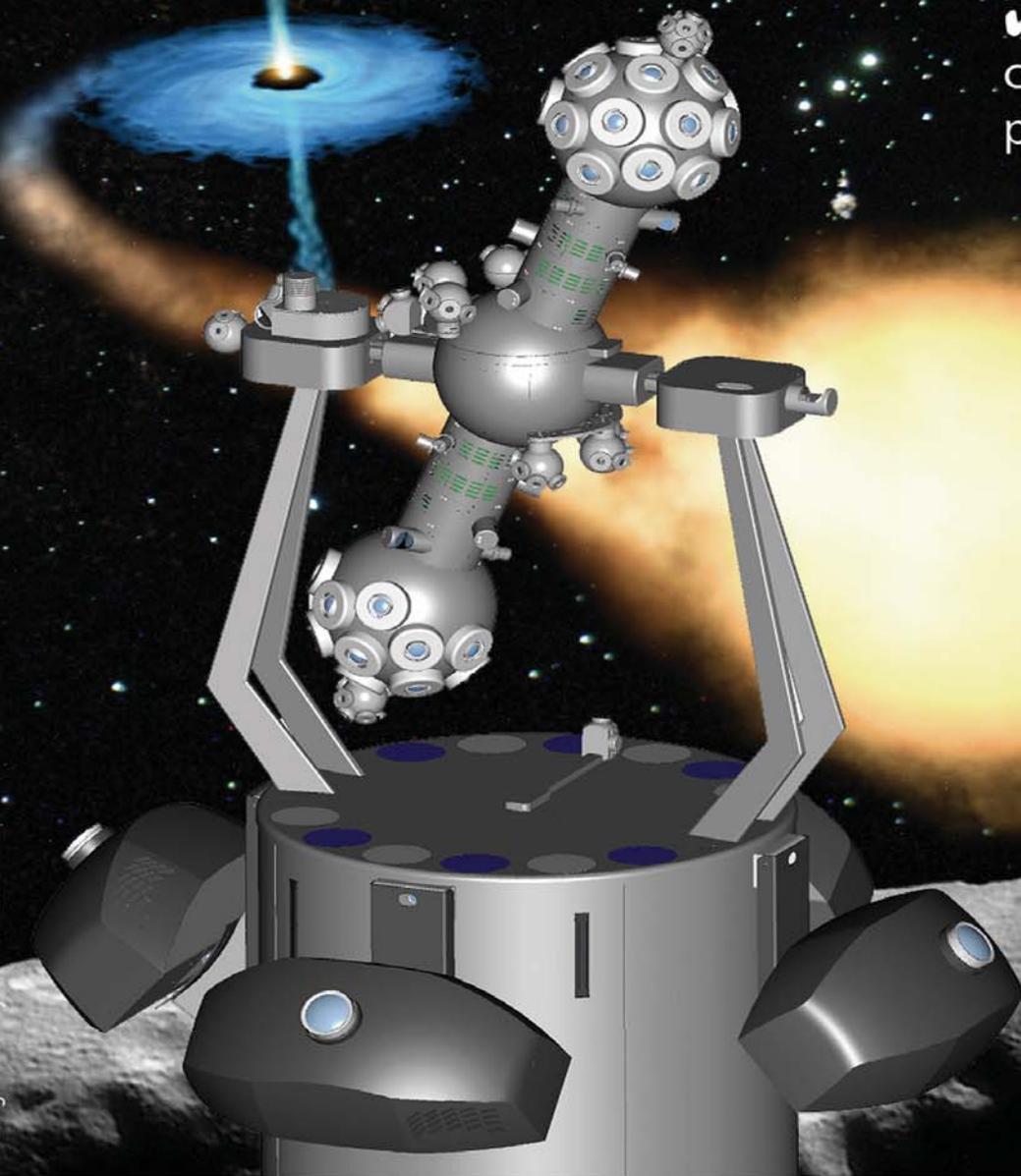
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A cumulative index of major articles that have  
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through the current issue is available online at  
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**June: April 21**  
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As you can see, I couldn't put it off any longer. Yes, the photo above is the 50-year-old me, the person who isn't afraid to come

out in front of the console but who hates having her picture taken. I owe a hundred thanks to Carl Leet, the very patient and very talented photographer in Youngstown State University's media department for putting up with me and my futile attempts to be imaged. He's the one who got me to smile.

I won't give you a lot to read this time around. You have enough to keep you busy in this issue. Between articles and our regular columnists, the IPS Council Meeting minutes from the 2006 Conference, and tantalizing

descriptions of beautiful cities and exciting sites, this issue of the *Planetarian* sets a new record for size. I have already apologized to the trees and thanked the for their sacrifice.

This issue's cover story—about the lessons learned in taking live action from the flat screen to the dome—is another peer reviewed article, and it deserves this treatment. Once you read it you'll see how much new ground was broken and how much time and effort will be saved by others thanks to the work of the team at the Gates Planetarium.

Because of the size of this issue I couldn't justify including an article from the *Astronomy Education Review*. Be sure to check out the latest issue online, however, especially "Teaching What a Planet Is: A Roundtable on the Educational Implications of the New Definition of a Planet" conducted by Andrew Fraknoi. The url is aer.noao.edu.

Now, as I get ready to put another issue (and myself) to bed, I gratefully give the rest of my space to Gary Likert. Gary responded to my plea for more star stories and this was the only space I had left to run his submission. After all those requests for material, the least I could do actually print what I get! ☆

## Sky Stories

**In Defense of Leo Minor**  
**Gary Likert**  
**The Home Planetarium Association**  
**Gallatin, Tennessee usa**  
**www.planetariumsathome.com**

Ever notice how certain constellations get more press than others? Maybe I spend far too much time beneath my own dome looking at my own stars, but the constellations above my head begin to tell me things after awhile.

True, I build my own planetariums, so perhaps I have a bit more vested interest and right to call them "my stars," and maybe the constellations talk to me in the privacy of my own dome more than they would, say, in a more public dome. They tend to be shy then, I think, and perhaps a bit more resentful that cable TV, DVDs, and glowing screens that have largely replace them as an evening's entertainment. But they talk to me, and they are concerned that certain of their ... umm ... members get far more press than the others.

I had to admit it was true, that even I tend to look at the same constellations over and over and ignore the rest. The big boys and girls, I need not mention them, with their swords and belts and sisters and sea monsters threatening, their heroes and myths. I listen to the gripes of constellations that were overlooked but admittedly still famous, and it's time to name some names. Aquarius lamented nobody sings about him any more and Capricorn butted me in a vain attempt to get some attention. And on and on it went. Finally I contemplated the twins of the skies, and realized there were more than I thought.

I heard a tiny voice crying from my sky overhead. It was Leo Minor. "What about me?" he cried.

He had a point. The two bears get all the attention, and those

Centaurus. True enough. The dogs ... they were bright and in full glory, couldn't argue there. Gemini even represented the original "two for one" sale idea.

"I represent the little guy," Leo Minor argued, "the lesser of the celestial pairs, that forgotten brother or sister who gets shunted off to the corner."

"Got any examples?" I asked him bravely. I'd never even identified him in the shadow of his big Lion King bro, and even now I was hard pressed to see where his voice was coming from.

He warmed to his subject. "Take horses. The big horse with the wing thing is famous, but who can find Equuleus? There's a big snake hogging tons of sky, but what about Hydras? Is he the jilted boyfriend? Doesn't he need some attention too? Who looks at the southern stuff? The triangle, the crown?"

"Wait," I argued. The southern fish is brighter than the Pieces. "Exceptions. exceptions," he continued. Serpens may be in two parts, but he gets more looks than Lacerta or Chamaeleon!"

Leo Minor had made his point, I suppose, so I conceded that someone needed to put in a word for those lesser twins, those forgotten sisters and brothers and objects up there in the sky that deserve at least passing mention. As I headed for the dome of my home-built 15ft theater, I already heard Aquila and Cygnus trying to make up with Pavo and Phoenix. Grus was crying in the corner. The last thing I saw before flipping on the lights was Leo Minor curling up with the Lynx and going to sleep. ☆



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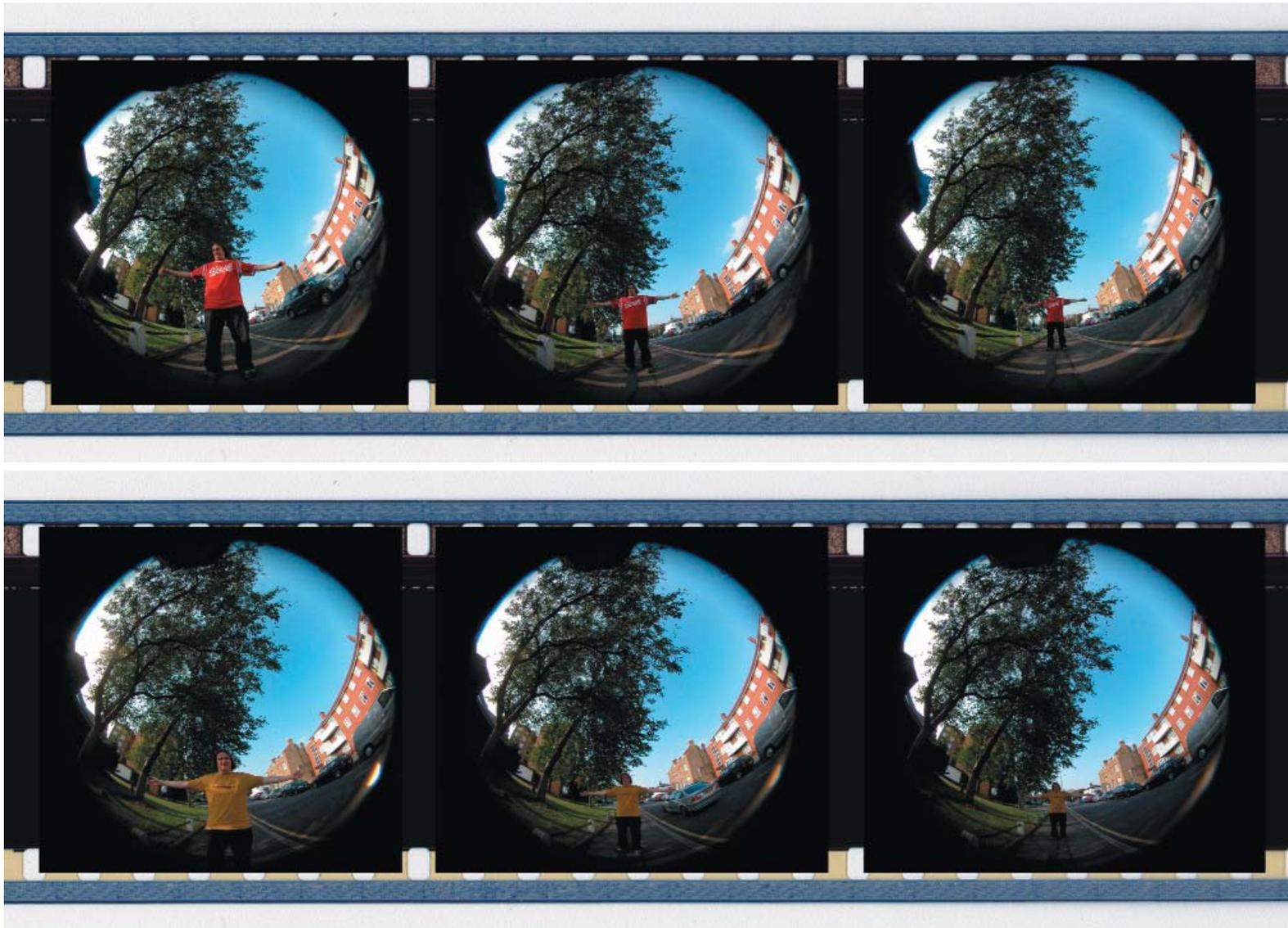
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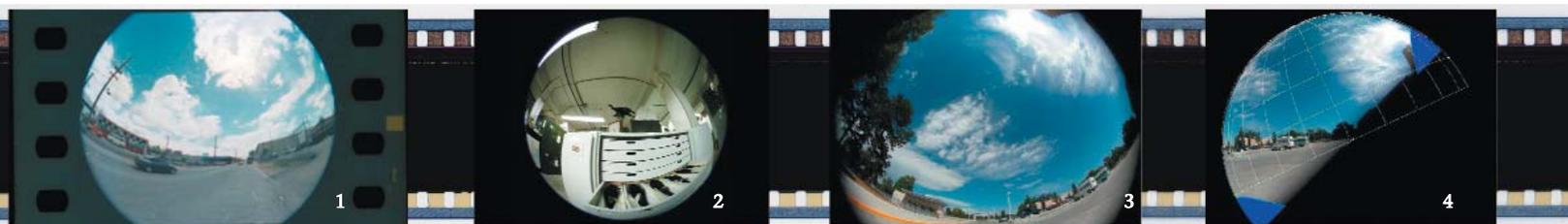
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**Figure 1: Fisheye Distance Tests**

Fisheye images taken with a consumer-grade Nikon Coolpix camera and a FC-E8 0.21x lens, tilted up at 45°. The figure (height of 178 cm/5 ft 10 in) is at distances of 1 meter, 2 meters, and 3 meters. For the top row, the camera was held 60 cm above the ground; for the bottom row, the camera was held 120 cm

Abstract: The majority of modern full-dome productions have relied almost exclusively on computer-generated imagery and animation. However, the Denver Museum of Nature & Science's *Black Holes: The Other Side of Infinity* includes live-action footage from both 35 mm film and HD video, which cumulatively accounts for just under 9% of the film's total running time. The demands of creating content for an immersive display—including resolution needs, composition, pacing, and the need to preview in a domed environment—are compounded by technical demands from using short lenses when acquiring footage from a live shoot. This paper will discuss some of the pre-production tests and experiments, the on-location shoots, and challenges from the extensive post-production. The solutions developed over time by the DMNS staff can be used to form a prototypical "best practice" for future live-action full-dome producers.



**Figure 2: Full-frame vs. Circular Fisheye Shots; Tilting the Fisheye Camera**

- 1: A single 35 mm frame showing footage shot with a Nikkor 8 mm lens. The size of the film negative means that the circular image is cropped at the top and bottom. Unless otherwise indicated, all images in this article courtesy of and ©DMNS.
- 2: A single exposure from a Canon EOS 5D camera with a 6 mm lens showing the circular framing of the entire fisheye image. Note that scanning in a full-frame image can result in as much as a third more pixels horizontally than the equivalent from a circularly framed one. Courtesy and ©Greg Downing.
- 3: A fisheye image taken with FC-E8 8 mm lens attached to a Nikon Coolpix camera tilted up at 45°, and with the image masked out to approximate the image that an 8 mm lens would project onto 35 mm film.
- 4: For the Gates Planetarium dome tilted at 25° (represented by the white grid), the fisheye image can be tilted down so that the cropped bottom of the frame is no longer apparent, while the cropped top of the frame appears at the back of the dome.

The 23-minute fulldome planetarium show *Black Holes: The Other Side of Infinity* (2006; dir. Thomas Lucas), produced at the Denver Museum of Nature & Science (DMNS), was funded in part by the National Science Foundation's Informal Science Education program along with seed money provided by NASA's Gamma-ray Large Area Space Telescope. Partnered with DMNS in the collaborative effort were Thomas Lucas Productions, Andrew Hamilton at the University of Colorado at Boulder, a scientific visualization team at the National Center for Supercomputing Applications (NCSA) led by Donna Cox, and Spitz Inc. as the show distributor. The visuals created for the planetarium show were also used for the companion NOVA documentary "Monster of the Milky Way," directed and produced by Lucas.

The majority of the scenes in the show were created using traditional computer animation techniques, visualizations of numerical simulations, model reconstructions based on observational data, and Hamilton's real-time general relativistic flight simulator. However, *Black Holes: The Other Side of Infinity* (henceforth, *BH*) also utilized live footage shot on high-definition (HD) video and 35 mm film, totaling 112 seconds in the final film. This is a dramatic departure from most other fulldome productions that have relied almost exclusively on computer generated imagery (CGI) and animation.<sup>1</sup>

Although live action has been done sparingly in past fulldome productions, there were several reasons why it was chosen for *BH*. The first suggestion of live action came from front-end surveys of visitor opinion at DMNS (Heil et al., 1999). The survey revealed that our audiences were not just interested in viewing computer-generated graphics for a fulldome planetarium show; instead, they wanted to see actual scientists and hear their stories, as opposed to watching a narrative

that was constructed completely from artificially-generated content and environments. One of us (director Lucas) also felt that the fulldome medium called out for experimentation at a level that was missing from previous fulldome programs that he had viewed. Live action footage would expand the content options available to the filmmaker.

Once the decision was made to couple the production of the fulldome program with a parallel hour-long NOVA documentary, it was clear that the two programs would share resources, visualizations, and documentary footage. Since most NOVA television programs focus on scientists at work on a research problem, it was expected that this production would highlight the personalities as well as the science. This meant that there would have to be live footage to cover the scientists for the fulldome show.

### Full-dome vs. Flat Filmmaking

There have been previous considerations and discussions of production guidelines for shooting fulldome video as opposed to traditional "flat" filmmaking (e.g., *Elumens* 2001, as well as the ongoing debates at the full-dome mailing list on yahoo.com). What follows are the challenges of fulldome filmmaking that we considered during the pre-production of *BH*.

- **Dome masters need to be very large.** The large fulldome theaters have display resolutions that require dome masters<sup>2</sup> with a minimum resolution of 2000 pixels (2k) across. To be safe, some animators may choose to over-render their scenes to 4k dome masters, to allow for all possible display resolutions (based on current dome deployments). Even a minimal 2048 x 2048 dome master has more than 13 times the pixel count of a television (NTSC) frame, and twice that of a full HD frame. For *BH*, the production team settled on a dome master resolution of 4096 x 4096. The sheer size of the individual frames

requires increased data storage space and more overhead time to accommodate image processing. Even routine tasks like file transfers become more laborious.

- **Full-dome video is meant to be seen inside an immersive hemispherical display.** Whether previewing live or CGI footage, compositional problems are not easy to discern when a frame is viewed on a flat monitor display. Because straight lines are curved and warped inside a dome master, it may not be clear where the horizon should lay, especially if the dome master is meant to be displayed in a tilted dome. And since dome masters can be quite large, visual minutiae will only become globally visible at full resolution. It is only when the footage is shown inside a fulldome theater that image composition and fine detail issues become apparent. Similarly, the pacing of a sequence, the number of cuts, and the camera motion may look fine on a monitor for a desktop video editor; but once the same footage is blown up to the dome, the large format may mean a dizzying experience for the viewer. Only after actually seeing their films in a dome can animators and filmmakers begin to gain the experience of how to film for this medium.

Aside from artistic questions, proper coordination of the facility also becomes paramount. Because DMNS has only a single fulldome theater, previews of dailies had to be done when the Gates Planetarium was not being used for other programming. Usually this meant that to avoid disrupting public programming, most of the work had to be done after hours. And since so much more computer and projection equipment were required to run the Gates Planetarium than for offline work on a desktop machine, use of the venue itself added to the expense of the production.

- **Filmmaking for domes can be different.** Ben Shedd was one of the first to codify the

differences between filmmaking for traditional cinema and for large-format film like IMAX (Shedd 1997). Because large-format films (and, by extension, fulldome productions) fill a viewer's field of view, the cinematic grammar available to a director changes. He suggested that cuts need to be reduced to avoid confusing the audience with instantaneous jumps to new perspectives or environments. Camera motions like pans and tracks also need to be minimized, or at least slowed down, to avoid creating motion sickness. The overall pacing of the film needs to be restrained if there is more surrounding visual content for the audience to see.

One of us (Lucas) felt that this philosophy resulted in a very conservative approach to previous fulldome filmmaking. As an alternative, he wanted to get away from an approach that consisted entirely of slow camera movements and no cuts. Instead, he wanted to make use of all of the normal techniques of cinema, including pans, tracks, varying camera angles, and vibrant editing. It has long been known that specific aesthetic choices by filmmakers can alter a viewer's perception and can lead to a greater emotional experience based on the predictable ways in which audiences respond to stimuli (e.g., Zettl 1999). Thus, using the array of options from ordinary filmmaking could lead to a greater potential impact on audiences. However, the filmmaker does have to work harder to keep audiences oriented so that they can follow the flow of images (for an example, see the end of the section on optimizing filmmaking).

### Live Footage for a Fulldome

The use of live video and film footage presented unique challenges to a medium that is already difficult to create content for. Here are further issues.

- **The commonly available video formats do not have high enough resolutions.** While dome masters created for large-theater fulldome productions require high pixel counts, the video formats in wide use do not come close to matching the necessary resolutions. NTSC video has a viewable image with a resolution of 640 x 480. Full resolution HDTV frames have 1920 x 1080 pixels. Even with a fisheye lens, the maximum resolution of the circular dome master within the 16:9 HD field is 1080 lines. Although 4k HD video cameras are being developed, it will be some years before they become inexpensive enough for widespread use. In addition, the widescreen aspect ratios of HD cameras means that circularly framed images will still be at 2k resolution.

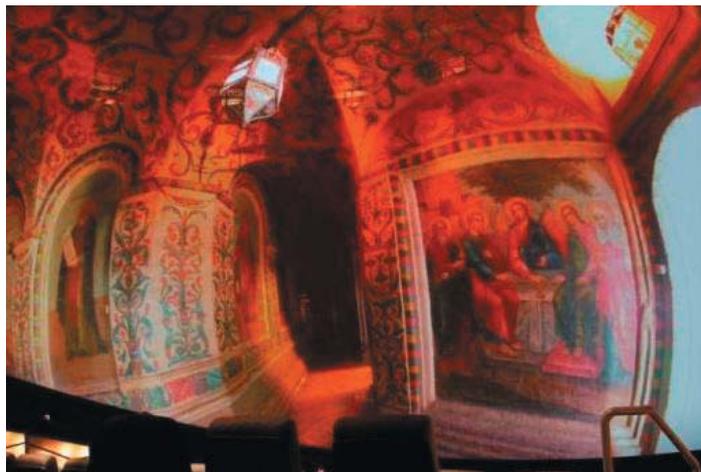
Because of the inability of current HD

video to meet the resolution demands, the *BH* production team decided to use 35 mm film for acquiring most of the live action. The current micro-fine grain Kodak EXR 50D Film 5245 stock has roughly 14 million high quality grains per frame. Even given constraints from camera movement and focusing and the parts of the frame not imaged by the fisheye, 35 mm film had the best potential for being blown up in the Gates theater without compromising image quality.

- **Fisheye lenses can make subjects look distorted.**

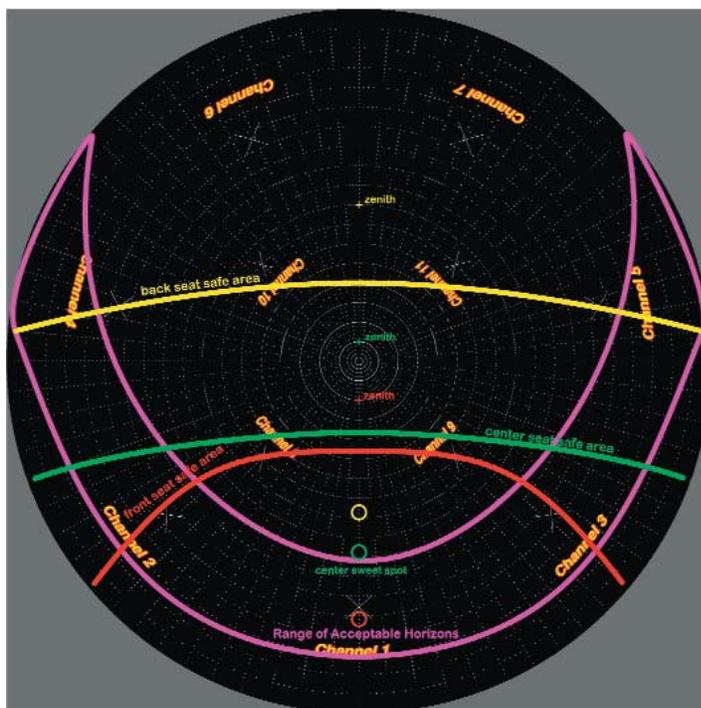
Because fisheye lenses have extremely short focal lengths (16 mm or less), subjects can be photographed extremely close to the lens and still remain in focus. However, wide angle lenses tend to distort such nearby subjects for most audience members in a fulldome theater. Although such distortion can appear acceptable on a video monitor or in the context of skateboarding videos (e.g., Kavanaugh 2004), they can be distracting when shown fully magnified in a fulldome setting.

To determine what levels of distortion were unacceptable, tests with a fisheye lens attached to a digital camera were used to photograph a human figure. Even at a distance of only 1 meter away, the subject looms in the field, and thus would cover much of the forward half of the tilted dome display (Figure 1). Only at a distance of 2 meters does the figure have a vertical span of



**Figure 3: Small Enclosed Space in a Large Dome**

The interior corridors of St. Basil's Cathedral (Red Square, Moscow) are little more than a meter across. When projected onto the Gates Planetarium's 16.9 meter dome, an audience member will feel that the projected environment is enormous, while she has shrunk down in size. Panorama photo courtesy and ©Greg Downing.

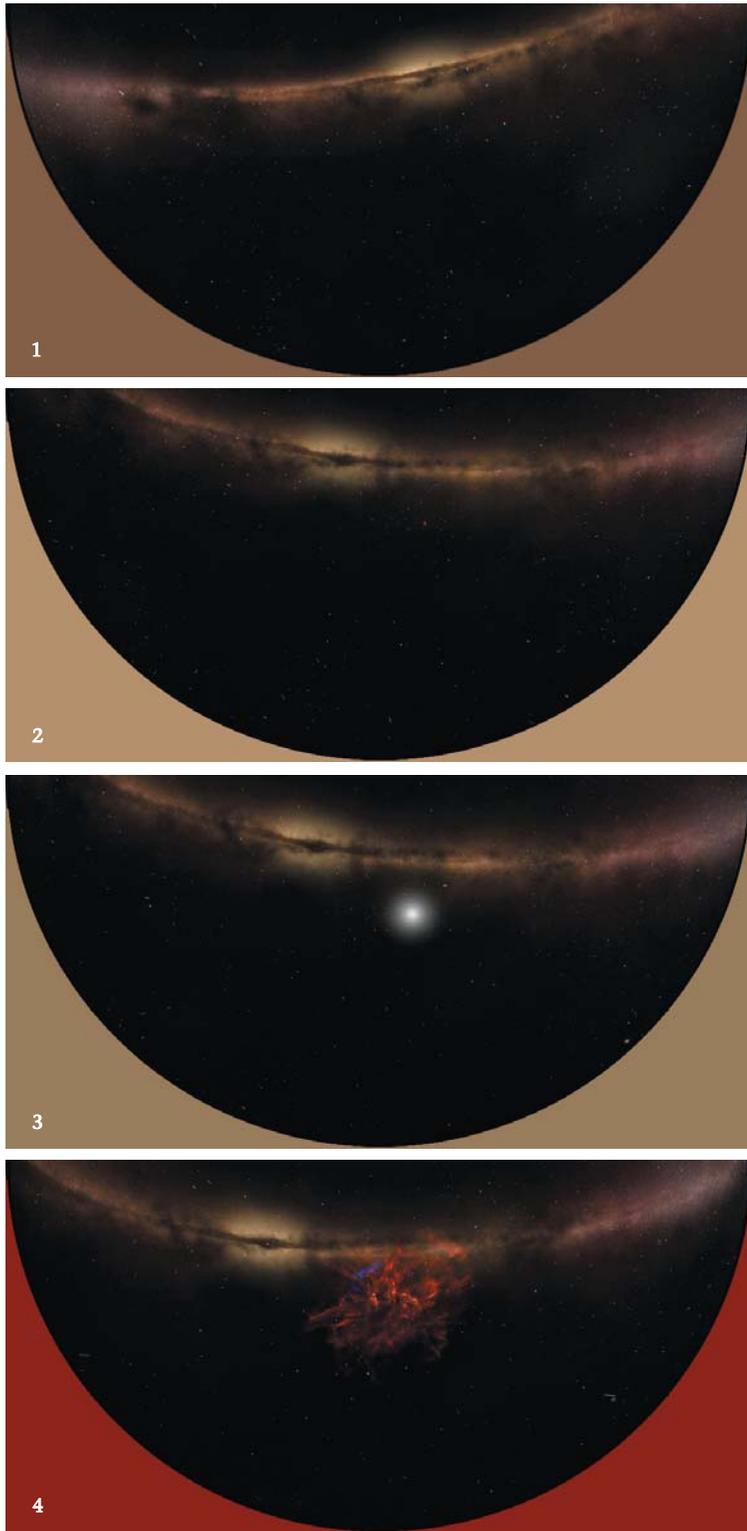


**Figure 4: Gates Planetarium Dome Evaluation Chart**

An evaluation grid for filmmaking for the Gates Planetarium dome at DMNS, rendered as a dome master with dot spacing of 1°. Subjective judgments were used to determine the range of acceptable horizon lines on the dome so that audiences did not feel like they were looking angled up or down.

roughly 45°. Based on such tests, it was suggested that minimal limits should be set for how close the camera would approach human subjects.

- **There is a trade-off between image resolution and cropping.** Tests showed that a lens with the Nikon Nikkor 8 mm T 2.8-22 resulted in an image that matched the curvature of the dome with a 180° field of view. The Super 35 mm frame, however, is not large



**Figure 5: The Milky Way**

1: Frame 1000; half of the dome master showing the band of the Milky Way arching almost directly overhead. The camera is flying towards a point to the left and below the Galactic bulge.

2: Frame 1250; the emergence of a red supergiant star, to the right of the vanishing point. Because of the strong contrast of its color and expanding size, the audience's attention is reoriented toward it.

3 and 4: Frames 1330 and 1500; the red supergiant goes supernova. The flash and the subsequent remnant continue to dominate the viewer's focus to the end of the shot. Although the voiceover also serves to emphasize the point, the visual redirection is so strong that even without the narration, the audience will be drawn to looking at the star before it explodes. Courtesy of DMNS; @University of Illinois

enough to show the 8 mm image without cropping 18° from the top and bottom of the frame (or 8% of the circular radius; see Figure 2:1 and 2:2). Switching to the Nikon 6 mm lens resulted in a slightly wider shot (220°), while the circular image was smaller on the negative. There is, therefore, a trade-off between the resolution of the scanned film frame versus the completeness of the image. Maximizing resolution was felt to be a higher priority than the clipped framing, so the 8 mm lens was chosen.

In order to maximize the image that would be seen in the dome, at what angle should the camera be held? The cropping of the circular fisheye image removes 18° from the top and bottom of the frame. Since the Gates Planetarium is tilted down by 25°, the camera should be tilted up by  $18^\circ + 25^\circ = 43^\circ$  from the horizontal. A camera pointing up by 45°, then, will give a fisheye image that can be tilted down to obscure the truncation at the bottom of the frame and allow the horizon to look correct. However, there is a considerable wedge of image— $36^\circ = 18^\circ + 18^\circ$ —missing in the back of the fisheye image (Figure 2:3 and 2:4).

- **The distortion from wide lenses can lead to viewfinding problems.** Content in the forward direction, for shots intended for tilted domes, will tend to be concentrated near the edge of the dome master, which, when projected, will be close to the horizon or edge of the physical dome. Subjects at the edge of the circular dome master will be horizontally stretched by a factor of  $\pi/2 \approx 1.6$  compared to those in the center of the frame. Through the viewfinder, the fisheye field will look distorted along its perimeter. If the camera has to be tilted to match a tilted dome, then keeping a subject in the “front forward” direction means keeping the subject not at the undistorted center of the frame (which is where the framing would occur in traditional camera work), but near the lower edge of the frame.

Keeping this non-traditional framing consistent may not be a serious concern for static content or if a moving subject is followed by a camera on a tripod mount. However, if a tripod or dolly is not available and a hand-held shot is required to track a moving subject, the camera operator will then have a difficult time keeping the subject centered properly, or even keeping a stable horizon line. Hand holding a camera angled up at 45° or more is not only awkward, but is counter-intuitive for a traditional camera operator.

- **Shooting in enclosed spaces can lead to unexpected effects.** If the size of the enclosed room is physically smaller than the full-dome theater that the footage is shown in, the audience viewing the footage will feel psychologically that they have shrunk by a factor proportional to the ratio of the two scales (Figure 3). Unless the full-dome theater is extremely large, there are still subtle perceptual cues that let audience members know that they are viewing a projected image on a screen at a fixed (not infinitely far) distance away. Thus, if the dome theater is 20 meters in diameter and the filmmakers shot footage from inside a closet 2 meters across, to the audience the 2-meter room has now expanded by a factor of 10 to appear as if it was really 20 meters in size.

This perceptual effect exists at a much less noticeable level for other types of cinema. However, the immersive nature of the full-dome theater accentuates it by creating a visual field that surrounds the viewers, which solidifies the illusion that they have been physically transported to another place being depicted on screen. The filmmaker should be aware that the psychological effect—and possibly the emotional content—of shots can vary depending on the size of the dome display used to present the film.

## Optimizing Filmmaking for a Dome

Because these points (as well as the potential for other unidentified issues) were recognized early on in the pre-production process, it was deemed important that test trials be performed to ensure the final filmed footage would be acceptable. The main goal would be to determine the parameters for effective filmmaking that would be optimized for DMNS' Gates Planetarium. One set of tests looked at the acceptable range of rendered stellar diameters for the space flight sequences for different dome master resolutions. Another set of experiments provided by Spitz Inc. explored the placement of credits and title cards, as well as title safe areas within the dome master frame.

A final set of evaluations utilized angular grid patterns projected onto the dome, which were used as a guide to determine horizon lines, visual "sweet spots," and safe areas. Again, these were optimized for the seating in the Gates Planetarium, which is influenced in part by not just the dome tilt, but also the angle of the seats, how far back the chairs lean, and the exact location of each chair with respect to the dome surface. These evaluation grids, therefore, would have only limited applicability for another dome theater, even for one with the same tilt. The locations of these regions could be shown on a diagram of the dome master field, which would be distributed to the animators and visualizers as a guide for compositing their shots (Figure 4).

It was discovered that horizons could vary

by 25° and still appear reasonable. Horizons inside this range still appear like natural horizon lines, while horizons outside would make the viewer feel that he was either looking angled up or down instead of in a level, forward direction. This was an important discovery since viewers in the dome would see an increasingly skewed horizon depending on how far their seats were from the center seat in each row. This also gave the post-production crew more latitude re-tilting the fisheye images for the dome, especially for hand-held shots which tended to wander more.

The visual sweet spots for content were determined from three different seats inside the planetarium: the front row center seat, middle row center seat, and back row center seat. These sweet spots were locations on the dome where material could be placed that required the least amount of head-turning for an audience member to still see. Although the immersive display nature of full-dome theaters allows for imagery to be shown at large angles away from the forward front direction, it was felt that a careful filmmaker would not want to constantly resort to neck-turning camera and object movements. Such a spot in the dome master where a viewer could naturally gravitate would be the default location to focus attention, and content placed there would reduce audience physical fatigue by minimizing head turns unless it was artistically necessary. The locations of the sweet spots on the dome master were a function of the location of the seat as well as the maximum angle that a person

could lean back for that seat.

Finally, "safe areas" within the dome master were also found from the three test seats in the dome. These are similar to the action safe and title safe areas used in television production for marking screen locations where the image should be visible for any television set. The full-dome safe areas were defined as those regions of the dome that would be visible to audience members who look straight ahead and do not turn their heads from side-to-side, crane their necks, or roll their eyes to look around. The safe areas for dome masters are another way to show diagrammatically where points of attention could be placed in the dome while minimizing audience physical fatigue.

On the other hand, there is no rule that content could not be found outside of the safe areas. However, by placing visual components inside these zones most of the time, a director can maximize the impact on an audience whenever the point of attention veers out of the safe area, e.g., when a large object flies prominently overhead. This creates a contrast in the visual experience, leading to greater intensity and dynamicism to the shot (Block 2001). The safe areas are another guide to compositing for the dome and allow the careful filmmaker to create surprise and drama within the narrative.

Even inside these safe areas, audiences have a viewing area with an enormous field of view (in excess of 600 square degrees). How attention is drawn to any one location will depend on the director's skill at guiding the viewer's eye to specific areas during a



Figure 6

1: Original 35 mm frame of fisheye shot; the nearly full-frame shot shows the top, bottom, and right edges of the fisheye image truncated.  
2: Fisheye shot on dome master; the full-frame shot has been placed onto the dome master, and then tilted down to hide the gap in the image at the bottom of the frame. Note the arm and the top of the head of the cameraman at the top left corner of the shot, as well as the power line that runs off the top edge.  
3: Repainting the dome master; The extraneous elements that could not be filled in, such as the cameraman and the power line, are now being painted out and replaced with blue sky. The clouds at the upper right edge are also being cloned to extend the image to the edge of the dome master. The Sun in this case was not close enough to the edge of the fisheye image that replicating any part of the starburst pattern was necessary. ©DMNS and Thomas Lucas Productions



**Figure 7: Original Frames for the Road to the Mauna Kea Summit**

Three of the original fisheye frames from the shot showing Ghez driving up the dirt road to the summit of Mauna Kea. The horizon and the car passes just below the center of the frame, meaning the camera was not tilted high enough for the Gates dome. @DMNS and Thomas Lucas Productions

shot. This is done with a conspicuous object or contrasting element in the visual, the dominant contrast. Any sort of a visual element can play the role of compelling focus. Research shows that when experimental subjects are allowed to freely observe pictures containing human figures, they are often fixated by faces (Yarbus 1967). Attention also can be drawn by motion, a lighting effect, a strong contrasting color, a visual pattern, or a sudden change in the visual field. Exploiting such cues becomes important in fulldome filmmaking, where the large displays make it inherently easier for an audience member's attention to wander. (For more information on dominant contrast in film, see Giannetti 2005.)

An example of how the viewer's attention can be directed appears in the very first shot of *BH*. The camera does a slow pan across the disk of the galaxy, until the band of the Milky Way arches in front of and over the audience (but not crossing the zenith). The camera then begins translating forward towards a point below the disk. The numerous stars flying past the viewer leads immediately to a dominant contrast in the form of the vanishing point, where the optical flow of stars is streaming from. This point is just below and to the left of the galactic center (Figure 5:1). The bright galactic core itself is placed too high in the dome to easily capture interest. A subsidiary contrast soon appears in the form of a red star to the right of the vanishing point. It is easy to spot because it is the only red star in the field. It grows in importance and becomes the dominant focus as the star balloons into a red supergiant. An audience member who did not notice the star when it first appeared is

bound to see its stellar disc expand larger even as its sharp color contrast also draws awareness to it (Figure 5:2). Finally, a flash of a supernova explosion and the subsequent expanding remnant seals the attention of the audience to the end of the shot (Figure 5:2 and 3).

Even without the voiceover narration (which also clues the audience into looking for additional contrasting elements amidst the stars), the construction of the visuals alone has pulled the viewer's awareness from one part of the dome to another. This was done not as a visual gimmick, but as a service to the story being told. In fact, the final shot was modified from an earlier version where the red supergiant was not as apparent. The camera flew at an angle that was almost directly into the galactic disk and the supernova progenitor itself was located in the band of the disk. The greater number of stars speeding past plus the stellar density of the galactic disk served to obscure the red supergiant from the audience until the actual supernova explosion.

In addition to aiding the design of animations and flightpaths, the dome evaluation test grids proved to be very useful for post-production work as well. Most of the compositing and animation work involved either the use or production of dome masters on desktop systems, which were separate and offline from the dome display computers. Referencing these test grids, for instance, allowed the production staff to rotate images to move horizons around until they were inside the acceptable range, without having to see their work on the dome.

Knowing when objects became visually noticeable for audience members was also

important, not only from the animation and visualization standpoints, but also for music scoring. Richard Fiocca, the composer for *BH*, did not live in Colorado and could not attend any screenings of the film inside the Gates Planetarium. Therefore he had to rely on seeing the movie through dome master sequences played back from a DVD.

## The Location Shoots

There were two location shoots for *BH*. The first was a trip up to the peak of Mauna Kea in Hawaii in May 2004 to follow astrophysicist Andrea Ghez, whose team was using the Keck Observatory to determine the orbital parameters of stars around the Milky Way's central supermassive black hole. The second was at the launch of the NASA Swift satellite from Cape Canaveral Air Force Station on November 20, 2004. The camera crew followed a group of the instrument scientists to the launch viewing grounds and filmed their reactions to the ascent of the Swift satellite aboard the Boeing Delta II rocket.

Many of the 35 mm fisheye shots were done with a hand-held camera—an Arri 435 in Hawaii and an Aaton 35-III in Florida—to capture the emotions from the crowd, as well as to add a sense of kineticism and action that we felt was missing from many other previous fulldome shows. In order to do this for the Swift launch, reaction shots from the assembled onlookers would have to be quickly filmed during the few critical moments during take-off. As a result, most of the launch footage was shot with camera work that was in the traditional sense of “flat” filmmaking. This footage showed the subjects very close to the camera, while the



**Figure 8: Processing a Frame for the Road to the Mauna Kea Summit**

The middle frame from Figure 6 is reprocessed. Left: First the frame is repositioned and warped so that the car and horizon will look correct when it is tilted. Center: The warped image is placed back onto the dome master, then tilted and scaled to a size to fill up the dome master. Right: The dome master is complete once the gap in the image at the top of the frame (or back of the dome) is painted in. @DMNS and Thomas Lucas Productions

horizon varied constantly (although it was blocked for the most part by the foreground figures).

For the Mauna Kea shoot, the camera was mounted for many shots, including a dolly used to follow Ghez walking on the summit. The filmmakers also were able to plan their Hawaii shots more carefully, and not have to shoot amidst a crowd of excited launch attendees. Hence shot stability and movement became less of a hassle (although it never disappeared because of the unforgiving nature of the dome in magnifying camera shake). There also remained footage taken with the camera tilted at an incorrect angle for the 25° Gates dome, and even the shots that were correctly tilted had gaps in the back of the dome (cf. Figure 2). Thus all of the shots would require some form of adjustment in post-production.

### Film Post-production

The first task for the post-production work was scanning the 35 mm film footage. G.W. Hannaway and Associates (Boulder, Colorado, USA) provided the 4k scans of the film negative. Next was conversion of the 24 frames per second film frame rate to a 30 fps digital video rate. The standard Adobe After Effects in-betweening algorithm was found to be inadequate for this task. Artifacts, consisting of jumpiness in the content, appeared. Further testing showed that this was the result of the interpolation algorithm failing to sample enough frames both ahead of and behind the current set of frames. Unfortunately, this problem was not detected on the offline After Effects workstation, but was visible only during playback in the dome. Eventually RE:Vision Effects' Twixtor

4.5 (see below) was found to correctly interpolate the frames without introducing new artifacts. All of the 35 mm footage had to be re-processed with this tool.

#### • Tilting and Painting the Swift Launch

One significant task was taking the Swift launch footage and making it look visually appealing in the dome. Because the fisheye frames were nearly full-frame, the images were cropped at both the bottom (front of the dome) and at the top (back of the dome; Figure 6: 1). In order to create a dome master with content that covered the dome, each frame had to be tilted down to fill in the bottom truncation (Figure 2). In-dome previews of the tilting and re-scaling was done with *remapper*, a real-time timeline-based full-dome formatting tool created by Nebulus Design's Nigel Jenkins. The software ran off of our SGI Onyx 3800 multi-channel visualization supercomputer system running the Irix operating system.

Although *remapper* was the fastest tool available for making quick previews in the dome and was used for the initial re-renders of the dome masters, the production eventually switched to offline batch processes using *reblend*, a command-line tool written for use on both our Linux and Irix systems by NCSA's Stuart Levy. Then, depending on the particular shot, each frame was re-scaled to stretch its boundaries until it matched the edge of the dome master using either After Effects or Adobe Photoshop (Figure 6:2).

The final step required replacing the content that was truncated at the top of the frame. Although this would appear in the back of the dome, normally not be visible to audiences unless they made the effort to

turn around, the production staff felt that only full-dome masters should be created. This meant that the remaining gap in each frame had to be filled in. In some of the shots, a phantom limb motioning to the crowd as well as the cropped head of the cameraman appeared just inside the frame. These elements also had to be excised.

For the crowd launch footage, the task of completing the background and painting out extraneous objects was made easier by the blue sky background (Figure 6:3). A number of other elements made individual shots more difficult, if not impossible, to work with. Most of the footage consisted of medium shots toward the front of the crowd, with the Sun behind the camera. Power lines above and behind the crowd were often visible and most of these were rotoscoped out of the frames. In other instances, when the size of the gap was small, it made more sense to extend the power lines into the truncated part of the frame. A first pass at painting out extraneous objects was done by G.W. Hannaway. The majority of the paint work, however, was performed by one of us (Brownell) using After Effects.

A number of the Swift launch shots were taken from behind the onlookers, with the rocket plume centered in the frame and off in the distance. In this case, the Sun was clearly visible within the shot, which meant that lens flares and starbursts were also very apparent. In many shots, the presence of lens flares made it impossible to paint or fill in the gaps in the frames.

One shot that we were worried would not work in the dome showed the rocket plume in the distance bracketed by people in the foreground (again, Figures 6:1-3). The figure



**Figure 9: Inside the Car Up Mauna Kea and at the Summit**

1: An original scanned frame from inside the car being driven by Ghez up Mauna Kea. 2: A final dome master frame, after tilting, re-scaling, removing camera shake, and re-painting. 3: A finished full-dome frame showing the summit of Mauna Kea, with the Sun in the sky. The brightness has been boosted as much as possible to show Ghez's facial details without making the red sweater look unrealistically bright. @DMNS and Thomas Lucas Productions

in the white t-shirt on the far left was so close to the camera lens that he looms over the scene in the original framing. After placing the frames into dome masters and re-scaling, the left figure becomes even more dominating. However, the shot works well in the tilted dome, which surprised the production team. What makes it work even for someone looking to the left-rear of the dome might have to do with the orientation of the figure: looking up at the trunk of the body toward a partially extended arm does not give many visual cues that are “obviously” wrong. Its location also helps to hide the figure from viewers who would normally be focused on the dominant object in view: the ascending rocket in the forward direction.

The Swift footage of the onlookers was slowed by interpolating to double the frames in the footage using Twixtor 4.5, running them at normal speed, and then making a stabilization pass with Twixtor again. This was done so that the shot could linger on the action, and show the emotions developing on the faces of the onlookers. The slower shot also was a better match with the apparent motion of the rocket as it lifted off. As an added benefit, the considerable camera jitter was lessened by the post processed slow-motion.

There was also an unexpected benefit from the nearly full-frame fisheye images. Because the fisheye shot stretched across the negative from side-to-side, the resolution of the resultant frames was maximized by a third if compared to a circularly-framed fisheye shot. The increase in the number of pixels horizontally across the frame helped to give additional clarity to the human faces, which was especially important for showing

their responses to the launch.

#### • **Warping and Stabilizing the Drive Up Mauna Kea**

There were four different shots from the Mauna Kea footage that were used in the final show. Two showed Andrea Ghez driving up the road to the observatory summit: one taken from the side of the road and the second a close-up shot of Ghez from inside the car. The last two shots were taken from the summit. One showed a long shot of Ghez walking with the camera ahead of her, and ended with Ghez stopping and looking up at the Sun in the sky. The camera then followed with a tilt up to the Sun as well. (The second summit shot, which we will not discuss, was a time-lapse shot of clouds moving over the summit at sunset from a locked-off camera.)

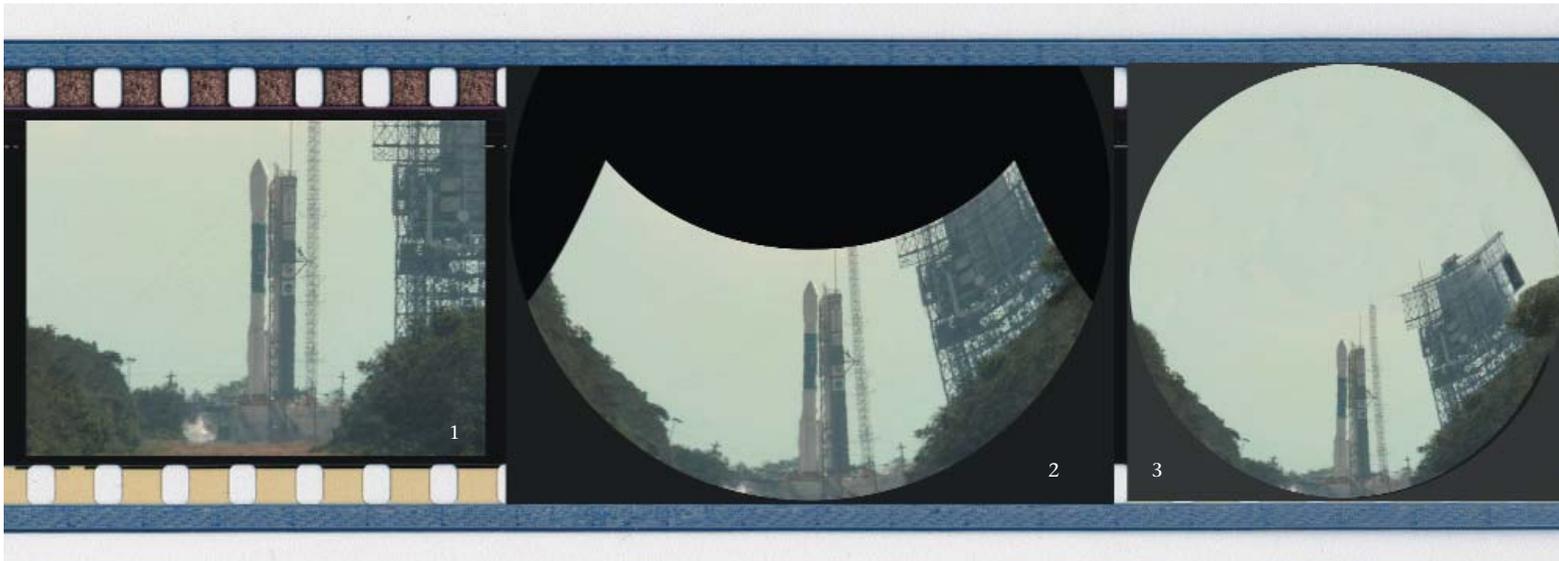
The first shot of the car driving up the summit road was done with the wrong camera angle. In fact, the camera was pointed nearly horizontally, as in a traditional shot intended for a flat screen with a minimal camera tilt. The shot consisted of the car at far frame right moving to far left with a pan to follow it as it drove by the camera's position. Because the car passed close to the center of the fisheye frame, when seen on the tilted Gates dome the car started on the far right side and then proceeded to arc almost directly overhead before receding to the far left side of the dome (Figure 7).

To re-center the car for the tilted dome, all of the frames were tilted down using *reblend*. There was still a distortion in the motion of the vehicle because objects near the edge of the dome master are represented by more pixels—their appearances look stretched—

when compared to objects at the center of the dome master. This stretching resulted not only in a curved horizon, but also a vehicle that appeared to change size or move radially to and away from the camera as it crossed the frame. *reblend* was able to re-warp the frame to mimic the increased stretch, thereby making the image and motion much more natural looking. Once this re-warping was done, the frames were placed back into dome masters, with the proper tilt and scaling to fill out the bottom of the frame. The remaining gap in the image at the top of the frame were filled by painting in the sky and replicating clouds from elsewhere in the frame (Figure 8).

The shot taken from inside the car was hand-held, and thus contained not only an enormous close-up of Ghez, but also considerable camera shake from the gravel-filled road (Figure 9). It was feared that because the camera was so close to the subject, the shot would not work at all in the dome (see discussion above and Figure 1). Surprisingly, it is effective in the dome and does not jump out as looking wrong. Although the brevity of the shot and the attempt at removing camera shake probably helped, the predominant reason is that the camera, even though it was just a few feet away, was still far away enough to avoid distortion. Like a traditional close-up, the subject's head is seen in full, but the body is cut-off just below the shoulders. The only visible point of comparison for the viewer is the head, which spans roughly 45°, an angular size that does not look distorted on the dome.

One of us (Lucas) did not wish for all of the camera shake to be eliminated, since it fit the action shown, that of a drive up a



**Figure 10: HD Image of the Delta II Carrying Swift**

1: An original frame from the HD NASA footage showing the launch of Swift. Note that the tower gantry and vegetation is cut off by the frame on the top as well as both sides. Courtesy of NASA 2: The HD frame properly placed and oriented within the 4096 4096 dome master. 3: The dome master with the HD frame filled in, using material cloned from within the frame (the sky and vegetation) as well as from subsequent frames in the shot (the top of the gantry).

bumpy road. However, staff from DMNS did feel the need to reduce some of the higher frequency rattle. 2D3's SteadyMove Pro, a plugin available for After Effects, was first used to stabilize the footage. Unfortunately, this tool turned out to create new problems. Image stabilization required that relative camera movement from one frame to the next be determined by locking onto objects on the horizon. Because the horizons in the fisheye shots were never straight lines, the software often locked onto nearby objects within the frame. This meant a foreground object was used as the reference, and the final jitter correction resulted in small rotations about the inaccurate reference point.

Eventually RE:Vision Effects' Twixtor 4.5 was found to be able to properly track the non-standard horizon within the shot. Because the software calculates motion vectors for each pixel, Twixtor can be used to pinpoint and quickly track arbitrary collections of pixels. By using such user-defined reference points, the camera shake within the shot was minimized or eliminated without introducing any new problems. The pixel tracking in Twixtor also made it a superior tool for telecining the film-to-video frame rate from 24 fps to 30 fps, as well as any slow-motion and fast-motion effects.

#### • Re-balancing the Color at the Summit

The third Mauna Kea shot of Ghez walking on the summit with the pan up to the Sun turned out to be one of the most difficult ones for post-production processing. The camera aperture was necessarily irised down because the Sun was always visible within the shot. As a result, such foreground

detail as facial features were underexposed and lost in the higher contrast shadows. Although the contrast and colors can normally be pushed up in post-production, this particular shot was more difficult because it involved a human subject wearing a bright red sweater. Exaggerating colors and contrast for most CGI content is not a problem, but care had to be taken when working with realistic materials or flesh tones. In this shot, it was easy to make the sweater look garish and glow neon-like if the settings were pushed too far.

Filmmakers shooting for IMAX (Omnimax) have long known that there is a trade off between a bright but washed out image versus a darker but higher dynamic range image (Lantz 1995). The reflective cross-bounce inside a hemispherical display environment meant that both the dome surface reflectivity and the overall light level of a shot had to be reduced to avoid completely washing out the image. Video full-dome producers have a slightly different set of concerns. Although cross-bounce is still a worry, the video projection used in modern full-dome theaters cannot provide the same dynamic range and color depth that film provides. As a result, higher contrast images can look worse when shown with video projectors compared with film projection.

Thus, how a sequence looks will depend on not just the brightness, contrast, and color fidelity of the original shot, but also partially on the display environment. For *BH*, the DMNS production team naturally decided to create shots that looked ideal in the Gates dome while aware that their choices might have a negative impact for other

facilities. Because the Gates Planetarium has Barco Galaxy DLP projectors that are relatively bright (peaking at 5000 lumens) when compared to most other installed systems, the show would look considerably different at another facility. In the Mauna Kea summit shot, the reds were boosted until the red sweater that Ghez was wearing was just shy of looking neon-like, while only a hint of pink appeared in her face and cheeks. For a CRT-based video full-dome, not only is the brightness attenuated (with typical projector luminous flux of 500-600 lumens), but the red light output is always weaker than the blue or green guns. The same sequence will look desaturated, with barely any color in the flesh tones, and the red sweater looking nondescript. Further experimentation with the image parameters (which we did not have the time or budget for) will be required in future full-dome films to better balance them for theaters using other display technologies.

#### • Dust-Busting

A new set of artifacts that were introduced from the film scanning was dust that showed up within each frame. G.W. Hannaway did a first manual pass at removing dust using Autodesk's Flame package. However, because of the size of the full resolution frames, most defects—some as small as 1-2 pixels across—were not noticed when the frames were worked on with After Effects on a desktop monitor and only became visible when the frames were transferred and displayed at full resolution inside the dome. Because new defects would be noticed with each iteration of a "cleaned" clip shown in

the dome, DMNS staff spent considerable time painting frames for each live footage sequence, usually with multiple (up to four) passes.

### HD Video Post-production

Additional footage from the Swift sequence was taken from official NASA HD shots of the launch. This telephoto lens footage showed the rocket on the pad prior to launch, and subsequently followed it up into the sky after it lifted off. It showed the launch from as close of a vantage point as was possible that day. (The *BH* camera crew was sequestered with the other guest observers several miles away.) However, the truncated framing of the HD shot (Figure 16) resulted in new difficulties for the production staff.

The preliminary shot of the Delta II rocket on the ground was troublesome because the gantry was cut off at the top of the frame and vegetation was clipped at the sides. The rest of the gantry was not revealed until the camera panned up to follow the ascent. Not only were there considerable missing or truncated features that would have to be replaced to complete the dome master, these details changed from frame to frame. Even re-painting the sky would be burdensome, because the quality of the light changed quickly in the early morning period immediately after sunrise. It became clear that filling in features in the single flat HD shot would be much more difficult than painting in sky in any of the 35 mm fisheye footage.

The final Swift launch sequence contains half a dozen shots, lasting 56.7 seconds, with intercutting between the NASA HD footage and the 35 mm shots of the reaction from the scientists. The original edit, however, was considerably longer and had twice as many cuts. Because the rough cut of this scene felt long within the context of the overall show, the total number of shots was trimmed down to those essential to tell the story of the launch.

The first daytime establishing shot of the rocket on the ground was reduced the most—down to a single frame—because none of the action within the shot was deemed to be critical. This decision saved the production staff from the task of stabilizing and re-painting multiple dome masters. The lone frame was used to recreate a 3-second shot. The frame was first placed into the dome master using a rebend feature that properly composited the 2D shot so that it looked correct inside the dome. Vegetation off to the side was cloned in Photoshop from the exist-

**Those who felt positively about the film footage liked it very much, and their opinions were similar to the responses from the front-end evaluations: they appreciated this humanizing element that contrasted with the rest of the CGI in the show. At the other extreme, those who did not like the live footage were taken aback by the size of the human figures in the dome, and complained about the camera getting too close to them .**

ing plants. The rest of the launch gantry was copied from later frames in the sequence during the ascent (Figure 10: 2 and 3). To help hide the fact that this was a single frame that was repeated, the image sequence was ripped in After Effects to mimic the mirage-like effect of heat in the intervening air.

### Issues for a Multi-Channel Dome

The Gates Planetarium operates with 11 Barco Galaxy DLP projectors whose individual graphics channels are tiled together to create a single image on the dome. To get video content that is sourced from dome masters to appear on the dome, the individual dome masters have to be split up into 11 component channels. Each stream is then converted into a movie file (using a proprietary wavelet compression routine), and uploaded to the 11 QuVIS Qubit players which playback to each of the projectors. The file splitting, movie file conversion, and subsequent upload all increased the overhead for creating and seeing shots on the dome.

For instance, the amount of After Effects work for the approximately 6000 frames of live action that was processed totaled 461 hours. Splitting the dome masters into 11 separate channels involved two separate sets of machines (our SGI Onyx 3800 with 30 processors and an army of 13 Linux workstations with 2.4 GHz Pentium 4 CPUs) requiring an aggregate total time of 351 hours. Creating (“qubifying”) the movie files totaled 7.8 hours, while actual upload to the playback units required 75 hours. Therefore, the additional time required to merely view the footage in the dome (434 hours) was just shy of the offline time processing the images!

Of course much of this work was done off-hours. In fact, the uploads were almost always done off-hours since the QuVIS units were used for show playback during the day. However, the sheer size of the original dome master files (4096 x 4096), the size of the component files meant for the individual channels (1280 x 1024), and the large frame count meant that careful time management was necessary to keep the production on track. This lesson is true not just for the live

footage, but for the CG content as well, which made up the bulk of the shots in the final show.

### Lessons Learned for Future Shows

Was the effort to incorporate live action footage into a full-dome planetarium show worth it? How did audiences respond to film footage intermixed with the CG content? No

final summative evaluations were devoted to that question, but audiences brought in for two formative evaluations during the production were asked to give their impressions of the existing rough cut. Their viewpoints on the show were generally very positive, but there were divided opinions about the live footage.

Those who felt positively about the film footage liked it very much, and their opinions were similar to the responses from the front-end evaluations: they appreciated this humanizing element that contrasted with the rest of the CGI in the show. At the other extreme, those who did not like the live footage were taken aback by the size of the human figures in the dome, and complained about the camera getting too close to them (Donelan 2005). To some DMNS staff, there was also a marked contrast between the live footage compared to the rest of the show. Despite being scanned from a 35 mm film print, the lower resolution of the live footage—especially after re-scaling—stood out from the scientific visualizations.

These comments suggest changes for future use of live footage. In some cases, the 35 mm footage did not have sufficient resolution when blown up and re-scaled from 4k dome masters and shown inside the Gates Planetarium. For a future full-dome production, 70 mm film footage would be able to match the visual quality between the CG and live footage. The larger format also means that fisheye shots should be imaged as circular frames within the negative, therefore removing the need for paint work to replace truncated areas of the image.

There are downsides to a 70 mm shoot, most obviously in the cost increase in equipment rentals, film stock, and development. Because the cameras are larger and bulkier, the shots are often not as mobile and flexible as can be achieved with a 35 mm camera. Along with a larger production budget, there may also be less willingness to experiment, resulting in more conservative shot choices given the larger stakes involved.

Additional training may be useful for the camera operator. The cameraman for *BH* had

two preparatory sessions to become familiar with the camera and lens, during which he shot short test sequences. This was not enough, since for certain shots he resorted back to the camera techniques that he was familiar with. This is not unexpected, since few cameramen are expected to have any experience with fisheye lenses and there is no great need for fisheye shots in current film or videography, or even for fulldome productions.

Furthermore, holding the camera for hand-held shots is extraordinarily awkward. Getting the horizon to look right is difficult, given that the camera has to be tilted up high to pull the horizon to the bottom of the frame. Getting the right shot is made even harder if conditions are dynamic and changing. Until a fundamental re-design is made that allows a 35 mm or HD camera to be carried on one's shoulder with the camera axis pointed up, any hand-held shot will require post-production fixes.

Although this paper has so far focused on complications involving live footage, what of the general production pipeline? What are the lessons learned from this process, and

how can it be improved for future fulldome show production at DMNS?

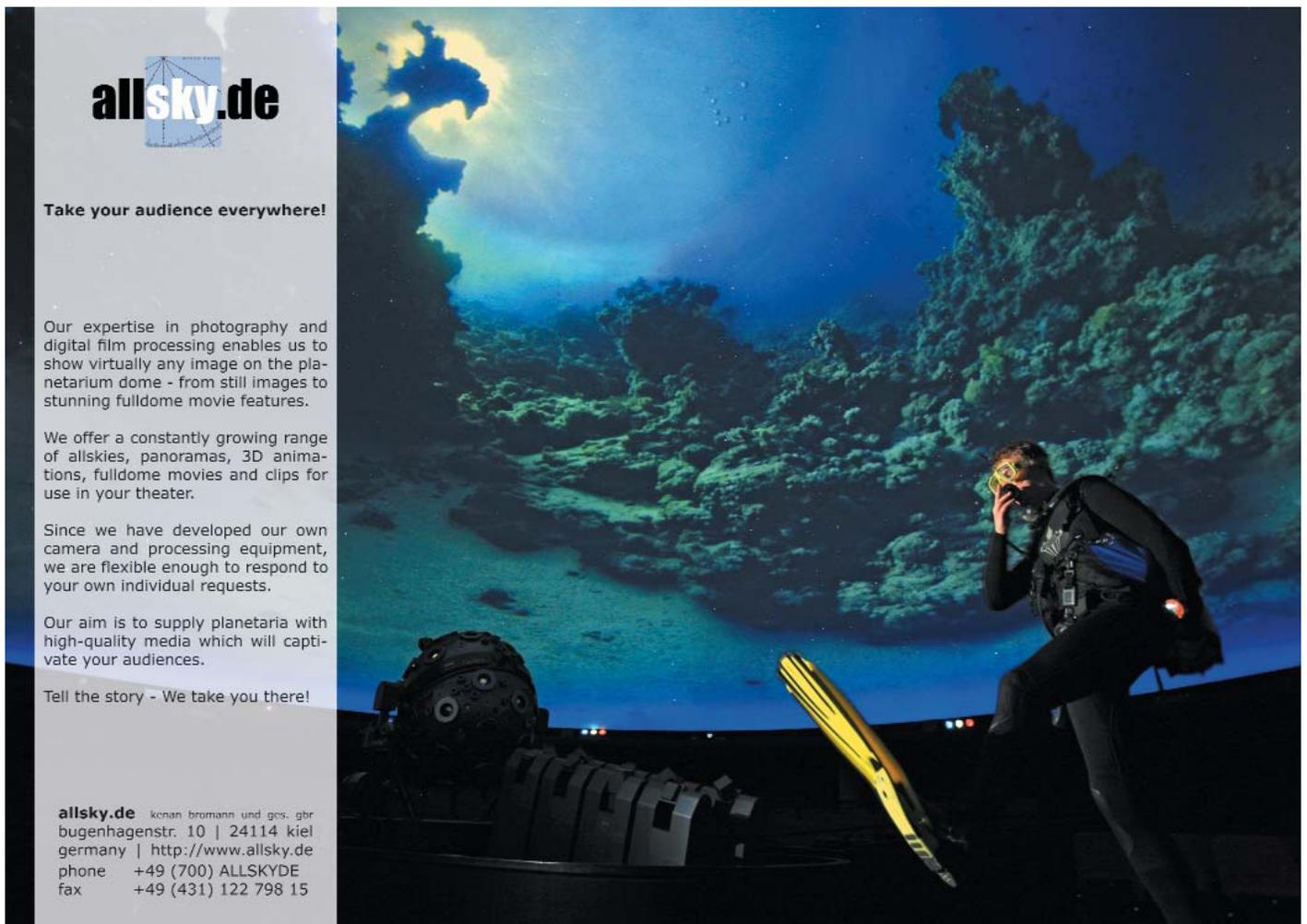
#### • Dailies

Because of the considerable work required to view dome master sequences on the Gates Planetarium dome, the process of reviewing dailies required considerable offline effort by the production staff, regardless of whether live or CG content was being previewed. The steps included splitting the dome masters into 11 separate file sequences, which took the longest time, followed by conversion into the QuVIS file format, and then uploading to the playback units. Because of the size of the 4096 x 4096 full-resolution dome masters, many fine details were difficult to see on a desktop monitor and were only noticed when they were up on the dome. The size of the full resolution dome masters meant that the 4k files took 5-30 seconds to load per frame into After Effects. This precluded the full-resolution images from being played back at full motion speeds from the After Effects workstation. Only the dome display could be used to see the full resolution film at normal speed.

For a future fulldome production, watching dailies would be far easier if the same set of machines were used to process the files as the ones used as image generators for the projectors. Although there would still be a need for converting the frames to a compressed media file, this would not be a multi-step operation involving networked machines. A prototypical solution would be a hardware rack like the SEOS Media Server that can play back pre-rendered movies as well as be configured to provide real-time image generation.

An even more important advance would be the ability to watch dailies offline on a single workstation. This would be used to judge overall composition and timing and not to look at fine detail, which would require the full resolution dome masters. In such cases, the ability to know where content will appear in the real dome is imperative. Thus a dome master previewer with a scrubbable timeline should also have the ability to overlay the dome evaluation grids. At the time of production for *BH*, it was not possible to view large 1024 x 1024 uncom-

(Please see *Live Action* on page 86)

The advertisement is split into two main sections. On the left is a white text box with the 'allsky.de' logo at the top, which includes a stylized globe icon. Below the logo, the text reads: 'Take your audience everywhere!', 'Our expertise in photography and digital film processing enables us to show virtually any image on the planetarium dome - from still images to stunning fulldome movie features.', 'We offer a constantly growing range of allskies, panoramas, 3D animations, fulldome movies and clips for use in your theater.', 'Since we have developed our own camera and processing equipment, we are flexible enough to respond to your own individual requests.', 'Our aim is to supply planetaria with high-quality media which will captivate your audiences.', and 'Tell the story - We take you there!'. At the bottom of the text box is contact information: 'allsky.de kenan bromann und ges. gbr', 'bugenhagenstr. 10 | 24114 kiel germany | http://www.allsky.de', 'phone +49 (700) ALLSKYDE', and 'fax +49 (431) 122 798 15'. On the right is a large photograph of a person in a dark wetsuit and scuba gear, sitting on a ledge and looking through a yellow-tinted viewfinder. The background is a vast, curved dome screen displaying a vibrant, colorful underwater scene with coral reefs and a bright light source, possibly the sun or moon, breaking through the water's surface.

# Bakersfield College:

## A first-person adventure in planetarium upgrades

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The installation of seats by American Seating at the end of May 2006 marked the completion of the long-awaited remodel of the William M. Thomas Planetarium at Bakersfield College, part of the Kern Community College District in Bakersfield, California USA. We went from a 7.3 m (24 ft) planetarium that had served Kern County for over 40 years to an expanded and modernized 11 m (36 ft) planetarium that will serve for many more years to come.

Planning for a new planetarium began soon after I came to Bakersfield College in 1996. At first I investigated simply refurbishing the Spitz A3P that had been installed in 1962 and adding some sort of automation to it. In 2000, however, I began having lunch meetings with professors in my department and the Math Department who wanted to build a science center. One of the professors mentioned the idea to the college president. Sometime during that year the college president's spouse visited the Downing Planetarium a couple of hours north of us in Fresno and came home really excited, so our project moved up the college priority list.

### The Science Center Dream

The college's recently-hired director of Institutional Development began meeting with our group in late 2000. Our dream was to build a science center on campus with a new planetarium as the centerpiece and earth science exhibits surrounding it. One member of the Bakersfield Board of Trustees had been chief assistant to our long-time congressional representative, Bill Thomas, and approached Thomas about getting a

state earmark for the project.

In January 2002, while still on winter break at my parents' place in Oregon, I received a phone call from my excited dean with news of a congressional earmark to the tune of \$1 million for the project. Well, that was very good news to share with my family! That also put the science center planning into a higher gear. We visited other planetariums and science centers to find out what



Nick Strobel

**Abstract: The Bakersfield College Planetarium upgrade project was finished at the end of May 2006. This article describes the history of the project and the reasoning for the decision to go with a GOTO Chronos and Spitz SciDome.**

worked well and what did not. We were planning to use the congressional earmark as a starting point for a nearly \$9 million science center that was still at least five years (and probably closer to ten years) into the future.

In the meantime, something would need to be done with the current planetarium because some systems would need to be replaced before then, and we also wanted to give the public a hint of what was possible with a newer facility. In late 2002 the team decided to use approximately \$55,000 of the earmark to change the Spitz lumiline cove lighting to an LED system and add an audio system and A3P automation, all from East Coast Control Systems. The lighting and audio (with some augmentation) could be transferred to the new planetarium.

A science center brochure and video were

created and plans were underway for the hiring of a science center director. I wrote a white paper on why a science center was needed in Kern County, for both economic and educational benefits.

### The Dream Changes

By the summer of 2003, however, the college's budget situation was pretty grim because of the sour California economy and the college administration pulled back on the science center. We were informed of this decision at the beginning of the fall semester. What a blow! It was decided that the rest of the earmark would be used to upgrade the current planetarium—approximately \$750,000 remained after other expenses were paid. The rest of the faculty on the science center team

pulled out of the project because now it was just a planetarium job. For the next year I got quotes from a number of vendors as I tried to figure out how I would upgrade the old planetarium with the remaining funds. Fortunately, I wouldn't have to use the earmark funds for building demolition and construction; that would come from a local bond issue recently passed by in Kern County. However, I would still have to come up with some idea of how to modify the current space to give the architect something to work with. By late May 2004 I had developed the specifications list that would be used in calls for bids on the equipment.

I wanted an opticalmechanical star projector for a beautiful, crisp star field, and an all-dome video system using a single projector for a seamless image. For the opticalmechanical star projector, I went with the Chronos

from GOTO. I first saw the Chronos at IPS 2002 in Wichita, but I wanted to see it in action so I visited Young Harris College in Georgia, where Kent Montgomery was happy to show off his year-old machine.

I also considered the Zeiss ZKP-3 projector and took a trip down to Victor Valley College before Scott Bryan retired in 2001. Both projectors are very nice machines and both Kent and Scott were pleased with their projectors.

### The Factors in the End

There were two factors that favored the Chronos over the ZKP-3 in the end. The first significant factor was the Chronos' digital control of the planets that was tried and true in a real installation. At the time of the bidding (end of June 2004), the Zeiss ZKP-4 with digital planet control had not come out or would not be ready to install at the time given in our original timeline. The second significant factor was that the cost of the Chronos was lower than the Zeiss ZKP-3/4 with the features we wanted. An extra bonus is that the star field from the Chronos was just as crisp as from the ZKP-3 as star measurements on the dome at several installations showed, but star sizes was not a criterion in picking one machine over the other.

For the all-dome video system, I wanted a single projector system that would work for a 36-ft dome. The system had to enable viewers to fly through the solar system, galaxy, and beyond using a simple input device like a computer mouse or joystick. While the multi-projector all-dome video systems are quite impressive, they are also beyond the budget of a small planetarium to purchase and hire qualified staff to maintain the hardware. I also have been to major planetariums with huge budgets and staff running multi-projector all-dome video systems and I could see unevenness in the dome image—one projector would have a grayer black than the one next to it, for example, or the planet image would shift as the planet moved from one projector to the next. If the “big guys” could not get that right, I had no hope of being able to do it right with a single person working only 20% of his job at the planetarium and no training in aligning projectors, edge-blending, etc.

The two single-projector systems that I had seen in action were the Evans and Sutherland Digistar 3 Junior (now “3SP”) and the Spitz SciDome. The Digistar 3 Junior is for domes up to 9.1 m (30 ft), so that left the Spitz SciDome as the system that could project a bright enough image for domes up to 12.2 m (40 ft). The SciDome uses a special version of Imaginova's Starry Night for display onto a hemispherical surface (instead of a flat 4x3 aspect ratio computer screen). Starry Night Dome has a very intuitive interface that mimics the computer desktop version with some special manual star projector controls. When the SciDome is being used, I lower the Chronos into the pit.

I decided to get the Spitz ATM4 automation system to control the Chronos, SciDome, cove lights and audio system, despite the hefty fee for the integration of the Chronos with ATM4. In conjunction with ATM4, I also opted to get the Spitz Nomad remote control unit so I could control most of the show from up front.

That left the seating. I wanted individual, unidirectional seats all comfortably under the dome so even the people on the outer edge would have a good view. I went with the American Seating Company, primarily because they have a special pricing arrangement with the state of California, and because they are comfortable.

### The Project: Too Small?

The remodeling of the surrounding building took longer than originally planned. We eventually went out for bid in May of 2005, a year after the equipment bids. Ironically, the main reason for the delay was the supercharged housing construction boom in California. The size of our project was too small for contractors to put up with the many regulations required of a California educational institution project. We might have had an easier time if the project was at least \$10 million, but at less than \$1 million, the extra cost of compliance and verification would be too great a percentage of the total cost. It's a strange sort of economic logic, but there you have it!

The final bid for the building remodel came in at around \$1.2 million. Yes, “bid” is singular. The administration decided to go

with the single bid because it was unlikely that the situation would be better a year later and it would probably cost even more then. Demolition and asbestos abatement began the first week of June 2005 and enough was finished by mid-March 2006 for the installation of the Spitz 11 m (36 ft) powder-coated premium-seam dome.

In our new floorplan, people enter through double doors at the northeast corner (the front of the room is to the south). The doors lock automatically so the console operator does not have to worry about stragglers barging in and ruining everyone else's dark adaptation. The console operator, at the back, is not directly under the dome, but can still see the front sufficiently well to work on the shows from there.

### Showing Constellation Outlines

Something that is unconventional is how I display the constellations as part of my overall show. Instead of superimposing a picture of the character or object on the appropriate stars on the dome, I display the picture on large monitors just below the springline while I slowly outline where the picture would be among the stars. I do this because it provides a more realistic “star-gazing experience”—the pictures do not actually appear in the sky and one has to make a mental transfer from a picture to the sky; and because the pictures that came with both the Chronos and Starry Night Dome are the classical, ornate images. I have a hard time distinguishing the parts of some, and an even harder time getting the picture to match the star patterns. In constellation tours I have experienced at other planetariums, the audience oohs and aahs when the picture appears on the dome's stars, but I believe that's it. In my constellation tour, I think a more permanent mental connection is made for the audience because they have to make a mental effort to place the picture onto the sky. People seem to be very willing to make the effort! More often than not, I will have people exclaim out loud “Oh, now I see it!” Of course, even better would be to distribute starcharts with red flashlights and allow the audience to go on their own tour of the sky. That would work if I had a lot more time with the sky tour and it was the entire show.



A panoramic view of the Bakersfield Planetarium showing the new Chronos projector and SciDome in the center. All photos by the author.

## DIGITAL PLANETARIUM, THE SHINING STAR OF HARTNELL COLLEGE

When the J. Frederic Ching Planetarium at Hartnell College in Salinas, California, decided to replace their 40 year old Spitz A3P with a Konica Minolta Mediaglobe, they considered the risks. Would attendance increase? Would the presentations be more effective? Would the technology remain relevant? Would the audiences love it? "Now after 28 months in operation with the Mediaglobe, the definitive answer is YES!" exclaims Planetarium Director Andy Newton.

Dr. Pimol Moth, a former research Astronomer who now teaches at the College states, "In order to effectively teach Astronomy, it is necessary to have a tool that demonstrates astronomical concepts, displays astronomical photos and movies in a captivating way. My stu-

dents are so much more engaged in astronomy now with the Mediaglobe than they are in a traditional classroom."

"It's hard to believe how the Mediaglobe has created so many diverse uses for the Planetarium", says Newton. "Students in the multi-media program show their works in the Planetarium through the Mediaglobe. For their final exam, the electronic music students compose a piece of music which is played in the Planetarium accompanied by Mediaglobe visuals. We have had jazz concerts, plays, poetry readings, fund raising events, board meetings, corporate and birthday parties among other things in the Planetarium - all which have made it easy to get show sponsorships," said Newton.

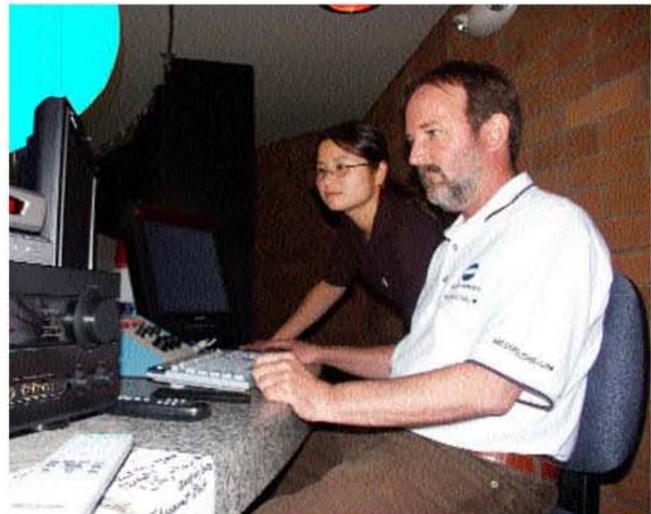
The best overall thing for me," says Newton, "is with the Mediaglobe the Planetarium

can practically run itself. For small Planetariums with limited staff this is huge. With the ease of operation, you can bring in and train multiple presenters. This has bought me more time out of the Planetarium to work in developmental areas that benefit the Planetarium, our academic science programs and the College at large."

"Andy has used his extra time to help secure a substantial amount of outside funding from NASA and NSF grants and the private sector that have provided significant opportunities for our students, faculty and institution at large. The choice to go digital with the Mediaglobe played a big role in that," says College President, Edward J. Valeau.



*Dr. Pimol Moth (Left) and Andy Newton*



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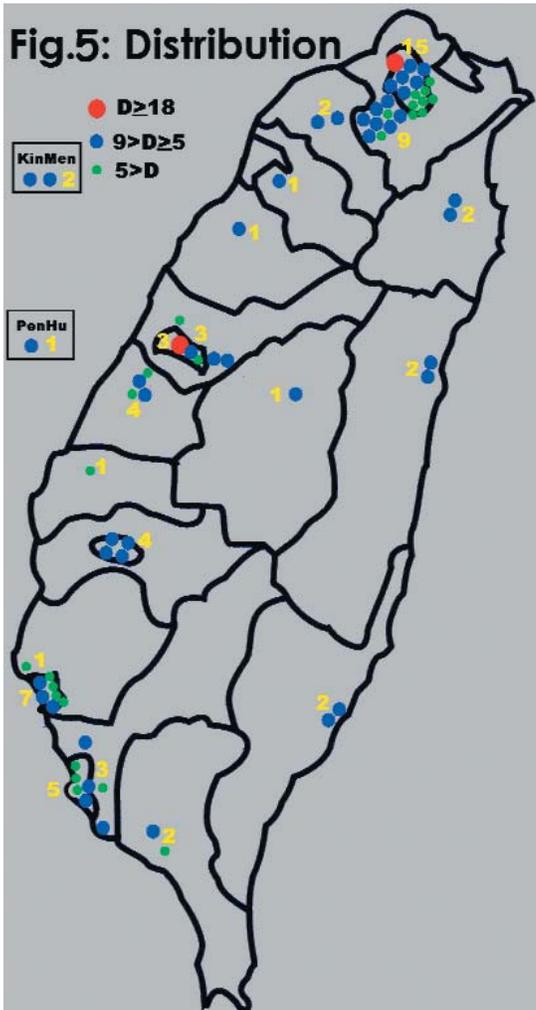
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<http://konicaminolta.com/kmpl/hard/mediaglobe.html>

# The Planetariums in Taiwan

Chilong Lin

National Museum of Natural Science  
1, Kuan Chien RD, Taichung, 404 Taiwan (ROC)  
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The "dumbbell shape of the distribution of planetariums in Taiwan. All graphics by the author.

The first planetarium in Taiwan appeared on the stage in 1957 (NTSM 1957). It was a Spitz A-1 (8m) donated by the Tsinghua Alumni Association of North America and installed at the National Taiwan Science Museum (now called the National Taiwan Science Education Center, NTSEC) in Taipei. Soon after its installation, the ROC Naval Academy also installed a Spitz A-2 for astronaut training in 1958 (Lin 2006).

Just like many allied countries of the United States during the Cold War, the development of planetariums in Taiwan followed a similar post-Sputnik trajectory. After

the launch of the Soviet Sputnik satellite on 4 October 1957, the US was seriously embarrassed and soon decided to reform the nation's science education. Many planetariums were founded in the next few years (Marche' 2001). Within about a decade, the number of planetariums in the US grew, almost 10 times more in the early 1970s than in the late 1950s (Herrman 1992). Taiwan followed the US and soon installed the first two Spitz planetariums.

## Rapid Growth Since 1980s

The number of planetariums in Taiwan has grown rapidly since the 1980s. The increasing of the education budget is an indication of the progressing economic situation and the education policy of Taiwan. Many school-owned planetariums in Taiwan were established in this way.

In 1978, the Lo-Tung Primary School built a 6m dome for a GOTO GE-6. It was the first planetarium installed in a primary school. It was donated by parents of the school kids and local sponsors from neighboring communities. In 1980, the Taipei Municipal Yuan-San Observatory installed a 16m GOTO GM. It was the first mid-sized planetarium in Taiwan and was retired in 2000. In 1986, a 23m GOTO GSS-I was installed at the National Museum of Natural Science (NMNS), Taichung. It's the first large planetarium in Taiwan and is still under operation; we plan to keep it working for at least one more decade.

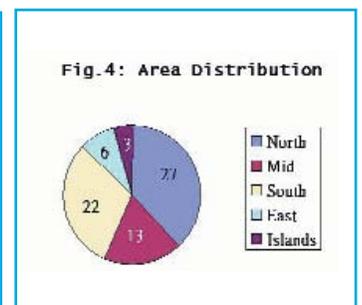
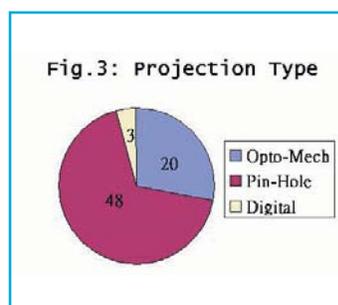
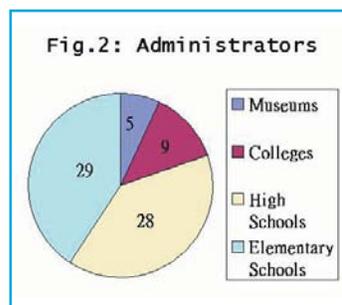
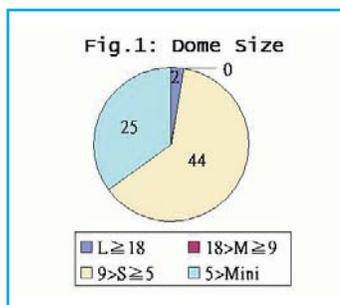
The largest planetarium in Taiwan now is the 25m Zeiss VI-TD installed at Taipei Astronomical Museum (TAM) when it was elevated from the Yuan-San Observatory and moved to a new site in 1997. In 2003, the Taipei Municipal Nan-Hu Elementary School installed a Minolta Medialogbe in their 5m dome and started the digital era of planetariums in Taiwan.

## Fundamental Information

In the past few years, we have done a survey for the planetariums in Taiwan. The data of 76 planetariums were collected and we found 71 of them are still in use and five are retired. A directory of the 71 existing planetariums has been submitted to the *IPS Directory of the World's Planetariums*.

Among the 71 existing planetariums, two of them are larger than 18m, 44 of them are between 5-9m and 25 are less than 5m. Most of them are managed by public museums, culture centers, and schools. Only one of them is built and managed by a private school.

Among the 71 planetariums, 48 are "pin-hole" projectors with dome diameter  $D < 6m$ , 20 of them are optomechanical projectors with  $D > 5m$ , and 3 are digital projectors with  $D \leq 5m$ . But I figure that the digital or the "traditional + digital" planetariums will increase rapidly in the near future. For planetariums with  $D \geq 5m$ , the digital projector could be treated as an attached multimedia equipment to show dynamic sky or animation programs. While for planetariums with  $D < 5m$ , the digital projector could play all roles itself without the need of any traditional,



**Abstract:** It has been 50 years since the establishment of Taiwan's first planetarium. In this report, I would like to review the development of Taiwan's planetariums in these past 50 years and introduce the status of them. In the past few years we have done a survey for the planetariums in Taiwan and the fundamental information of 76 planetariums, 71 of them still in use, was collected. Their status will be analyzed in this article.

optomechanical, or pin-hole planetariums. So I expect it will follow the fast progressing of computer technology and be applied widely and rapidly. Maybe it will take over the market of all pin-hole planetariums soon.

### Distribution

I learned from our survey that Taiwan's planetariums distribute like a "dumbbell," which indicates that most of the planetariums are distributed in northern (27) and southern (22) Taiwan. Furthermore, 24 out of the 27 planetariums in northern Taiwan are concentrated in Taipei city and county. This indicates a serious bias of the allotment of Taiwan's education resource. However, there is a large and public planetarium in mid-Taiwan, the 23m GSS-I of NMNS, which may make up for the disadvantage of the quantity.

In southern Taiwan, all planetariums are  $D < 9m$  and none of them are fully open to the public. Thus a large—or at least a mid-sized, public planetarium—seems to be in great demand for southern Taiwan. Besides, unlike the concentration in northern Taiwan, the planetariums in southern Taiwan are spread quite equally in several cities. The readers may see it from Figure 5.

I also tried to analyze the resource allotment problem in some other ways: the Population/Planetarium (P/P) ratio or the Population/m<sup>2</sup> (P/m<sup>2</sup>) ratio. The P/P ratio divides the local population by the number of planetariums in that area directly, which means "how many people share one planetarium." In Figure 6, we can see that almost 440k people share one planetarium in mid-Taiwan, while it is only about 58k people per one for the islands.

Nevertheless, the P/P ratio may not present the problem properly since we can not read the information of the size of planetariums from it. That's why I would also suggest the P/m<sup>2</sup> ratio to present the other face. The meaning of P/m<sup>2</sup> ratio is "how many people share one square meter area of the planetariums." Combining figures 6 and 7, it is easy to find out that southern Taiwan needs large public planetariums, while mid-Taiwan needs some more small planetariums. I hope

this analysis will be helpful to the future resource allotment.

### The Manufactures

In our survey, we also noticed an interesting phenomenon: that 87.3% of Taiwan's planetariums are using the products of GOTO Optical Corporation of Japan. Totally, 95.8% of Taiwan's planetariums are using Japanese products. Such a large market occupation rate may due to three major factors: the "distance" factor, the "language" factor and the "agent" factor.

1. The distance between Taiwan and Japan is much shorter than between Taiwan and the United States or Germany. This reduces a lot not only the traveling time but also the cost. When needed, Japan technicians can fly to Taiwan, complete the emergency maintenance, and then fly back within 24 hours. In the meanwhile, US or German technicians may still be on their flight to Taiwan.
2. Since Taiwan was occupied by Japan between 1895 and 1945, many senior persons in Taiwan can speak and read Japanese very well. Since the beginning of 1980s, Taiwan built many public and educational planetariums. Those persons who were in charge of these projects more or less have accepted Japanese education. They can communicate with the technicians and read the documents in Japanese easily. That's why they tended to choose Japanese products instead of others.
3. Regarding to the "agent" factor, it is interesting to know that only the agent of GOTO is active in Taiwan. The potential customers can easily contact with GOTO's local agency and communicate with the sales representatives face to face in such local languages as Mandarin or Taiwanese. While for the other manufactures, either in US or Germany, the customers here feel uneasy since they have to deal with the manufactures directly without any assistance. This brings the 87.3% occupation rate of GOTO products in Taiwan. During our survey, the Nick Entertainment Co.,

Fig.6: The P/P Ratio

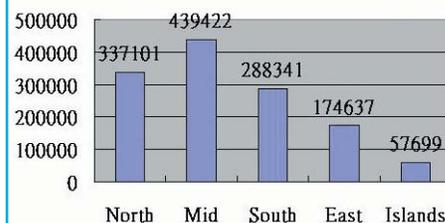


Fig.7: P/m<sup>2</sup> Ratio

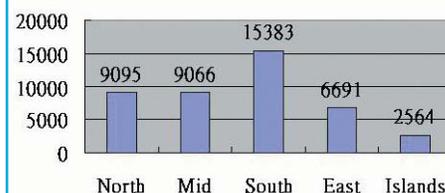


Fig.8: MANUFACTURE

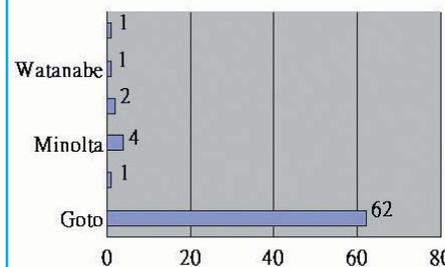
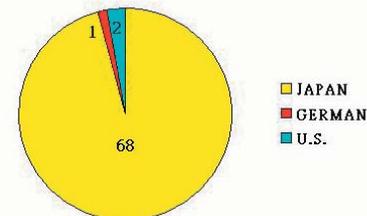


Fig.9: Country of Manufactures



GOTO's agent in Taiwan, provided us a list of their customers. It includes almost 60 planetariums among the 71 existing ones. That is the most helpful information we have got.

### Conclusion and Discussions

Surveying the planetariums and collecting

(Please see *Taiwan* on page 24)

# What's SLOOH With You?

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Disclaimer: Before I delve into the niceties of using SLOOH in the planetarium, I feel compelled to mention that I have an on-going relationship with the company. I'll get to the nature of that relationship a bit later.

## SLOOH: An Online Experience

SLOOH, which gets its name from a play on the word "slew," currently operates two telescopes at the Observatory of Teide (OT) on the Canary Islands. The Canary Islands, a territory of Spain, are located in the Eastern Atlantic, 100 miles off the coast of Morocco. The island of Tenerife hosts a dormant volcano named Teide, the peak of which is the highest point on any island in the Atlantic Ocean. OT is located on a foothill of Teide and is run by the Institute of Astrophysics of the Canary Islands (IAC), a consortium of governments led by Spain. The OT comprises over 40 major telescopes and is Europe's leading observatory site. Numerous advanced astronomical research projects use data gathered at OT. At an altitude of 2340 meters, the site is photometrically clear approximately 90% of the time in the summer and 50% in the winter; seeing is usually better than 2 arc-seconds. The site also has the benefit of being dark 4 to 8 hours ahead of North America, timing that is ideal for planetariums here.

The fully robotic SLOOH Observatory is

housed in two 10-foot diameter fiberglass domes. Each dome contains a Bisque Paramount ME mount, a Celestron C-14 SCT, and a piggybacked refractor. On each C-14 is a SBIG ST-10 CCD camera, and on each refractor is a SBIG ST-2000 ABG CCD camera. The piggybacking allows for concurrent observations of any object at different scales. Each of the four instruments includes an

ment, and other steps. The raw image data produced by the cameras is in FITS format. The image processing can produce FITS, but JPEG format is used to encode end-user-ready images that transmit quickly over bandwidth-limited connections.

The CCD chips used by SLOOH produce monochrome data. The first exposure produced in each mission is rendered as a

**Abstract: What is SLOOH? It is the only internet provider of near-real-time deep sky observation. It observes the Moon, planets, galaxies, nebulae, clusters, comets, minor planets, and more. It was designed to serve individuals, families, and schools. It requires no astronomical knowledge to use, but it still appeals to experienced observers and has an obvious application in the planetarium field. That's SLOOH.**

LRGB filter wheel and electronic focuser. In addition, there is an all-sky camera between the domes that provides nighttime views of the weather.

The observatory software performs automated image processing. SLOOH is the first and only system that automatically processes color deep-sky images in near real time. The image processor handles frame alignment, color combination, contrast adjust-

ment, and other steps. The raw image data produced by the cameras is in FITS format. The image processing can produce FITS, but JPEG format is used to encode end-user-ready images that transmit quickly over bandwidth-limited connections. The CCD chips used by SLOOH produce monochrome data. The first exposure produced in each mission is rendered as a grayscale image that is quickly transmitted to users. Then more images are gathered using color filters and a color image can be transmitted, followed by luminance images and more detailed color images. All the observatory control and image generation happens in real time within the span of each 5-minute mission. According to the folks at SLOOH, no other system in the world can do this.



Left: Jupiter and some of its moons; Above: The Pleiades in full color; and Right: The Whirlpool galaxy in high detail are examples of the image processing done with SLOOH. All images provided by author and courtesy of [www.slooh.com](http://www.slooh.com).

## And Internet Radio

Each night at 1:00 UT, SLOOH hosts one of several in-house produced, astronomy-themed internet radio programs. An mp3-quality stream broadcasts from the astronomers to users. The astronomers, like David Levy, Phil Harrington and Bob Berman, describe the events of each mission and answer questions submitted in a dedicated online chat area. And here's where I come in: every Friday evening I co-host The Event Horizon with NASA/JPL Solar System Ambassador M. Scott Foerster. Unlike the other programs, our show is less formal and relies more on open debate than the images on SLOOH while also featuring a call-in segment using Skype.

The Cranbrook Planetarium recently upgraded to a Digistar 3 and adding content is incredibly simple. Rudimentary knowledge of Photoshop and a connection to the internet are really all that is needed to add dazzling, awe-inspiring content. In the early going, we decided to add an element of distinctiveness by employing SLOOH imagery in our live sky shows. So far we've used SLOOH in two particular modes. The first is to capture images from SLOOH ahead of time and simply "plug" them into the show later on. The second method, I think, is more interesting as it utilizes the live nature of SLOOH by scheduling "missions" that are viewed, in real-time, during each program. Each mission observes a specified target, like the Pleiades

At the beginning of each mission, the

mount slews to the target. Then the cameras, focusers, and filter wheels are used to produce a sequence of images. By carefully scheduling missions ahead of time, our planetarium can augment each show with real-time images as they're being taken.

## SLOOH in the Planetarium

You may wonder if this means that the entire world is subject to the whims of the staff at Cranbrook.

That would be nice, wouldn't it? Sadly, it isn't so. Each night one of SLOOH's two domes is assigned to an "Editor Channel" and the other dome is assigned to a "Member Channel." On the "Editor Channel," SLOOH automatically schedules missions from dusk until dawn (typically over 100 missions per night). The missions are selected from a set of 250 popular astronomical objects in the database. The scheduling software basically follows a "Messier Marathon" strategy of observing progressively up from the western horizon after sunset, then progressively down towards the eastern horizon nearing dawn. On the "Member Channel," the user is able to block out time to view specific tar-



The SLOOH computer interface.

gets, either based on name or right angle/declination.

SLOOH is obviously not restricted for use by digital planetariums. In fact, any planetarium capable of connecting a PC to the internet and projecting onto their dome can make use of this resource. Additionally, you can save any of the images you take for use later! Is this a replacement for those stunning HST images that are so readily available? Hardly. But SLOOH does give live-sky shows an interesting new element and also gives the planetarium show producer a new resource for generating show content.

If interested, anyone can sign up for a free seven-day trial at [www.slooh.com](http://www.slooh.com). ☆

(*Taiwan, continued from page 22*)

their information is just the first step of our work. Owing to the long disregard of astronomy science in Taiwan, the study of the planetarium is also very scanty. At the beginning of our research in 2000, most of the planetariums were isolated from others and only 31 of them were recorded (TAM 2001). Besides, the correlations among these planetariums were weak. We made a survey for the ignored planetariums and invited their staffs to a workshop at NMNS in 2002. Now we have 71 existing and 5 retired planetariums within our directory.

In our research we found that the human resource is the problem that bothers planetariums most. At the beginning of our research, almost all staffs of the planetariums, except the TAM, came from untrained teachers, technicians, and employees. Many of them can recognize only the Sun and the Moon before they came to their positions. Therefore, they are eager for participating in the training camps or workshops which may

increase their knowledge about astronomy and help them learn how to teach.

Fortunately, the attendees of the workshop in 2002 have got a common consensus of the importance of the human resource. Many of recently established planetariums have assigned experienced teachers to follow the preparation works and to manage the planetariums. This is a positive progress in Taiwan's planetarium education.

There is still a lot of work that has to be done. In the future, we expect that there will be regular training camps and workshops held for the planetarium staffs so they may share their experiences and exchange their ideas with others.

Another important task is to reform the resource allotment. Some public, mid-sized planetariums are now under discussion in southern Taiwan. No matter where they will be located finally, this will make up for the shortage of public planetarium in that area. Although the number of planetariums in mid-Taiwan is increasing, it is still a long way before reaching maturity.

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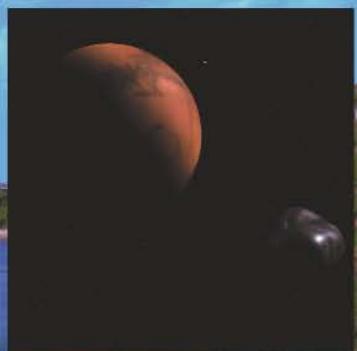
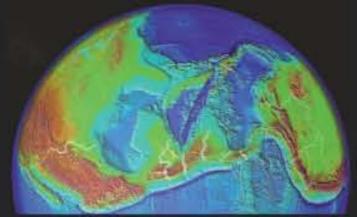
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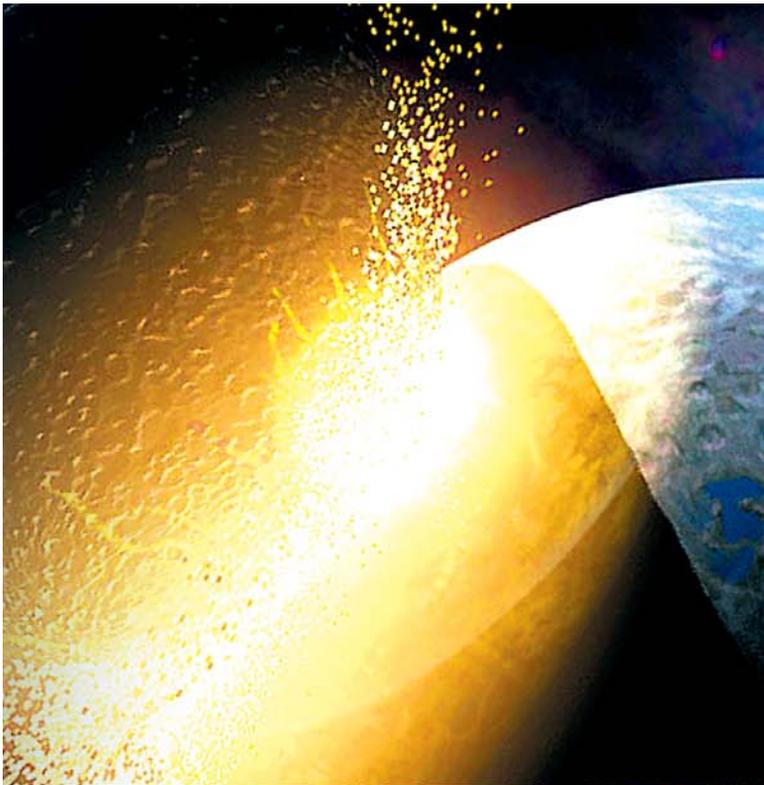
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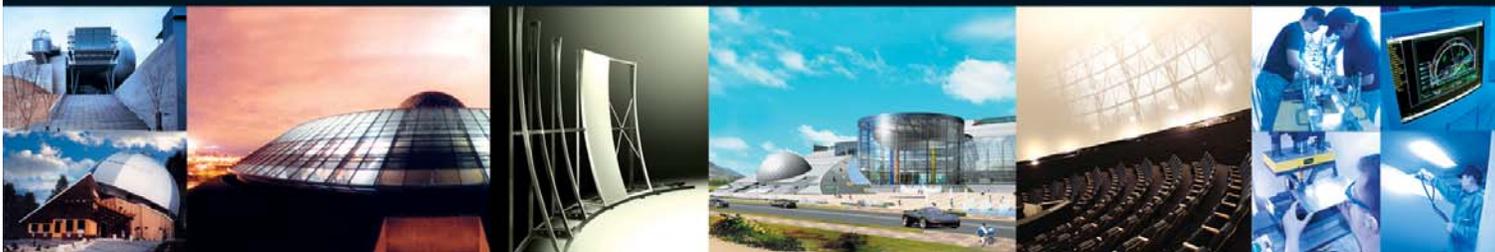
Planet photography courtesy of Evans & Sutherland Computer Corporation.

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## 2007 IPS/Eugenides Foundation Scriptwriting Competition

Steve Tidey  
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stevetidey@hotmail.co.uk

Picture the scene. Your June 2006 issue of *Planetarian* arrives. You skip past that odd little Forum column edited by that crazy Brit with the funny accent, Steve Tidey, and you read the *Astro-Quiz* script that won the last IPS/Eugenides scriptwriting competition. You think to yourself, OK, that was very good, but you know what? I could do just as well. Tell you what, why don't I wait for Steve to get round to launching the next competition, then I'll enter a script of my own. I heard there's a \$1000 prize for the winner and \$350 for the runner up.

Just think what I could do with \$1000:

a) buy a Centre Court ticket for Wimbledon on finals day (assuming it isn't raining that day);

b) I could book a room for one hour in the world's most expensive hotel room in Kuala Lumpur (but I'd need another \$23,000 to stay there the whole day and night); or

c) I could simply use it to pay my expenses for attending the IPS conference in Chicago in 2008.

OK, now it's Steve Tidey in person, so to speak. Please consider submitting a script; we all benefit when good scripts are written that can be shared amongst the whole planetarium community. As marvellous as the shows visuals are becoming these days, they don't mean anything without a decent script to accompany them.

Steve Tidey  
IPS Scriptwriting Competition  
Coordinator

The official release form appears on Page 45. Please copy as needed (no need to mutilate your issue of the *Planetarian*!)

### Competition Guidelines

#### I. General

A. **Scripts are requested for school shows only, on the subject of constellations. You can write about any aspect of constellations: factual, mythological, etc.. No other subjects, please. The target age group is 11-14.**

B. Any currently enrolled IPS member may enter one or more scripts.

C. The first and second prize scripts remain the author's property, but the IPS retains the right to publish them in *Planetarian*.

#### II. Contest Rules and Procedures

A. Previously submitted scripts or material published elsewhere are not allowed.

B. Writers should submit six (6) copies of each script to the contest coordinator: one copy for the Eugenides Foundation's files, one copy for IPS files, and one copy each for the three judges and the coordinator. A single electronic copy may be substituted for the hard copies, but a hard copy of the release form must still be mailed.

C. The contest coordinator will choose from the IPS Fellows three judges to mark each entry based on the criteria set out below, and the coordinator will then quantify the totals to determine the winners. The author's names will be kept anonymous from the judges.

D. Entries may be submitted between July 1 and December 31, 2007. Please mail scripts to: Steve Tidey, 58 Prince Avenue, Southend, Essex, SS2 6NN, England. Email entries should be sent to stevetidey@hotmail.co.uk The two winning authors will be recognised during the awards ceremony at the 2008 IPS conference in Chicago, where they will receive a certificate and prize money.

E. All scripts must conform to the following format:

1. A signed release form must accompany the script and appears on Page 45. A copy of the form is allowable.

2. Attach a cover page giving the script's title, author's name, institution, address, telephone/fax number, email address, and the number of pages. Do not put author's name on any other page.

3. Scripts should be written in English with directions for visuals (slides, panoramas, video clips, etc.) in the left-hand column and the narration in the right-hand column, typed or computer printed, double-spaced, with lines and pages numbered. Place a paragraph on page one that states the script's goals and purpose.

4. The length should be 25 minutes and include a 5-minute live segment, incorporate slides and/or video segments, pans, all skies, and basic star projector functions.

5. If the above requirements are not met, a script may be disqualified.

#### III Evaluative Criteria

In the assumption that the above criteria for submission have been met, the judges will evaluate each script based on: a clear writing style, factual accuracy, the correct use of grammar, originality in presentation and content, a maintained focus on the script's core topic, overall entertainment value, and, whether or not the script has achieved the author's stated goals.

#### IV Awards Categories and Values

A. First Place \$1000 (US)  
B. Second Place \$350 (US)

# In Touch With Ancient Observatory and Modern Planetarium in Beijing: IPS 2010

Jin Zhu, Director  
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 www.bjp.org.cn



At Left: The Great Wall, symbolizing China's ancient civilization, is one of the world's most renowned projects. Photo © Jennifer Bentley, iStockphoto.com. At Right: Beijing Planetarium, the new building and old building. Photo by Liu Hequn; this and the remainder of images provided by the author and used with permission.

Have you ever been to the Great Wall? Would you like to attend an IPS conference that includes having dinner in the 568-year-old Ancient Observatory and enjoying modern planetarium shows under a 40 MB resolution digital environment? Even if you have already been to Beijing and even to the Beijing Planetarium, I promise that if you come to Beijing Planetarium in 2010, you will be surprised to find out that Beijing has changed a lot and is much more beautiful than before.

As a planetarium with both an ancient observatory and a modern optical starball and digital projectors, Beijing Planetarium would like to invite you to "In Touch with Ancient Observatory and Modern Planetarium" at the Beijing Planetarium for IPS 2010.

## A Unique Combination

Beijing Planetarium is a quite suitable place for hosting an IPS conference, not only because of its unique combination of ancient observatory and modern planetarium, but also because of its extensive facilities.

The 18 m Universe digital theater with 200 seats in the new building of Beijing Planetarium was the first planetarium dome in the world with digital laser projectors. In the nearby original 23-m dome, the newly renovated theatre with about 500 seats is being equipped with a Zeiss Mark IX optical projector and a Sky-Skan definiti system. Using 6 Sony SXRD Xenon-powered projectors, the definiti system is the most advanced in the world with nearly 40 MB in pixel resolution and brightness of 30k lumens. It uses 10 bit color, expanding the gamma range far beyond any other contemporary system, and realizes razor-sharp resolution in real time and dome masters of 7.8k x 7.8k at 30 frames per second. The new Beijing Planetarium definiti system is due for completion in early 2008.

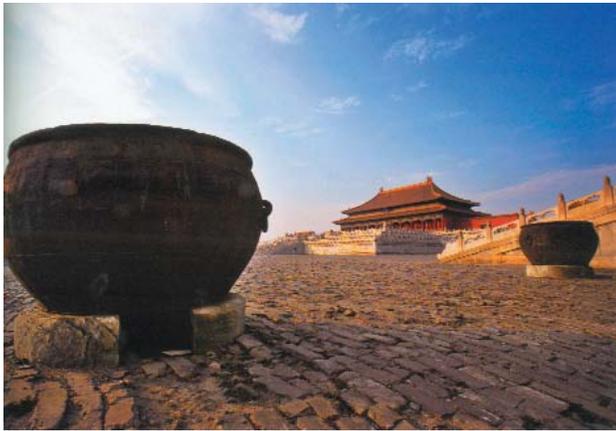
The two domes will provide an excellent environment for companies and planetariums to display their most up-to-date products and shows during the conference. The two regular exhibition halls in the old building, each about 400 square meters in area and 7 meters high, give good places for ven-

dor exhibitions. At least another 400 square meters of area in the new building could also be used for exhibitions.

It is expected that there will be great public interest in astronomy before and around 2010 in China. As the headquarters of the Popularization Working Committee of the Chinese Astronomical Society (Nanjing), Beijing Planetarium is responsible for the astronomical popularizations for the whole mainland part of the country. Some very important astronomical events are planned for the coming years. For example, space exploration in China is entering a new era of development. More and more Chinese are becoming interested in space and astronomy in these years.

The two total solar eclipses visible in China in 2008 and 2009 will surely attract many members of the general public to become interested in astronomy.

The year 2009 will be declared as the International Year of Astronomy by the United Nations. Beijing Planetarium is taking a very important part in the preparation of IYA2009 events for mainland China. We are



At Top: Beijing Friendship Hotel's Grand Building. Beijing Friendship Hotel is one of the largest garden-style hotels in Asia. Photo by Beijing Friendship Hotel. Bottom: The Forbidden City, also known as the Palace Museum. It is the largest and most well preserved imperial residence in China today. Photo by Li Shaiba

investigating the possibility of including astronomy as a normal middle school course in some cities and emphasizing the importance of planetariums in astronomy education. We are recommending that every middle-size city in China could have a large- or middle-size planetarium and every middle school in China could have its own middle- or small-size planetarium. It is expected that hundreds of new planetariums will be built in the next several years, and IPS 2010 in Beijing will greatly speed-up such a process in China, as well as in some other regions in Asia.

The Planetarium Working Committee within the structure of the Chinese Association of Natural Science Museums is under the Chinese Association of Science and Technology, which will locate in Beijing Planetarium and will organize and serve all different sizes of planetariums in China. We also suggest this committee as a new affiliate of IPS in China.

### Host Facilities: Beijing Planetarium

Beijing Planetarium, the first large-size planetarium in Asia, was opened on Sept. 29, 1957. The new building of Beijing

Planetarium was opened to the public on Dec. 12, 2004 and includes several exciting parts: digital space theater, 3D simulation theater, 4D theater, exhibition hall, solar observatory, public observatory, astronomical classroom, and more. The Digital Universe theater, which can seat 200, presents grand views of our night sky and feats of space adventures, projected by the world's most advanced digital laser projector, SGI visual workstation and ADLIP laser system. The 3D theater has 48 seats and the 4D theater has 196 seats. As a supplement for the Digital Universe theater, they can present an exciting feeling of motion and visual and audio spatial effects, enhancing experiences.

The public observatory is equipped with a 400 mm Schmidt-Cassegrain telescope, which can provide youngsters observation and educational practice and some research work.

There are about 3000 square meters of exhibition space within the new building, and about 2200 square meters of it has been used for relatively permanent exhibitions.

Beijing Ancient Observatory is a part of Beijing Planetarium and is located in another part of the city. It was first built in 1442 in the Ming Dynasty (1368-1644), and was the royal observatory in the Ming and Qing dynasties. It has 8 astronomical instruments made in the Qing Dynasty, and has successive observation records of nearly 500 years from the Ming Dynasty to 1929 AD. The 8 instruments were equipped with western technology and Chinese local art design, and they can show us the academic exchange between the western and eastern worlds and the magnificent western design. It is now a key national relic protection unit. Some description of the facilities in the new building and Beijing Ancient Observatory were published in the

March 2005 *Planetarium* (vol. 34, no. 1).

### Conference Site and Hotels

Currently there are two options for the conference site, either Beijing Planetarium itself or Beijing Friendship Hotel. Although it is very suitable for vendor shows and exhibitions, the current meeting rooms for academic conferences inside Beijing Planetarium may not be enough for participants over 450. Besides the three dome theaters with approximately 200, 200, and 500 seats, Beijing Planetarium has two standard classrooms which can hold 80-120 persons each, and there will be three more classrooms before IPS 2010 of similar size, located on the fifth and sixth floors of the new building. The opening ceremony could be arranged in the Peoples' Congress Hall near the country's famous Tian'anmen Square.

If participants number over 500 persons, Beijing Friendship Hotel will be chosen as the conference site. Beijing Friendship Hotel is one of the largest garden-style hotels in Asia. Located in the heart of the Zhongguancun High-Tech Zone, it's a 4-star hotel. It is about 5 km away from Beijing Planetarium. The Friendship Hotel was established in 1954 and covers a total area of 335,000 square meters of land in the capital city, of which 200,000 square meters are landscaped in the traditional Chinese garden style.

Within the hotel, there are various multi-function and meeting halls that can accommodate 16-1000 people from 37-500 square meters in size and conference rooms of different sizes, providing needs for any activities, such as business meetings and exhibitions. The equipment includes internet access, audio-visual equipment, automation equipment, slide projector, overhead projector, whiteboard, etc. The proposed cost of



Digital Space Theater of Beijing Planetarium. Photo by Liu Hequn



The Summer Palace: Characterized by its vast scope and rich cultural embodiments, it has become one of the most famous tourist sites in the world. Photo by Mei Sheng



The snow view of Beijing Ancient Observatory. It is about 14 meters high with 8 astronomical instruments made in Qing Dynasty. Photo by Liu Hequn

registration is \$300, including the banquet. There are several additional 4-star hotels (Xiyuan Hotel, Beijing Capital Xindadu Hotel, Debao Hotel) and one 5-star hotel (Hotel Nikko New Century Beijing) within walking distance of the Beijing Planetarium with accommodations for double/single rooms currently ranging from \$50 to \$120 (US) per night for one person.

### Conference Activities

The proposed dates for IPS 2010 are July 4-8. The conference agenda will follow the normal style of IPS conferences, including papers sessions, poster sessions, workshops and invited speakers, sub-group discussions, and exhibitions. We will invite local speakers, including a Chinese taikonaut and experts on ancient Chinese astronomy.

A digital planetarium show on ancient Chinese astronomy is being prepared for the year 2008/2009 by the Digital Studio of Beijing Planetarium, relating to the theme of our proposal to host the 2010 IPS conference in Beijing.

The agenda will feature a variety of excursions: not only visits to Beijing Planetarium and the Beijing Ancient Observatory, but also city attractions (one day for Temple of Heaven or Beihai Park, and the Houhai or Peking Opera, etc.; another day for the Great Wall, Ming Tombs and the Observatory). In addition, accompanying family members can visit the Forbidden City, the Summer Palace, Yonghe Palace, Capital Museum, and other tourist activities.

### Pre- and Post-Conference Tours

Tours before and after the conference will be arranged. One tour is to visit Xinglong Station of the National Astronomical Observatories of the Chinese Academy of Sciences and the famous Chengde summer villa; another tour is to Xi'an and Shanghai, the famous traditional and modern cities in China, including a visit to the World Expo 2010 in Shanghai. More tours could be introduced later if members are interested.

### Host City

Beijing lies in the north of the North China Plain, covering 16,807.8 square kilometers and having a registered population of 13 million. As the capital city of the People's Republic of China, Beijing is the nation's political and cultural center and also a center of international contacts.

First conceived and developed in Beijing (Peking), the Peking Opera has been performing for around 200 years. Like any other traditional opera, it tells stories through movement, singing, and elaborate dancing. Thus it is a graceful and consummate art which combines the best elements of literature, music, and dance. Peking Opera has become the important

and influential opera form for Chinese audiences and is now regarded as the quintessence of Chinese culture.

City attractions also include the Forbidden City, also known as the Palace Museum, the largest and most well preserved imperial residence in China today. The Great Wall symbolizes China's ancient civilization and is one of the world's most renowned projects. The Ming Tombs are found at a distance of 50 km northeast of Beijing, where stands an arc-shaped cluster of hills fronted by a small plain. Here is where 13 emperors of the Ming Dynasty (1368-1644 AD) were buried.

The Summer Palace is characterized by its vast scope and rich cultural embodiments, and it has become one of the most famous tourist sites in the world. The Temple of Heaven, one of the most strictly protected and preserved cultural heritage sites of China, served as an exclusive altar for Chinese monarchs during the Ming and Qing dynasties.

Beijing Cuisine mainly refers to Beijing local cuisine that is attributable to Shandong Cuisine, Imperial Court Cuisine, Imperial Official Cuisine, and other cuisines from different regions. Among them, Beijing Roast Duck, Hotpot, and Barbecue are most famous.

Beijing Planetarium is located in the northwest part of the city, about 27.5 km from the airport. You can easily take taxis in Beijing. Beijing will host the 2008 Olympics, and several new subway lines are under construction now. The subway to the airport will be finished June 2008, and a new subway station just in front of Beijing Planetarium is planned for September 2009. Two of the city's largest public transportation centers also located very near to Beijing Planetarium. We will keep you informed on our preparation at [www.ips2010.com](http://www.ips2010.com).

The city of Beijing is still making changes rapidly these years and so is the Beijing Planetarium. Please come and find the changes for yourself. We look forward to meeting you in IPS 2010 in Beijing! ☆



4D theater of Beijing Planetarium. Photo by Liu Hequn

# IPS 2010: Back to Alexandria

## 12-15 July 2010

Dr. Omar Fikry and Miss Mona El Madany  
Planetarium Science Center, Library of Alexandria  
P.O. Box 138  
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When we invite the International Planetarium Society to the city of Alexandria, Egypt in 2010 for its 20th conference, we are inviting IPS to participate in the revival of the spirit of the glorious ancient Library of Alexandria.

The ancient Library of Alexandria was a unique effort of the human intellect and imagination and remains engraved in the memories of all intellectuals and scientists to this day. The ancient Library has been a center of culture and civilization and a meeting place for various intellectuals and scientists from the east and west since its construction by Ptolemy III (246-221 BC). Scientists and thinkers used to visit the library to exchange their ideas as well as their scientific and literary expertise.

Since the launch of Bibliotheca Alexandrina in October 2002, serious efforts have been exerted to regain the spirit of its predecessor and to play a cultural role in both the local and international arenas. Every year, the Bibliotheca holds numerous conferences and workshops in various fields and specialties. Scientists and intellectuals, including Nobel laureates, enrich the ongoing cultural events and conferences that take

place at the Bibliotheca Alexandrina all year long.

### Bibliotheca Alexandrina

The building and location of the Bibliotheca Alexandrina are major assets on which we rely on in this proposal for hosting IPS 2010. Since its launch in 1972, the conference has met in Europe, America, Asia, and Australia, but has never met in the Middle East or Africa. We think that the IPS conference in Alexandria could greatly strengthen ties between IPS and planetariums in this part of the world and would be a wonderful opportunity to bring planetariums in our neighboring countries into IPS.

The Bibliotheca Alexandrina—[www.bibalex.org](http://www.bibalex.org)—a vast cultural complex rising on the shore of the Mediterranean, is an unparalleled Egyptian enterprise of international scope and ambition. It is the revival of the ancient Library of Alexandria that was a unique effort of the human intellect and imagination. In the digital age, the new Library of Alexandria has the ambition, embedded in its glorious past, to become the reference point in digital heritage and standards-setting for the third millennium, fully

anchored in the surrounding communities of Alexandria, Egypt, the Arab World, and the Mediterranean.

The beautiful building, with its decorative granite walls covered by the letters of all the world's alphabets, is already a recognizable landmark of the new Alexandria. Its internationally prized architecture and internal design truly have laid the foundation for the realization of the objectives of the new library. To fulfill the role, the new complex is much more than a library. It contains:

- A library that can hold millions of books;
- A center for the Internet and its archive;
- Six specialized libraries for audio-visual material, the visually impaired, children, the young, microforms, and rare books and special collections;
- Three museums for antiquities, manuscripts, and the history of science;
- A planetarium;
- An Exploratorium for children's exposure to science;
- Three permanent exhibitions;
- A conference center for thousands of persons;
- Seven research institutes covering



At Left: A view of the main building of the Library of Alexandria; Right: outside view of the Planetarium Science Center. All images provided by the Bibliotheca Alexandrina and used with permission.

manuscripts, documentation of heritage, calligraphy and writing, information sciences, Mediterranean and Alexandrian studies, arts, and scientific research; and

- A dialogue forum.

The basic structure of the New Library of Alexandria contains three buildings; the Library itself, the Conference Center, and the Planetarium Science Center (PSC).

The Conference Center, where we hope to host the IPS conference, includes the Main Hall which contains 1700 seats and three medium-sized halls (300 seats each), all equipped with the most modern audio-visual aids and internet connections. It also includes conference halls for private meetings, including the VIP Hall, in addition to smaller halls that can accommodate small numbers of groups (40-50 people) and are convenient for holding all types of workshops. There are also two fully-equipped press rooms.

There also are two large areas designed for various cultural and artistic exhibitions. These halls are fully equipped for displaying various exhibits and include electric connections, lighting, and different types of partitions. There is a specialized department in the Bibliotheca Alexandrina dedicated to the supervision of artistic preparations and assembly of exhibited articles. This department includes interior designers as well as technicians in various specialties who have acquired wide expertise in the design and implementation of several exhibitions since the launch of the Bibliotheca Alexandrina. The exhibit halls are 450 square meters each and can also be used for small teaching domes or portable planetariums. The Conference Center also hosts two large catering halls for serving lunches, dinners, and/or coffee breaks. All the catering halls at the Conference Center and the whole library are operated by Hilton.

The planetarium building, a component of the PSC, can be easily recognized from inside or outside the library, as it has a unique design and attractive form. In the daytime, it is a dark spherical form which looks like a suspended planet in space. In the



The great hall in the conference center.

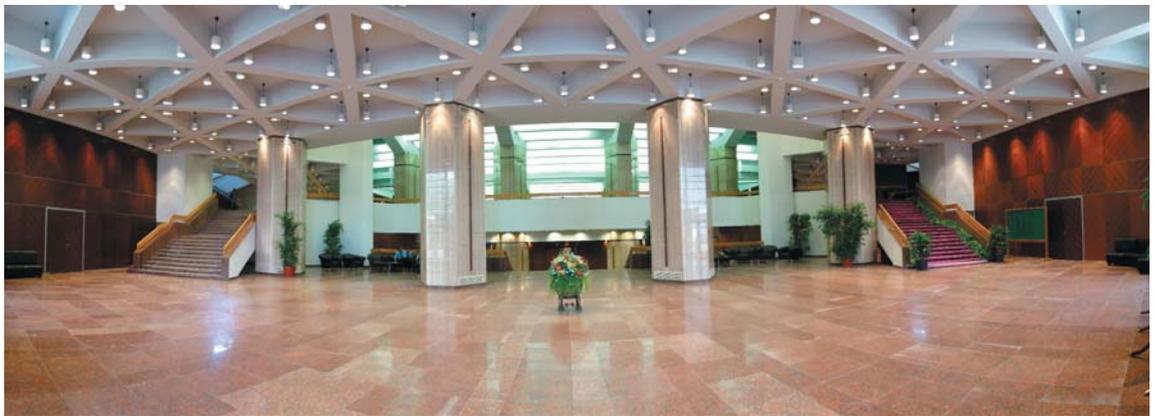
evening, it looks enchanting, with its indirect blue light set against the darkness of the outstretched Corniche of Alexandria. The theatre accommodates 100 viewers, the projection system is Electric Sky from Spitz as well as an IMAX projection system, and the library has already taken serious steps to upgrade the planetarium facilities.

### The Conference Programs and Estimated Fees

The organizing committee will find great flexibility in planning the conference agen-

council meeting, business meetings, lectures, opportunities for special interest groups, workshops, panel discussions, breaks, lunches, and the conference banquet.

According to today's rates, the participation fees for a conference in Alexandria can be \$350-400 (US), which includes the opening ceremony; attending all sessions, demonstration, exhibits, and workshops; conference bag and publications; lunches, daily coffee breaks, and the gala dinner; and local transportation. In addition to all the mentioned, the BA staff will provide a full free



The entrance to the conference center.

da due to all the various physical facilities provided inside the conference building and its various rooms and auditoriums. The conference program usually consists of an opening ceremony, registration, paper sessions, vendor demonstrations and exhibits, IPS

tour to all facilities of Bibliotheca Alexandrina, museums, exhibitions and many other unique facilities.

### Post Conference Tour

We can arrange a trip to visit to the pyra-

mids and Sphinx in Giza (225 km from Alexandria). There are three main pyramids, which were built in the 4th Dynasty (circa 4650 BC). The pyramids of ancient Egypt were built as tombs for kings (and queens), and it was their exclusive privilege to have a pyramid tomb. Today there are more than 93 pyramids in Egypt; the most famous ones are those at Giza. The Great Sphinx, or as the ancients knew it, "Shesib Ankh" or "the living image," has to be one of the most recognizable constructions in history. Think of the Sphinx and you automatically think of Egypt and the Giza Plateau.

### Events at the BA

A grand international conference was held in the Bibliotheca Alexandrina in 2005 to celebrate the centennial of Einstein's miraculous year of 1905. The conference hosted Nobel laureates as well as eminent scientists from all over the world, including Murray Gell-Mann, Gerard't Hooft, Edward Witten, and many others. The BA also hosted the Einstein exhibition licensed from the American University of Natural History. In 2006, during the total solar eclipse that passed over the west of Egypt on March 29, the library invited eminent astronomers and scientists (from Max Planck Institute of Astrophysics, Paris Observatory, Cambridge University, Oxford University, Princeton University, and other international scientific institutions) who delivered public lectures on astronomy, cosmology, and physics. At the IPS conference we can invite a Nobel laureate to participate as a conference speaker.

### Human Resources at the Library

Bibliotheca Alexandrina has the necessary human resources and trained staff who are capable of organizing various conferences. Please visit the Bibliotheca Alexandrina website at [www.bibalex.org](http://www.bibalex.org) to learn more on its facilities and scientific and cultural activities. These activities are assets strongly supporting the Bibliotheca Alexandrina to host the IPS 2010 Conference.

### Alexandria, the city

The city of Alexandria is the largest port of Egypt and its second capital. Ideally situated at the crossroads of cultural and commercial traffic between the Middle East and Europe, it enjoys a unique advantage among Mediterranean cities. It boasts a cultural heritage dating back to Alexander the Great and the Ptolemies; relics of Pharaonic, Hellenistic, Coptic, and Islamic civilization; and a coastline strip of 70 kilometers.

Alexandria has an atmosphere that is more Mediterranean than Middle Eastern; its

ambience and heritage distance it from the rest of the country, although it is actually only 225 km from Cairo.

The Corniche, which is about 18km long, links the harbor with the former royal palace of Montaza. It has been given its becoming new look with Bibliotheca Alexandrina undoubtedly adorning it at the Silsilah. Qait Bey Fortress was built by Sultan Ahsraf Qait Bay in 1480 in the Eastern harbor on the site of the famous ancient Lighthouse of Alexandria. It is said that the fortress incorporates debris from the lighthouse. It has long been a main landmark of the city, dominating the northern skyline. The restoration of the fortress, along with the major improvements in the city in the past

conference can visit before and after the conference. The tours are to be organized under the supervision of specialized tourist agencies with high standards and in coordination with the Bibliotheca Alexandrina management to offer a reasonable rate.

### Alexandria and Getting There

Participants can either arrive at the international airport of Alexandria (Bourg El-Arab/HBE), which is a 30-minute ride away from Library of Alexandria and the main hotels, or arrive at one of two international airports in Cairo. The distance from Cairo to Alexandria is around 225 km. There are various means of transportation from Cairo to Alexandria; one is by train that is operated



In the planetarium.

five years, has brought the eastern harbor to life.

The districts of Anfushi and Bahari, located on the way to Qait Bey, are renowned for the purchase of fresh fish, the making of fishing nets, and the manufacture of colorful fishing boats. The Mursi Abu al-Abas Mosque, built in 1775 and featuring four domes and a 73-meter high minaret, is situated in the Mosques Quarters. It was rebuilt in 1943 and is today one of the foremost Islamic buildings in Alexandria. The bridge at Stanley Bay, with its four towers echoing the Montazah Palace towers, has become a main attraction to visitors. One of the famous renovated and refurbished old artistic culture centers is the Mohamed Ali Theater, renamed Sayed Darwish Theater after the famous Alexandrian folklore poet, composer and singer, Sayed Darwish. It was inaugurated in February 2004.

There are several tourist attractions in Alexandria that participants in the IPS2010

by the Egyptian Railway Authority and passes by numerous Egyptian cities. Other ways are by a local airplane operated by EgyptAir or by car.

### Accommodation in Alexandria

In addition to the perfect climate conditions in the city of Alexandria, as a coastal Mediterranean city, the accommodation in the hotels in Alexandria and in Egypt in general are quite inexpensive when compared to that of Europe, America, and Asia. Moreover, the Bibliotheca receives special rates at hotels, which ranges between \$60-80 a night in 4-star hotels and \$100-110 for 5-star hotels. Most of these hotels are only a few hundred meters away from the Bibliotheca Alexandrina and the conference location.

So we believe that our location, striking modern facilities, and ancient heritage make the Bibliotheca Alexandrina an ideal site for IPS 2010. ☆

# The Place of Planetariums in the Cultural Policies of Our Cities: Saint-Etienne for IPS 2010

Jacques Guarinos, Director of Astronef

Robert Karulak, Deputy-Mayor of Saint-Etienne in Charge of Culture

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The first immersive digital video projection planetarium in France and the second one in Europe is called Astronef (“spaceship” in French). It is located in Saint-Etienne, a medium-sized town situated on the eastern edge of the Massif Central at the heart of an area populated by 450,000 people. Saint-Etienne stretches out between superb valleys and hills, providing some of the most splendid natural landscapes of France (Gorges de la Loire, Parc Naturel du Pilat, Rochetaillée, and more).

The planetarium was developed as an integral part of the city's cultural plan. This vision will set the theme for our conference. Combined with proximity to a convention center, connections with the city's high technology optics industry, and access to the attractions of central France, this vision makes Saint-Etienne an ideal site for IPS 2010.

## A City Dedicating Itself to Creation and Culture

Saint-Etienne is not unknown to those who remember the Apollo program: some of the optics the astronauts used on the Moon were designed and built by Angénieux, a French company based in the Saint-Etienne metropolitan agglomeration. Angénieux technology is present on board numerous satellites and spacecraft.

Saint-Etienne is now a center of excellence for optics and vision, mechanical engineering, and medical technologies. But one cannot understand well what the town is all about without knowledge of its history. Thanks to its coal mines, Saint-Etienne underwent its own industrial revolution during the 15th and 16th centuries, becoming France's leading industrial town during the 19th century. Until the 1970's, Saint-Etienne was known for its coal mines and heavy industries. But in the 1970's, the crisis

in the mining and metal working industries hit the town, putting an end to these traditional mainsprings. Fortunately, creativity and a sense of innovation had developed and would persist as Saint-Etienne's driving forces. Thanks to a large economic restructuring, Saint-Etienne has since become dedicated to industrial design, technological innovation, and cultural creation.

This restructuring is not only economic. The city has a high quality cultural offering for all its inhabitants, providing access to renowned museums, theaters—and to a highly-creative planetarium equipped with a system designed and built by a local company! As a means of travelling through space and time, a means of exploring all the mysteries of our huge universe, Astronef is one element of the ambitious cultural policy



At Top: Aerial view of the ancient ManuFrance site in Saint-Etienne. The planetarium is visible at the center (white dome). The Convention Center, a higher education establishment, and the Chamber of Commerce and Industry are now located in this restructured industrial site. © TV and CO Communication. Bottom: The planetarium in front of the Convention Center main gate. © Eric Frappa (Astronef). All images used with permission.

undertaken in Saint-Etienne. This policy intends to transform an old working-class town into a modern city opened to the world and having projects to shape its own future.

Many ambitious projects are under way: the first Zenith entertainment venue in Rhone-Alps region with revolutionary architecture designed by Sir Norman Foster, the "Optics & Vision Pole" with its laboratories devoted to high technology optics, the technological park METROTECH dedicated to further promoting technological innovation (to open in 2009), as well as several urban projects involving other famous architects such as Fumihiko Maki's business city.

Furthermore, Saint-Etienne has gained international recognition: the success of its International Biennial of Design is just one example, as is Saint-Etienne's application to become the 2013 European Capital of Culture and the imminent opening of its International Design Center (spring 2007).

But if Saint-Etienne is strongly committed to shaping its own future, it does not want to forget its past. Various cultural sites serve as reminders of its traditions, including the Museum of Art and Industry, the Mining Museum, and the Museum of Modern Art, as well as the architectural heritage of Le Corbusier in Firminy under the auspices of UNESCO. In 2000, Saint-Etienne was named as a Town of Art and History.

So, is there any better place in our changing world for discussing planetariums' place in the cultural policies of our cities?

### Convention Center and Digital Planetarium at the Same Place

Only a few meters separate the planetarium from the Saint-Etienne Convention Center, which has already organized 1400 events attracting more than 550,000 people since 1993. If our city is chosen for organizing and hosting the 2010 IPS Conference, this ideal situation will allow for a maximum number of planetarium shows, including a planetarium show productions festival, to be organized in parallel with the other activities in the Convention Center. Every participant will be able to attend every planetarium session with no risk of missing any of the other conference's main sessions. With 6500 square meters of floor space, 3000



Etienne Mimard amphitheater, in Saint-Etienne Convention Center. © Centre des Congrès, Saint-Etienne.

square meters of exhibition space, a modern amphitheater with 700 seats (with options to set the size at 500 and 300 seats), 17 meeting rooms for 15 up to 180 people, catering for up to 2200 people, air conditioned spaces, Wifi and all the latest audiovisual installations, the Saint-Etienne Convention Centre is the perfect place for organizing the 2010 IPS conference.

The Saint-Etienne planetarium was first inaugurated in 1993 with an optomechanical system. During the following decade, the planetarium gained strong experience in planetarium show production. Then, a digital system was installed and inaugurated in June 2003. The new Astronef has a hemispheric room with 82 seats plus places for disabled persons. It is equipped with a full-dome, 6 channel digital video projection system with real time astronomical simulation. The 3D production unit allows the planetarium team to create ambitious full-dome digital shows. The latter are also played in other



The Optics and Vision Pole (main entrance). © Saint-Etienne Métropole.

planetariums located not only in France, but also in Austria, Greece, Italy, Spain, and Tunisia.

In Saint-Etienne, the conference participants would not waste time in transportation. This would be possible thanks to the close proximity between the Convention Center and the planetarium and to the size of the town, which allows all the hotels to be located at very small distances from the Convention Center and from Astronef. Saint-Etienne can now offer more than 1200 rooms, a large number of them at rates about 50 to 60 € per night (at the time of this writing, between 65 and 80 US dollars per night), with every modern convenience.

Furthermore, two new hotels are planned to be built before 2008.

The reduced costs of transportation and the fair prices in the Saint-Etienne area would allow us to set low registration rates. With an expected 400 participants, we plan to fix the registration rate at about 330 € (about \$430) per person.

### Rosetta and Lutetia As Guest Stars During the Conference

If Saint-Etienne is chosen for hosting the 2010 IPS Conference, we plan to organize it during the week of Monday 17 July. This will allow us to offer to the attendees a very special event during the conference, taking advantage of the encounter between the space probe Rosetta (European Space Agency) and the asteroid Lutetia, interestingly named after the ancient name of Paris, capital of France. On July 10, 2010, Rosetta will fly over Lutetia. The French astronomical community is very much involved in this mission, with important participation from LESIA (Paris Observatory) and LAM (Astrophysical Laboratory of Marseille).

Astronef came to an agreement with an astronomer on the French team involved in the Rosetta mission: he or one of his colleagues will be ready to present the very first scientific results of the mission during the IPS conference in Saint-Etienne. All they need is about 10 days between the encounter and the presentation. This agreement could be reached thanks to the very good relationships Astronef has with the scientific community (the name Astronef is associated

with papers published in *Nature*, *Science*, *Astronomy and Astrophysics*, *Monthly Notices of the Royal Astronomical Society*, *Earth Moon and Planets*, and *Journal of Geophysical Research*.

### A Worldwide Recognition in High Technology Optics

Famous as a provider of optics for use in space, the local company Angénieux is also renowned in the cinematography industry. And this is just one example of the skills Saint-Etienne developed in high technology optics. With the will to put research laboratories, higher education establishments, and industrial companies working in optics, vision, and electronics all in the same place, the Saint-Etienne agglomeration created the Optics & Vision Pole in 2002. The femtosecond laser, nanotechnologies, adaptive optics, and digital imaging are some of the topics its researchers and students are working on. About 1000 people will be working there in 2010, and of course the IPS conference attendees will be offered the opportunity to visit.

### Easy to Reach, Perfect Departure Point for Visiting France

Saint-Etienne has its own airport, with daily return flights to Paris. But it is only 50 minutes from Lyon International Airport by car and 2 hours 45 minutes from Paris, thanks to the TGV (the French High Speed Train with 4 daily returns).

When you are in Saint-Etienne, no interesting place in France is far from you, neither the Mediterranean Sea, nor the famous Châteaux of the Loire, nor the volcanoes of Auvergne in the Massif Central, nor the Alps mountains. You are interested in knowing the captivating atmosphere of the Pic du Midi Observatory in the Pyrénées mountains? You want to see the extraordinary viaduct of Millau? Or you wish to visit some famous wine-producing area? No problem, whatever your transportation means is: plane, train or car. Saint-Etienne benefits from several motorway accesses: A72 to Paris, A47 to Lyons, A48 to Grenoble and the Alps, A7 to Marseilles and the Mediterranean Sea. We are considering organizing a post-conference tour that would include Pic du Midi, with which we have a close relationship, and other attractions.

Yes, Saint-Etienne is a perfect departure point for visiting France. But most of Saint-Etienne's visitors just prefer to stay here and enjoy its magnificent landscapes and its inhabitants' warm welcome. Just come and check it out! ☆



The Saint-Etienne Zenith entertainment venue, the first one in Rhone-Alps region (opening 2008). © Foster and Partners.



At Top: Saint-Victor and Bottom: Chambles, both in the close surroundings of Saint-Etienne. Both images © Laurent Asselin (Astronef).

# IPS Publications Archive Now Digitized

Dale W. Smith  
 IPS Publications Chair  
 Department of Physics & Astronomy  
 Bowling Green State University  
 Bowling Green, Ohio 43403 USA

Since it was founded in 1970, IPS has produced a wide variety of publications to serve its members. These include:

- Our Society's journal, the *Planetarian*, published quarterly since 1972
- Proceedings of all IPS conference since 1994 and some earlier conferences
- Directories of planetariums since 1971
- A variety of special publications since 1972

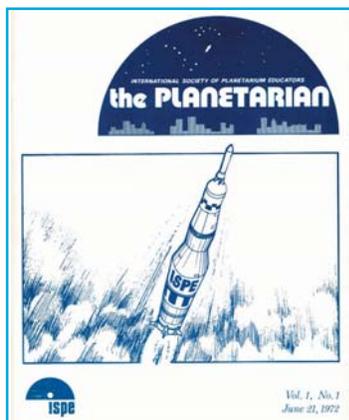
With the passage of time, many of these publications have become difficult to obtain. To prevent these valuable resources from being lost and to make them readily available to today's members, we have created electronic copies of all of the Society's past publications. We have scanned all past publications into PDF files and have assembled them on a set of 8 CDs.

This article outlines the contents of the archive CD set. You can find an order form as

a separate insert accompanying this issue of the *Planetarian*. The ordering information is also provided in this article.

## The Publications

The archive includes all issues of the *Planetarian* from 1972-2006. During this time, 35 volumes and 135 issues of



**Abstract: IPS announces the release of the IPS Publications Archive. This set of 8 CDs includes PDF files of all IPS publications since the Society was founded in 1970. These include the Planetarian, conference proceedings, directories, and special reports and publications.**

the journal totaling 7048 pages were published under nine different executive editors (see Table 1).

The PDF files for these issues have been assembled onto five CDs—one for the 1970s, one for the 1980s, one for 1990-1994, one for 1995-1999, and one for 2000-2006.

One archive CD includes all known IPS conference proceedings from the period 1974-2004, as shown in Table 2.

The archive also includes the Asia Forum held at the 1996 conference in Osaka and the Sri Lankan Skies conference held in Colombo, Sri Lanka in 2001. The Proceedings of the 2006 conference in Melbourne are still in preparation as this article is being written.

To our knowledge, no proceedings were published for the conferences in 1972, 1976, 1978, 1980, 1984, 1986, 1988, or 1992.

One archive CD includes all directories published by IPS since 1971, described in Table 3.

The 1970s directories included primarily North American planetariums. Coverage became more international with the 1980s editions. The Resource Directory (of vendors) was launched in 1998.

One archive CD includes all special publications from 1972-2005 (Table 4).

Special publications from 1971-1982 were called Special Reports and were numbered as indicated in the table. Special Reports 1, 3, 6, 8, and 9 were directories or proceedings and are included on the directory or proceedings CD, as appropriate, rather than on the special publications CD. Note that IPS was originally called the International Society of Planetarium Educators, hence the abbreviation ISPE in the early years.

*The Planetarium Educators Workshop Guide*

Years	Volumes	# of Issues	Editor
1972-1974	v1#1- v3#1,2	8	Jettner
1974	v3#3,4	1	Batch
1975	v4#1,2- v4#3,4	2	Cotton
1976-1977	v5#1- v6#4	8	Fagan
1978	v7#1	1	Hartman
1978-1981	v7#2- v10#4	15	Hoffman
1982-1986	v11#1- v15#4	20	Marché
1987- 2006	v16#1- v35#2	78	Mosley
2006-	v35#3-		Shanks

Year	Site	Original Mode	Editor	Notes
1974	Atlanta	print	Tate	ISPE special report #6
1982	Vancouver	print	Hurd?	
1990	Borlänge	print	Broman & Back	
1994	Cocoa Beach	print	Hutton & Thrall	
1996	Osaka	print	Kato?	
1996	Osaka	print	Itoh	Asia Forum at Osaka conference
1998	London	print	Grafton	
2000	Montreal	CD	Jobin	
2001	Colombo	print	Smith	Sri Lankan Skies conference
2002	Wichita	CD	Gould	
2004	Valencia	CD	Guirado	

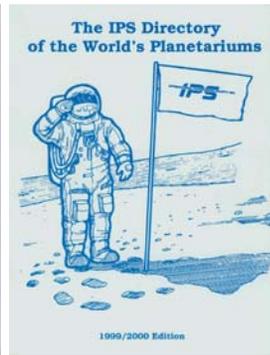
is © by the University of California, *27 Steps to the Universe* is © by Lars Broman, *Naked i Astronomy* is © by George Reed, and *Planetarium: A Challenge for Educators* was published by the United Nations; all are reproduced by permission.

*Planetariums and their use for Education* is the proceedings of a symposium held at the Cleveland Museum of Natural History prior to the founding of IPS and also is reproduced here with permission.

### Notes and thanks

The mode of original publication of proceedings, directories, and special publications has shifted from print to CD in recent years. For publications originally released as a CD, the PDF file is the one that appeared on the original CD. For publications originally released in print, the PDF file is composed of PDF images scanned from the printed page.

Preparation of the *Planetarian* has become electronic in recent years. For most issues beginning in 2003, the PDF was provided



directly by the executive editor. For issues prior to 2003 (and for some since then), the PDF files are composed of images scanned from the printed page.

Thanks to IPS Historian John Hare for loaning copies of publications that were not already on my shelf, to Dave Batch and the Abrams Planetarium for loaning two issues of the *Planetarian*, to Jon Marshall for giving me several early issues of the *Planetarian* when he retired some years ago, and to Walt Tenschert for fine service when I bought all available back publications upon joining IPS

in 1983.

Thanks to colleagues past and present who have contributed to, authored, or edited these publications. This treasure trove of material is a testimony to the vitality of our profession and to the talent and dedication of planetarians everywhere.

### Ordering

The IPS Publications Archive is available as a set of eight CDs. The CDs cannot be purchased individually. The purchase price, including shipping, is \$75 for IPS members and \$175 for non-members.

An order form has been included as an insert with this issue of the *Planetarian*. If the form is missing, you can order the archive set from IPS Treasurer Shawn Laatsch, Imiloa Astronomy Center of Hawaii, 600 Imiloa Place, Hilo, Hawaii 96720, USA, email slaatsch@imiloahawaii.org. Payment must be US dollars by credit card (Mastercard or Visa) or by a check drawn on a US bank.

The deadline for receiving orders is June 15 and we plan to ship the CD sets in July. ☆

**Table 3: Directories**

Year	Original mode	Editor	Notes
1971	print	Sperling	ISPE special report #1
1973	print	Sperling	ISPE special report #3
1977	print	Lazarus & Fleming	ISPE special report #8
1979	print	Lazarus & Fleming	IPS special report #9
1983	print	Cotton	
1986	print	Petersen	
1987	print	Petersen	
1988	print	Petersen	
1989	print	Petersen	
1990	print	Petersen	
1994	print	Petersen	
1995	print	Johnson	
1997	print	Laatsch & Smith	
1998	print	Smith	Resource Directory 1st edition
2000	print	Smith & Laatsch	
2003	CD	Smith	combined Planetarium & Resource Directory
2005	CD	Smith	combined

**Table 4: Special Publications**

Year	Original Mode	Title	Author/editor
1960	print	<i>Planetariums and their use for Education</i>	Scheele
1972	print	<i>A Bibliography for Planetarium Educators</i>	Reed (ISPE Special Report #2)
1973	print	<i>A Bibliography for Planetarium Education, Part II</i>	Reed (ISPE Special Report #4)
1974	print	<i>Some Planetarium Programs of 1972-73</i>	LoGuirato (ISPE Special Report #5)
1974	print	<i>Planetarium Handbook</i>	Sultner (ISPE Special Report #7)
1980	print	<i>Planetarium Educators Workshop Guide</i>	Friedman et al. (IPS Special Report #10)
1982	print	<i>Special Effects Sourcebook</i>	Aguilar (IPS Special Report #11)
1986	print	<i>27 Steps to the Universe</i>	Broman
1988	print	<i>Naked i Astronomy</i>	Reed
1992	print	<i>Planetarium: A Challenge for Educators</i>	Haubold & Smith (UN Publication)
1994	print	<i>So You Want to Build a Planetarium?</i>	Wilson
1996	print	<i>Special Effects Sourcebook, revised</i>	Concannon (IPS Special Report #11 revised)
2001	print	<i>Stories in the Stars</i>	Whitt
2002	CD	<i>Portable Planetarium Handbook</i>	Button
2005	CD	<i>Educar con el Planetario</i>	Saizar & Button
2005	CD	<i>TIPS for Excellent Scriptwriting</i>	Tidey

# Minutes of the IPS Council Meeting

## The State Ballroom Carlton Crest Hotel Melbourne, Victoria, Australia July 22 & 23, 2006

### \* indicates action items

#### In attendance:

President Martin George  
President-Elect Susan Button  
Past President Jon Elvert  
Treasurer Shawn Laatsch  
Secretary Lee Ann Hennig

#### Affiliate Representatives:

Association of Dutch Speaking Planetariums (ADSP) - Milo Grootjen & Anne-Lize Kochuyt for André Milis  
Association of French Speaking Planetariums (APLF) - Dr. Jacques Guarinos for Agnès Acke  
Association of Mexican Planetariums (AMPAC) - Martin George for Ignacio Castro Pinal  
Australasian Planetarium Society (APS) - Martin Bush  
British Association of Planetaria (BAP) - Dr. Tom Mason  
Council of German Planetariums (RDP) - Thomas Kraupe  
European/Mediterranean Planetarium Association (EMPA) - Manos Kitsonas for Dionysios Simopoulos  
Great Lakes Planetarium Association (GLPA) - Dave Weinrich  
Great Plains Planetarium Association (GPPA) - Jack Dunn  
Italian Planetaria's Friends Association (IPFA) - Susan Button for Loris Ramponi  
Japan Planetarium Society (JPS) - Shoichi Itoh  
Middle Atlantic Planetarium Society (MAPS) - Lee Ann Hennig for Patty Seaton  
Nordic Planetarium Association (NPA) - Lars Broman  
Pacific Planetarium Association (PPA) - Gail Chaid  
Rocky Mountain Planetarium Association (RMPA) - Kevin Scott  
Southeastern Planetarium Association (SEPA) - John Hare  
Southwestern Association of Planetariums (SWAP) - Donna Pierce for Tony Butterworth

#### Affiliates not in attendance:

Association of Spanish Planetariums (APLE)  
Canadian Association of Science Centres (CASC)

Planetarium Society of India (PSI)  
Russian Planetarium Association (RPA)  
Ukrainian Planetarium Association (UPA)

#### Guests:

Dr. Dale Smith - Chair, Publications Committee  
Alan Gould - IPS Chair, Web Committee  
Dr. Paul Knappenberger, Adler Planetarium, Chicago, Illinois, USA - 2008 IPS Conference  
Dr. Jin Zhu, Beijing Planetarium, Beijing, China - 2010 IPS Conference Bid  
Dr. Jacques Guarinos, Saint-Etienne Planetarium, Saint-Etienne, France - 2010 IPS Conference Bid  
Robert Karulak, Deputy Mayor, City of Saint-Etienne, France - 2010 IPS Conference Bid  
Andrew Buckingham, Stardome Observatory, New Zealand  
Steve Tidey - IPS Script Contest Committee Chair, Column Editor, *Planetarian*

The meeting was called to order at 9:15 A.M. by President Martin George. Martin extended a warm welcome to Australia and following the introductions of Council members and guests, Martin recognized new Council members and reviewed the format for the Council meeting as well as changes in the agenda. President Martin George announced that we will be providing news of the IPS Conference on a daily basis to IPSNews Editor John Schroer for posting to our IPS Listserve. Gail Chaid, PPA Affiliate Representative was appointed coordinator of the IPS Conference News Daily.

The Secretary's Report on the Minutes of the 2005 Beijing, China Meeting had been previously published in the March 2006 *Planetarian*. There being no corrections or additions, Tom Mason moved to accept the Minutes, seconded by Thomas Kraupe, and approved by Council.

Treasurer Shawn Laatsch presented the **Treasurer's Report**. In accordance with Council directions in 2005, a review audit was prepared by Richard R. Cox Certified Public Accountant. Shawn reviewed the report and format of the review. The review concluded that the financial statements of the organization are in conformity with acceptable accounting practices. The CPA advised that IPS should continue to use the

"review" format for auditing purposes due to the size of our organization and for the number of transactions we process. Donna Pierce moved to accept the Audit Review, seconded by Gail Chaid, and approved by Council.

Council reviewed and discussed specifics of the 2005 Financial Report and the mid-year 2006 Budget. Shawn recognized Ash Enterprises and John Hare for their generous contributions to the Armand Spitz Planetarium Education Fund during the year. The company has a special arrangement with their customers which results in regular donations to the Fund. Gail Chaid moved to approve the Treasurer's Report, seconded by Milo Grootjen and approved by Council.

Treasurer Shawn Laatsch then presented the proposed 2006/07 budget. John Hare noted that the line item for Council Lodging/Expenses needs adjustment for 2007. Shawn will make those adjustments. Council discussed the proposed additional guidelines for the IPS Star Partner's Fund. Discussion centered on voting privileges and selection process.

**\* The officers will draft a revised version of the proposed guidelines and present it to Council for approval.**

In the **Membership Report**, Shawn reported that total membership as of June 2006 is 640 (250 International Members and 390 United States Members). Shawn presented a membership cost analysis covering the year 2000 (the last year that dues were raised) to the present. Due to increases in expenses in a number of areas, the Treasurer proposed that a dues increase would be necessary in the near future. Council discussed the details of the cost analysis report and possible impact of a dues increase, as well as the consequences of not increasing dues. Issues discussed included: printing and mailing expenses of the *Planetarian* and other publications; alternatives of publishing the *Planetarian* electronically; comparison of IPS dues to other professional organizations' dues and the benefits to memberships of those organizations; reevaluation of the rates on advertising in the *Planetarian*; the impact of implementing some of the recommendations of the Strategic Planning Committee

regarding a paid Secretariat, etc. The discussion on the proposal was tabled until Sunday to allow further discussion overnight.

Treasurer Shawn Laatsch led the discussion regarding Institutional Membership and Corporate Membership status: benefits, cost, number of staff covered under each category, the definition of each membership status, etc. Council decided to table further discussion until Sunday to allow Council more time to define the difference between the two categories and to propose a solution to the issue.

Past President Jon Elvert presented the **Past President's Report** as a summary of the goals, challenges and opportunities that were part of his tenure as President and Past President:

- Committees had a chance to voice their concerns and highlight their efforts in the *Planetarian* and through their reports. This was important in gauging the success, exposure, and shortcomings of committee work which resulted in significant restructuring and redesign of committees.
- The Committee restructure and evaluation will make for a more effective organization as IPS matures
- In some circumstances it is more effective to assign a "point person" to do the work in place of a committee
- Jon thanked the Officers, Council Representatives, Committee Chairs and expressed his pleasure in having the opportunity to serve IPS

President Martin George delivered the **President's Report**. This report will be published in the September 2006 *Planetarian*. Martin concentrated on the following topics:

- Communicating more frequently with Council and Officers regarding IPS issues
- Acting on several of the issues addressed by the Strategic Planning Committee and others will be part of the agenda at this conference and throughout the year
- Reinstating the Strategic Planning Committee with Tom Mason as Chair
- Building on the 2005 Council Meeting in Beijing, (the first official gathering of IPS in that country.) Martin has continued to work with several members of the Beijing Planetarium to encourage IPS membership throughout the country and perhaps an affiliate group formation.
- Attending conferences in promotion of IPS (regional as well as international) and reaching out to those areas which may

not have regionals or may not be aware of IPS,

- Recognizing John Mosley, Editor of the *Planetarian*, for his outstanding service to IPS and welcome to Sharon Shanks, new Editor of the *Planetarian*.
- Restructuring of several committees, including Outreach with Jon Elvert as chair.
- Highlighting the Scriptwriting Booklet distribution and overall work accomplished by the Publications Committee under the chairmanship of Dale Smith
- Encouraging Council members to communicate throughout the year, not just at Council Meetings
- Continue with the production of the annual President's Message to Affiliates DVD
- Making IPS more accessible to planetarians - new initiative to be discussed during Council Meeting
- Persisting in the efforts of formalizing the Memorandum of Understanding (MOU) with NASA and then expanding that model to other organizations
- Attending the IAU Conference in Prague to increase the profile of IPS with the professional astronomical community.

Donna Pierce moved to accept the Past President's and President's reports, seconded by Jack Dunn and approved by Council.

#### Affiliate Reports

Written **Affiliate Reports** were reviewed. In Affiliate News from the floor:

GLPA Representative Dave Weinrich announced that GLPA has donated \$300 to the IPS Star Partners Fund and \$200 to the IPS Armand Spitz Planetarium Education Fund and encourages other affiliates to consider donating to these important projects as well.

JPS Representative Shoichi Itoh reported that the 3 regional Japanese associations will be unified into one association this year.

NPA Representative Lars Broman announced that a new planetarium in Iceland is now a member of the Nordic Planetarium Association.

PPA Representative Gail Chaid reported on highlights of the 2007 PPA Conference in Fairbanks, Alaska.

RDP Representative Thomas Kraupe reported that the next meeting of the RDP would be held in Schwaz, Austria.

SEPA Representative John Hare announced that SEPA/GLPA/MAPS will hold a triple conjunction meeting at Oglebay

Conference Center, in Wheeling, West Virginia, October 9-13, 2007.

Dr. Jin Zhu of the Beijing Planetarium gave a brief report on the planetarium community in China and efforts to organize a regional group.

NPA Representative and International News Editor for the *Planetarian* Lars Broman thanked those affiliates who forwarded regional news to him and expressed his hope that everyone will continue to pass newsworthy items on to him for inclusion in the column. Council thanked IPFA Representative Loris Ramponi for his efforts in collecting material from the regionals for the International Calendar of Planetarium Events which is now available on the IPS Website.

John Hare moved to accept all Affiliate Reports, seconded by Dave Weinrich and approved by Council.

*Although the Agenda was reordered to allow several committee chairs to present their annual reports for the sake of convenience, the minutes will record the reports in their proper order for organizational purposes.*

#### Standing Committee Reports

**Standing Committee Reports** were presented, reviewed and discussed (this section continued over to the Sunday meeting).

President Martin George presented Chair Jon Bell's **IPS Awards Committee** Report. The IPS Fellows and Service Award honorees will be presented at the Banquet on Thursday evening.

President Martin George presented the IPS Elections Committee report on behalf of Chair Steve Mitch. Nominees for the offices of President Elect, Executive Secretary, and Treasurer/Membership Chair are:

#### **President-Elect:**

Stephanie Parello: Rose Center for Earth and Space, New York, NY USA

Derrick Pitts: Fels Planetarium, Philadelphia, PA USA

Steve Tidey: Southend, Essex, England, UK

#### **Executive Secretary:**

Lee Ann A. Hennig: Thomas Jefferson HSST Planetarium, Alexandria, VA USA

#### **Treasurer/Membership Chair:**

Shawn Laatsch: Eastern North Carolina Regional Science Center, Greenville, NC USA

A call for nominations from the floor will be made during the General Business

Meeting later this week. Biographies and candidate statements will be posted on the web and in the *Planetarian*. With a successful electronic election vote in 2004, the 2006 election will also be conducted in that format.

**\* Special Note: See Addendum to Minutes from the General Business Meeting at the end of this document**

The IPS **Publications Committee** Chair Dale Smith reported on the activities of the Committee. John Mosley retired as Executive Editor effective with the June 2006 edition. He edited 78 consecutive, on-time issues (representing 59% of the 133 issues since the founding of the journal). The period of 2002-03 saw the transition of the *Planetarian* to a full-color publication. Council expressed its gratitude to John for his exceptional leadership as Editor and for his devotion to duty as Editor-in-retirement for two issues while the search for a new editor was underway. Sharon Shanks, of the Ward Beecher Planetarium of Youngstown State University, Youngstown, Ohio USA, is the new Executive Editor. She will oversee the work of several new Associate Editors including Christopher S. Reed (General Counsel, a new column), and John Schroer (What's New). The 2005 *IPS Directory* was mailed to the membership in October in CD format. It contains two distinct sections, the IPS Directory of the World's Planetariums ("white pages") and the IPS Resource Directory ("yellow pages"), and is edited by Chair Dale Smith. The Directory is also available in the members-only area of the IPS website. The Directory is published on a biennial basis with updated files available on the website between editions. The next edition will be published in 2007.

#### Special Publications:

- **Tips for Excellent Planetarium Scriptwriting** (Steve Tidey, editor): based on an earlier GLPA booklet, this updated and internationalized version was distributed to the membership as a CD in December 2005. As a joint IPS/GLPA publication, it was also distributed to GLPA members.
- **IPS Astronomical Songbook**: (Jon Bell, Editor) includes texts for dozens of astronomical songs and recordings of many of them. The CD master is ready will be distributed with a future issue of the *Planetarian*.
- **Moonfinder** (Jay Ryan, artist/author) original artwork has been digitally

scanned and the presentation format is being arranged -some technical problems are being addressed.

#### Status of other documents, publications, and efforts:

- The Proceedings of the IPS 2006 Melbourne Conference are in process.
- Chair Dale Smith has created a comprehensive list of all past IPS publications (besides the *Planetarian*) including 17 Directories (1971-2005), 13 Conference Proceedings (1974-2004), 15 Special Reports (1971-2005), and 5 administrations of President's Newsletters.
- The archive of past publications will be released as a set of CDs later this year and made available for purchase as a set by IPS members.
- Dale reported that IPS maintains three repositories of back publications: the U.S. Repository is with Treasurer/Membership Chair Shawn Laatsch; the European Repository is with Chris Janssen at Europlanetarium in Genk, Belgium; and the Asian Repository is with Shoichi Itoh at the Suginami Science Center in Tokyo, Japan.

Chair Dale Smith urges each Affiliate to contribute at least one article to the *Planetarian* annually. Not only would this effort increase the number of articles published in the journal, but it would also highlight the regional affiliate's participation.

#### Ad Hoc Committee Reports

**Ad Hoc Committee Reports** were presented, reviewed and discussed (this section continued over to the Sunday meeting).

The report from Chair Ed Lantz of the **IPS Full Dome Video Committee** was reviewed. Several accomplishments were mentioned: full dome forum meetings at DomeFest in Albuquerque on July 17th, the Western Alliance Conference of Planetariums at the Denver Museum of Nature and Science on September 10, 2005, and at the Workshop on Immersive Cinema in Espinho, Portugal on September 12th, 2005: added full dome resources page to the official IPS website; maintained a regular column in the *Planetarian* called Digital Frontiers to inform IPS members about digital planetarium education, art, operations, technology and happenings; guest-edited two special topic issues of the *Planetarian* devoted to "Digital Domes and the Future of Planetariums."; Ryan Wyatt continued operation of the Full dome Video Discussion Group which operates as a

supplement to other planetarium discussion groups, including DOME-L and the Digistar Users Group mailing list. The Committee plans to hold other Full Dome workshops at IPS 2006 and selected regional conferences. Council will discuss the goals, operations and mission of the Committee on Sunday.

The **IPS History Committee Report** was delivered by Historian John Hare. The task of scanning photographs and slides began this spring. Utilizing Ash Enterprises equipment, over 1000 images have been digitized and at the present rate the project should be nearly complete by year's end. The effort of identifying various individuals, the circumstances, and the events is challenging. John reports that ultimately many of these images could be made available on the IPS website. John will be presenting a paper this week which highlights several pre-IPS era planetarium conferences and focuses on several; interesting topics of discussion that have implications with the "planetarium of today". Research for the paper originated from materials contained in the IPS Archives and from the Historian's personal experiences. John encourages members to pass on relevant material for the IPS Archives.

The **IPS Language Committee Report** was presented by Chair Martin George. Martin reported on the committee's goal of completing the series of translations for the IPS Membership Brochure and resolving some of the issues of translations at conferences. The Language and Publications Committees will expand their working relationship on projects related to multilingual issues.

Newly appointed IPS Outreach Committee Chair Jon Elvert summarized his vision for this redesigned committee. A major goal will be to make available more educational materials to the IPS membership through the exchange of reciprocal resources between the IPS and other professional astronomy and educational related organizations. This committee will include the input offered by the Media Distribution Committee and Education Committee to serve the membership in a more effective manner. The Outreach Committee will continue to facilitate communication and develop collaborative opportunities with astronomy and space education related agencies and strive toward improving upon the existing partnerships, especially in the strategic goals of NASA's informal education initiatives. However, the committee will also be asking the Affiliate Representatives for more involvement in the distribution of information to their regional members.

Council discussed ways to accomplish the goals of the committee as a merger of Media Distribution and Education Committees.

The **IPS Planetarium Development Group** chaired by Ken Wilson continues to make progress on the **IPS Planetarium Development Guide**. Sandro Gomes of the Rio de Janeiro Planetarium has volunteered to write the chapter on sound systems and sound studios. Ken reports that he is still in need of volunteer authors for the chapters on renovation, special effects/multi-image, and participatory planetaria.

Chair Susan Button presented the **IPS Portable Planetarium Committee Report**. The Fourth European Meeting of Itinerant Planetaria is being planned for 2007 in the Slovak Republic and will be hosted by Marián Vidovenc. The Committee continues to seek contact people in each regional affiliate and news of their activities for publication in the **Planetarian**. Susan reported that a new editor for the **Planetarian** column is being considered. The committee encourages the IPS affiliates to include information of interest to portable planetarium directors in each of their newsletters and to have a proactive contact for portable planetariums in each regional affiliate.

Steve Tidey, Chair of the **IPS Script Contest Committee** submitted a report on the Eugenides Foundation Scriptwriting Contest. As a result of improvements in the implementation and goals of the contest, Steve reported that nine entries were received for the most recent competition which closed on December 31, 2005. Winners of the contest will be announced at the Banquet. Council expressed its pleasure at Steve's continued progress on the improvement of the contest and of the generous support provided by the Eugenides Foundation. The next contest will be officially launched in the March 2007 **Planetarian**.

Chair Alan Gould presented the **IPS Website Committee Report**. The IPS Website has been undergoing updates, refinements and redesign. Alan demonstrated some of the elements of the redesign and membership only access areas. Loris Ramponi's International Calendar of Planetarium Events is now maintained directly by Loris and posted on the Website. Each Committee has its own page and Alan encouraged the Chairs to send him material to post on those pages so the membership can be informed on the business of the committees. The committee is also considering a blog system for

posting job opportunities on the jobs' page. Alan brought up the possibility of considering joint memberships in IPS and Affiliate groups perhaps associated with an electronic **Planetarian** journal. This might increase IPS membership and would perhaps save printing costs with an e-journal. Alan also asked Council to be mindful of the benefits of an electronic journal in terms of the ecology /environmental concerns. Treasurer Shawn Laatsch will be working with Alan to investigate the structure of offering IPS membership on-line.

There would be an initial set-up cost, then an annual fee for continued service. This option would also allow a personal password to be generated at that time and this action would make our membership-only area more secure. After evaluating reactions to the newly designed prototype of the website, Alan will transition the relevant pages into the new format.

No Reports were submitted from the Professional Services and Technology Committees.

President Martin George announced that Dr. Tom Mason will be the new Chair of the reinstated IPS Strategic Planning Committee.

Donna Pierce moved to accept all Affiliate Reports, seconded by Gail Chaid and approved by Council.

#### Constitution Issues

Secretary Lee Ann Hennig, President Elect Susan Button and Former President and Publications Chair Dale Smith, have reviewed the document's overall structure for ease of reading and will propose further revisions in specific sections requiring updated terminology and clerical modifications as well. The draft changes will be submitted to Council for comment and subsequent approval. There will be some By-Law changes placed on the October 2006 ballot for consideration by the IPS membership, and the remaining Standing Rules changes will be considered by Council.

The conditions under which the organization carries out its business in terms of utilizing electronic means (balloting, communication, voting, etc.) is not specifically stated in all circumstances covered in the By-Laws and Standing Rules. Therefore a "sense of Council" as to the use of electronic communications in IPS business was stated as: "It is the interpretation of Council that the language of Article XIII of the By-Laws includes ballots distributed, signed, and returned electronically."

\*Jack Dunn moved to accept the sense of

**Council regarding the interpretation of the language of Article XIII, seconded by Jon Elvert and approved by Council.**

#### Old Business

NPA Representative Lars Broman reported on the status of the Armand Spitz Planetarium Education Fund grant approved for two of the master students in science communication at Dalarna University. Lars gave a brief review of the entire program up through the Spring of 2006. The reports from their theses fieldwork and Internships are available at [www.sciencecommunication.se](http://www.sciencecommunication.se). In keeping with the provisions of the grant, the students are submitting reports describing their experiences and the significance of their projects to be published in the **Planetarian** and posted on the IPS Website. Lars announced that two new students will be doing thesis fieldwork in 2007. Council expressed its approval that the use of the ASPEF as a grant to students involved in this kind of work was appropriate and necessary for the future of the planetarium community, and that it should be made more visible to young people in terms of promoting these opportunities.

\* Shawn Laatsch moved to accept the proposal for renewal of the grant for 2007, seconded by Jon Elvert and approved by Council.

President Martin George reported that work on a **Memorandum of Understanding** formalizing the flow of information between IPS and NASA is still under revision. As soon as Martin has a draft it will be presented to Council.

Council meeting was adjourned until Sunday morning, July 23, 2006

The meeting was called to order at 9:30 A.M. by President Martin George.

The Agenda returned to tabled items.

#### Old Business

The **Corporate Membership** status discussion continued from Saturday. RMPA Representative Kevin Scott presented a proposal which would address corporate membership in relation to Individual and Institutional memberships. Council held considerable discussion on the benefits, definition, and necessity of embracing a corporate membership status. The idea of a "non-member" or "observer" category was also discussed.

\* President Martin George directed Kevin Scott and Treasurer/Membership Chair Shawn Laatsch to draft a proposal addressing

the “Corporate Membership” category and its associated Standing Rules and By-Laws revisions. The draft proposal should be submitted to Council by October 1, 2006 for subsequent discussion and action.

President Martin George reviewed a proposal for making IPS more accessible to the international community. This proposal arose from a recommendation by the Strategic Planning Committee and is one of the issues which Council is addressing. “That the IPS invite through, but not limited to, its website, non-members around the world, at no cost to become **IPS Associates** who will receive IPSNews electronically. This offer is to be reviewed after two years.” The purpose of this proposal is to introduce non-members to IPS, to boost IPS visibility, and to make IPS more inclusive. IPSNews and the IPS Website would be the major vehicles for “Associate” information. \* **Council voted its approval to proceed with the IPS Associate initiative.**

President Martin George summarized the state of restructuring several IPS Committees:

- **IPS Outreach Committee:** will now incorporate the former Media Distribution Committee and Education Committee under one umbrella. Martin expressed gratitude on behalf of Council for the tremendous work accomplished by former Chairs Thomas Kraupe (Media Distribution), Christine Shupla (Outreach), and April Whitt (Education)
- **IPS Full Dome Committee:** the IPS Technology Committee is connected to some extent to the Full Dome Committee. The restructuring of the IPS Full Dome Committee should also encompass some of the goals and objectives of the Technology Committee. Ed Lantz, Chair of the Full Dome Committee, will be stepping down as Chair, and the Technology Committee Chair is vacant. These events provide an opportunity to reevaluate the roles of both committees before a new Chair is appointed.

Council discussed the direction of the restructuring in terms of the objectives: is it streamlining, or creating subcommittees under a larger umbrella format. Martin will consider Council suggestions in his proposed revisions to the committees.

President Martin George stressed the importance of Council Members staying in communication through the Yahoo Groups IPS Council site. IPS Web Committee Chair Alan Gould will work with Council on coor-

inating a Council page or area that might be easier to use, or used in conjunction with the Yahoo Group site.

#### Conferences

##### **IPS 2006 Melbourne Conference**

Host and Australasian Planetarium Society Representative Martin Bush reported on the plans for the July 24-27, Melbourne Conference. Martin assured Council that everything is on track for a great conference and expectations are high for clear skies, engaging presentations, enlightening vendor demonstrations, wonderful food, and warm “Down-Under” hospitality! Council thanked Martin and the Local Organizing Committee for its commitment to hosting an outstanding conference.

##### **IPS 2008 Chicago Conference**

Paul Knappenberger of the Adler Planetarium, reported on the June 15-20, 2008 IPS Conference to be held in Chicago, Illinois USA. Plans are progressing on schedule for all events related to the Conference and details will be posted on the IPS Website as they become available.

**2010 IPS Conference Bids** were presented by the following representatives:

- Dr. Jin Zhu, Beijing Planetarium, Beijing, China: The dates for a Beijing conference would be July 4-8, 2010
- Dr. Omar Fikry- Library of Alexandria, Alexandria, Egypt. The dates for an Alexandria conference would be July 12-15, 2010.
- Dr. Jacques Guarinos- Saint-Etienne Planetarium, Saint-Etienne, France. The dates for a Saint-Etienne conference would be July 17-21, 2010.

Dr. Fikry of Egypt could not be present during the Council meeting, so his presentation was rescheduled for the IPS Business Meeting, during which all potential hosts would speak to the membership about their bids.

Council inquired about registration fees, room and boarding costs, as well as meeting and planetarium facilities. Details on each of the bids will be posted on the IPS Website and in upcoming issues of the *Planetarian*. At the 2007 IPS Council Meeting, a final selection will be made regarding the host for the 2010 IPS Conference.

#### New Business

Treasurer Shawn Laatsch returned to a tabled item from Saturday, regarding the financial health of the organization and whether a dues increase should be imple-

mented based on the cost analysis of the membership. The proposal to increase dues effective 2008 included the following structure:

Individual	\$65 - 1 year, \$100 - 2 years
Institutional	\$125 -renewal, \$250 - new
Library	\$45

In 2007 members could renew for the current rates. Council discussed the proposal and the Cost Analysis Report as it applied to the proposal as well as the corresponding corporate membership and its impact. It will have been eight years since the last dues increase if the 2008 date is approved. \* **Gail Chaid moved to accept the proposal for the dues increase effective 2008, seconded by Tom Mason and approved by Council.**

President Martin George shared a presentation relating to the life and contributions of Radio Astronomer Grote Reeber and the Foundation which is overseeing the wishes of his estate as to how his ashes would be distributed. Martin discussed with Council how IPS might be a part of an effort to honor Grote Reeber, but after much discussion it was agreed that several other organizations’ missions might better justify involvement.

BAP Representative Tom Mason shared that some of his Affiliate members were concerned about the cost of attending IPS Conferences, and in particular that the Banquet expenses may be prohibitive for many. It was suggested that perhaps there could be sponsorships from Affiliates or other sources to reduce the registration fees for attendees. Martin reminded Council that IPS cannot require that Affiliates sponsor their attendees, that is an Affiliate concern. Indeed some Affiliates do offer financial support for their representatives. Council discussed other issues regarding conference scheduling, vendor time, meal expenses, etc. It was pointed out that cultural differences also play a role in event scheduling, and meals. The IPS Conference Guidelines should address the need to balance the overall purpose of IPS conferences and cultural customs in the host venue. The Conference Committee should also be more vigilant concerning the budget items of meals and events.

ADSP Representative Milo Grootjen demonstrated how Affiliate Representatives could use the Google Earth Website/Tool to develop a map to show the locations of the Affiliate planetarium facilities. This is a possible addition to the IPS Website Affiliate Pages.

President Martin George reported on

behalf of Loris Ramponi that several conflicts among major conferences have appeared. Loris encourages Affiliates to check the dates on the International Calendar of Planetarium Events to be aware of potential conflicts. Vendors should also check those dates for planning purposes.

President-Elect Susan Button is working on a location for the 2007 IPS Council Meeting. There were suggestions from Council regarding several possibilities:

- holding it in conjunction with affiliate conferences
- meet in non-affiliated areas to draw in non-IPS areas
- meet at a time when a majority of Council members can attend

RDP Representative Thomas Kraupe reported that 2007/08 has been designated International Polar Year, and International Heliophysical Year. There are a number of on-line activities related to Global Climate Change. Perhaps IPS should be involved with these events. Discussion centered on a number of other special anniversary celebrations planned (50th Anniversary of Sputnik,

400th Anniversary of Galileo's discoveries, International Year of Astronomy, etc.) Council agreed that we should explore the possibility of involvement or coordination with these events.

GLPA Representative Dave Weinrich spoke to the issue of reaching out to the developing areas of the world. Perhaps hosting a "Local Day" in conjunction with an IPS Conference where non-members could visit the conference at selected events (vendor sessions, guest speakers, etc.) Thomas Kraupe suggested that some of our sessions might even be opened to the public on occasion. This has happened at past IPS conferences-particularly open sessions for special speakers and planetarium events. Martin Bush stated that the Local Organizing Committee could elect to nominate a section of the conference for public outreach or other local groups, and allow attendees to participate at a nominal/no charge. It should be clearly stated which areas/activities are limited to the membership.

With business completed, Donna Pierce moved to adjourn the Council Meeting, sec-

onded by Jack Dunn and approved by Council.

Respectfully Submitted,

Lee Ann A. Hennig  
IPS Secretary  
Sept. 30, 2006

**\* Addendum to Council Minutes**

During the General Business Meeting of July 26, 2006, the following addition to the slate of candidates for office was made:

For the Office of **President Elect**:

Dr. Tom Mason  
Armagh Planetarium  
Armagh, Ireland UK

nominated by Undine Concannon, seconded by Thomas Kraupe. Motion to close the nominations was made by Dale Etheridge, seconded and approved by the membership. This additional candidate will appear on the ballot for the fall election. ☆

# Assignment and Release

## IPS/Eugenides Foundation Scriptwriting Contest Entry Form

(Entry guidelines appear on Page 33)

Complete one form per script. Enclose with each script by the deadline: December 31, 2007.

Submission date: \_\_\_\_\_

The undersigned does hereby assign and release unto the International Planetarium Society (IPS) the script titled

\_\_\_\_\_ and permits the use of content of the script in whole or in part in connection with planetarium programs of all kinds.

The undersigned acknowledges that the script assigned here may be included within any script bank maintained by IPS, that IPS may publish the script in the society journal *Planetarian*, that IPS may maintain scripts for distribution to its members on magnetic media and in hard copy form, and that scripts assigned to IPS may be screened by a committee to control duplication of material and to eliminate known proprietary material.

The undersigned does hereby represent unto IPS that this assignment and release is not contrary to any copyright registration or other registration relating to copyright protection with respect to the script; that this assignment and release is not in conflict with any other agreement executed by the undersigned, and that the undersigned will, to the extent reasonably necessary, execute such further assurances of title as may be necessary and defend the same.

IN WITNESS HEREOF, the undersigned has executed this assignment and release as of the date first above written.

SUBMITTED BY:

(Signature) \_\_\_\_\_

PRINT NAME: \_\_\_\_\_ TITLE: \_\_\_\_\_

ORGANIZATION/PLANETARIUM: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

WITNESS: (Signature) \_\_\_\_\_

PRINT NAME: \_\_\_\_\_ TITLE: \_\_\_\_\_



**Steve Tidey**  
58 Prince Avenue,  
Southend, Essex, SS2 6NN  
England  
steveidey@hotmail.co.uk

For those who need to hang on to their slide projectors for as long as possible because they can't (or don't yet want to) make the jump into full-dome video, I believe there is an intermediate solution. So, I was watching an episode of *The West Wing* today. A group of administrators from NASA shows up at Josh's office asking for money for a Kuiper Belt explorer mission. Josh says he doesn't know anything about space, and that the Bartlett administration's policy on space is simply to tell NASA to stop screwing up. He launches into a mini tirade about the HST not initially working properly, probes getting lost because of metric or feet confusion, and he claims the ISS should be renamed the "SS Good Money After Bad," etc. Then one of the party invites him to spend the night looking at the sky for the first time through her telescope. He accepts and is quickly transfixed by the beauty and mystery of what he sees. He goes into his office the next day and thinks seriously about how to sell a crewed mission to Mars concept to the American people.

That highlighted for me the instinctive pull that the cosmos has on almost everybody when they experience it up close, think about the less mundane day-to-day aspects of life, and where we fit into the whole cosmic kit and caboodle. And it also highlighted the importance of every single planetarium show that you and I the rest of us in the profession host for the public. They may not always say as much, but we're touching something deep inside them. Ain't

that great?

We're finding new ways to put over this joy of the sky, which prompted my decision to use this poser as the subject for discussion this time round:

**The release of new, traditional, slide-based planetarium shows is clearly on the decline, as is the production of slide projectors. Nobody expects (or wants) them both to wither and die, of course, but to what extent should this trend be fought against? Is it simply part of the natural evolution of the profession? Can we expect to see a time, no matter how long it takes, when new slide and digital shows can exist together in the profession in comfortable numbers? The numbers of domes converting to digital worldwide will eventually plateau out, of course, but how will the demand for slide-based shows have coped with the transition by then?**

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Much as I am endeared of slides, I never really mastered them as I should have. My skills in slide production, masking, and so forth were never honed to where they should have been. Never really honed at all. At the same time, my skills in digital image work are not what they should be, either, but I've noticed that in some ways it's easier to get a nice looking digital product than it is to get a decent photographic slide image. At least for me. The younger generation even more so. Digital images are certainly easier to reproduce, store, ship, and organize.

So what I find myself in anticipation of is the next generation of reasonably priced high resolution projection systems. At IPS in Melbourne, I saw how inexpensive it is to have a convex mirror digital projection system, especially for small to medium size domes. With the cost of a mirror being so much less than that of a fisheye lens, one can pour one's hard earned pennies into the highest resolution projector available. Spread of pixel size from front of dome to back is the main drawback there, but no system is perfect (though Denver's Museum of Nature & Science planetarium comes close).

Can slide shows and digital shows coexist? They certainly are now coexisting, but I expect it to become more and more difficult to maintain slide-based shows and less and less difficult to create digital and full-dome video shows.

Still, it's pretty impressive how relatively high a resolution one can get with slides, and the slide projectors are a fraction the cost of video projectors. Magnificent resolution at

low cost. But limited to still images. Decisions, decisions. My guess is that I'll be virtually slide projector-less within a couple years.

Alan Gould  
Holt Planetarium  
Lawrence Hall of Science  
University of California  
Berkeley, California, USA

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As technology evolves, so does our ability to utilize new techniques to communicate our messages. Audiences expect to see improvements and advances in the way subjects are presented, but one thing should never change: the need to compose a gripping story and present it in an engaging and meaningful way. Technology shouldn't be seen as merely new frills and toys to play with—it's a tool, and it's only as good as the talent and vision of those who use it.

Slide projectors to the public mean still imagery, and this technique still has its place if a presenter melds it properly with the story he or she is telling. But still imagery can be done with any number of technologies—we don't have to depend on slide projectors to do it. I used to avoid CRT and LCD

## So what I find myself in anticipation of is the next generation of reasonably priced high resolution projection systems.

projectors for projecting stationary imagery for years because I disliked the drop in resolution and color balance when compared to slide emulsions. But the improvements in video technology are advancing at an exponential rate, and we're rapidly approaching the time when brightness, resolution, sharpness, color diversity and saturation are almost matching what can be done with 35mm slides.

Some "classic" facilities are buying up used CRT or LCD projectors (they're out there by the thousands and getting cheaper every day). Placing three discreet "screens" of video on the dome would allow for the placement of digital animation (say on a wide-angle center screen) and utilizing multi-visual techniques with still images on the left and right screens. Many of us have already seen this arrangement for years, but by adding even more video projectors people can not only buy the time needed to raise the funds for a modern system but also improve the dynamics of their programming.

Mike Murray  
Clark Planetarium  
110 South 400 West  
Salt Lake City, UT 84101 USA

I do not expect optomechanical slide projectors to completely fade away within the next decade. They will, however, become more and more expensive and impractical to own and maintain. Already it is difficult in some countries to obtain processing for slide film, and the choice of new slide projectors continues to diminish. At the same time, digital projection continues to improve in quality and reduce in cost. Stunning, high resolution space imagery and other material are increasingly available online in digital format, and inexpensive digital still cameras are readily available with 10 million pixels or more. The transfer to slide film is therefore already a costly and cumbersome step in the content generation-to-projection chain.

Unfortunately, digital projection still cannot match the resolution of a 35mm slide projector at a comparable cost. Yet for many, the convenience and efficiency of digital image capture, processing, storage and recall (not to mention full-motion video) greatly outweighs this disadvantage. One can now purchase a mega-pixel DLP or LCoS projector with 2,000-3,000 lumens and 3,000:1 contrast ratio for less than the cost of a slide projector dissolve-pair. There are many options for serving digital images as well, including HD video that approaches 35mm slide quality with 2k or more horizontal pixels. Video projector contrast continues to increase, and ultra-high contrast options are now becoming available such as SEOS's Zorro projector.

Academy 2k resolution (1828 x 1332 pixels/2.4 million pixels) has been used for many digital films, while Academy 4k (3656 x 2664 pixels-9.7 million pixels) is generally considered to fully capture the resolution and grain of 4-perforation, 35mm film. Since planetariums use SLR format slides (36mm x 24mm) which are 8-perfs wide, then scanning and projecting at approximately twice this number of pixels would be required to satisfy the most discerning eye. The Kodak Photo CD Pro, for instance, allows 35mm scans up to 6144 x 4096 or about 4400 dpi, thereby producing 72 MB image files. In practice, however, few would notice the loss in resolution when dropping down to half this scan resolution, such as the 3072 x 2048 pixels provided by standard Kodak Photo CD. The smaller file sizes of 2200 dpi scans (18 MB) are much more manageable as well. While video projectors that can handle this resolution are currently expensive, it is still best to capture the full slide resolution to allow digital zooming and to future-proof your digital slide collection.

Full-dome video can now consolidate all

projection systems—stars, special effects, zoon-slues and slides—into a single, flexible, digital projection system. The latest video systems can project virtual flat-screen images anywhere on the dome screen, and can manipulate these images in real-time including scaling, translation, cross-fade, 3D effects, full-motion video, etc. In effect, any number of slide projectors or zoom-slues can be simulated in a full-dome system—with no slide trays to change, no bothersome dust, no mechanical parts to wear down, and only a single integrated projection system to maintain. Full-dome systems would require over 60 million pixels over the hemisphere to approach the resolution of a typical 35mm slide projector with standard 4-inch focal length lens. However, in practice, systems

**But support is eroding chaotically for various links in the chain. It's like snow on a roof in spring—it doesn't melt at a linear rate...it slides off in large chunks at unpredictable times ...two large professional photo-finishing labs near us disappeared suddenly within a year.**

exceeding 6-8 million pixels over the hemisphere provide enough image quality that most facilities do not utilize slide projectors or other limited field-of-view "inset" projectors, aside from an HD projector for standard films and PowerPoint presentations. Even lower resolution full-dome systems effectively manipulate slide images that, while not cinematic in quality, are considered by many to be acceptable for educational use.

Given the current pace of development and decreasing cost of digital graphics technologies, it is not unreasonable to expect half of all planetariums worldwide to be operating full-dome systems within the next decade, with many, if not most, of the remaining optomechanical planetariums using inexpensive video projectors instead of slide projectors within this same time frame.

Ed Lantz  
Visual Bandwidth, Inc.  
1290 Baltimore Pike, Suite 111  
Chadds Ford  
Pennsylvania, 19317 USA

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In the short term, slides and digital video will coexist. At Strasenburgh we could continue to operate that way for a long time—except that slides rely on the maintenance of what we here in the town that formerly called itself "The World's Image Centre" refer to as the "Imaging Chain." The Imaging Chain comprises everything between the

subject (traditionally, a model who looks like the young Lindsay Wagner wearing a yellow sweater, holding a purple parasol and a red beach ball, posing in front of autumn leaves at the beach) and the viewer (symbolized by a close-up of a beautifully flecked iris with the pupil open but, please, not dilated).

In the case of slides, the Imaging Chain includes a camera or film recorder, film, film processing, slide mounts, and slide projectors with their lamps and lenses. This whole chain has to function with reliable precision to be useful to us. But support is eroding chaotically for various links in the chain. It's like snow on a roof in spring—it doesn't melt at a linear rate of so many centimetres per day; instead, it slides off in large chunks at unpredictable times. For example, here in what used to be called "Picture City," two large professional photo-finishing labs near us disappeared suddenly within a year. More of that is on the way.

At Strasenburgh, a Planetarium Task Force led by some board members has agreed to support an intermediate step between slides and full-dome video, namely the use of about three video fields as substitutes for our most frequently used slide projectors. Funding is being sought at this moment. The Task Force is very interested in full-dome video as a concept, but they need to be shown the twin problems of bounce back and GRIS (Gray Rectangles in Space) to understand how hard it really is.

We have other problems to solve. Video lacks the resolution of film, so far. But we can convey detail with Ken Burns scanning so the "camera," rather than the viewer's eye, explores the image or scene. Video and slides don't coexist well on the dome at the same time—not to mention video and stars. So we'll have to figure out how to make them work in the same show. Maintenance and operation are unknowns, too: we don't find the mid-century built-like-a-tank engineering in video projectors that Kodak used to put into slide projectors.

Meanwhile, however, support is growing for the Imaging Chain for video output. Software for image creation, animation, and geometric adaptation is losing its mystique. More and more scientific results are being released as motion video. Many of the most important concepts, such as motion and wide ranges of scale, are best conveyed with some kind of moving image. Students and adult volunteers have no interest in slides, but are excited about doing something "on the computer."

So we're entering new territory, and we'll have to blaze our own trail. In the long run,

*(Please see **Forum** on page 50)*



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impossible.

## How did Sky-Skan do what others have found impossible?

Getting a beautiful picture from Sony's SXR D projectors is easy, but getting that same quality picture in Full Dome is downright impossible—unless you're using Sky-Skan. You see, the highly curved dome screen creates a difficult challenge for wide-angle lenses. But we've engineered the first successful lens with the sharpness, color fidelity, and perfect edge blending to get the spectacular film-like SXR D picture into Full Dome: Sky-Skan's *definiti*<sup>™</sup> HD lens.

But a truly impressive picture is still impossible without seamlessly synching eight HD resolution inputs in real-time. So Sky-Skan created the hardware and software for an amazing 4K by 4K input system. That's 16 million pixels fed into only two projectors! After edge blending and masking, 10-12 million unique pixels make up an impressively clear, bright, colorful picture—available for *definiti*<sup>™</sup> theaters exclusively from Sky-Skan.

### SUPER BRIGHT

20,000 lumens from only 2 projectors. Variable lamp output means longer lamp life + enhanced black level (fully controllable with SPICE Automation).

### SUPER SHARP

4K x 4K input resolution (16M pixels). 10-12 million unique pixels after edge blending and masking. Superior edge blending + pixel tuning.

### PROVEN BY SONY

Built by Sony with a rugged design along with the same brightness, sharpness, and color quality of large format film projectors. The SXR D chip technology has been used for years in consumer and professional video products.

### AMAZING COLOR

3-chip design + pure Xenon white light source that stays true to color throughout its lifespan.

### LOW MAINTENANCE

Dual long-life Xenon lamps. System can operate alternating lamps. Easy lamp changes without tedious calibration. Only 2 projectors for Full Dome means fewer parts.

### PROVEN BY SKY-SKAN

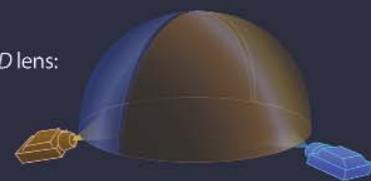
3 SXR D *definiti* theater installations in 2006, 3 more in '07 (so far)  
6-stop world tour (IPS-Melbourne, Washington D.C., Athens, Chicago, Beijing, Nagoya)  
1 Full Dome + full color stereo 3D demo (Athens)  
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Two projectors, one amazing feat of engineering.  
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real-time



playback



Bon Voyage.

*definiti*<sup>™</sup>

(*Forum*, continued from page 47)

resistance is futile. (Forum Editor's note: You will be assimilated!)

Steve Fentress  
Strasburgh Planetarium  
Rochester Museum & Science Center  
657 East Avenue  
Rochester, New York, 14607 USA

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For a moment, I need to speak from the heart. Not as an employee of P.G. County Public Schools. Not as MAPS President. But as a member of the planetarium community, who is, by heart, "old-school." So considering the very real decline of traditional slide-based planetarium shows makes my very being want to protest "say it isn't so!" I want to fight it, to lash out, to convince the world that I am not really a dinosaur in a young body.

But then I realize that perhaps I am not looking at the right question. Who is defining the future of the planetarium? Ladies and gentlemen, is it technology? Because slide projectors are no longer manufactured because of the trend toward digital technology, are we going to let the manufacturers define who we are and what we do? Is it the fact that the digital age is introducing us to more readily available toolkits for video editing? Are we letting "progress" define who and what we are?

I'll be honest. The facility that I have had the pleasure of working for on both a part and full time basis for the last, what, 20 years, is a large dome with a small dome budget and purpose: we are part of a school system. And as I have been tasked to study the local curriculum and match my programs to the desired student outcomes, I have been pleased to see how many of the astronomy objectives are met by the simple use of the star projector. Period. As it was originally created for—to teach the basic concepts of the stars/planets/Sun/Moon. We have actually revamped our programs to take out a lot of the slides, videos, and hoopla (and provide those formats as web sites, online streaming, and activities in pre- and post-visit materials) and returned to live programs with minimal automation. (Remember the days of "Under Roof, Dome, and Sky"?). The needs of my facility are met by traditional planetarium programs. The needs of my public programs are often met by the same.

Now, that isn't to say that I haven't taken advantage of other multi-media uses for my theater (we have an annual "poetry under the stars", for example). But the bottom line is, I am trying not to be defined by the latest trends in the multimedia circles. But, I

digress. The next question is, what can other facilities do? We can't really force vendors to produce different versions of their new programs, can we? From their point of view, would that be cost-effective? That is an ugly reality. Or is it? Would it be unreasonable to ask for images in digital format so that we can turn them into slides? To ask for a soundtrack in a digital format we can use to integrate into our own systems? If enough of us are vocal enough, maybe this can be standard practice. Or maybe we just don't deal with some vendors anymore. So slide projectors aren't produced anymore. So what. There are enough of us around who by now know how to repair them. We can help each other out, in true planetarium community spirit.

Okay, say it's 10 years down the road, and now theaters have 360 degree, 3D interactive multi-media astronomy programs. So what. Are your slide-based, live planetarium programs meeting the need of your facility? Are you defining who and what you are? Then you can let technology happen around you. It serves its purpose, and we serve ours. From my heart, my friends. Treat it gently.

Patty Seaton  
H.B. Owens Science Center Planetarium  
9601 Greenbelt Road  
Lanham, Maryland 20706, USA

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Evidence of technological progress confronts us almost every day as we learn to live with, if we can afford it, advances in the capabilities of cameras, cars, telephones, computers, and so on. Planetariums, of course, are no exception; advances in our field are dizzying. I truly enjoy this progress and quality digital planetarium lessons/shows. I also enjoy quality analog planetarium lessons/shows. The key word is quality.

Yes, I believe that the decline in slide-based planetarium show production is a part of the natural evolution of our profession. The current focus is on production for digital planetariums because there is so little material prepared for those folks making the transition and in-house production is so costly and time consuming. Current planetariums who still utilize slide projectors will not all go away in the near future and will have to either make their own new shows or cry out for help. I have a favorite saying, "Nobody does anything until they feel they have to—for whatever reason." I believe that when the need for new slide based shows becomes severe, some enterprising planetarium or company will jump in and fill the void. Then we can have coexistence of new slide and digital shows.

There are multitudes of planetariums who cannot afford, or prefer not, to purchase new digital equipment to replace their slide projectors and/or their analog planetarium projector. Quality presentations can be presented with either solution, anyway. Therefore, I believe that slide projectors and analog star projectors will be around for many years to come. Also, as newer systems are installed, the "outdated" equipment will perhaps be recycled and become "new" and valuable to people who may never have had a planetarium before. IPS is committed to assisting people in less advantaged areas of the world to develop planetarium programs in this way. If you are excited by the thought of helping with this kind of initiative please contact me; we will gratefully take advantage of your talents and/or "outdated" equipment!

Sue Button  
IPS President  
8793 Horseshoe Lane  
Chittenango, New York 13037, USA

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Let me preface my statements. Even though the US Air Force Academy Planetarium has closed, there is work afoot to revitalize the facility. It would become a public facility rather than the academic support facility it once was. As it closed in 2004, the staff and department to which it was assigned wanted to convert it to a more digital future, eliminating many of the slides and projectors it then contained. Now, if it is revitalized, it will be as a low budget facility unless and until it can "pay its own way."

Regarding slides and associated equipment: "to what extent should this trend be fought against?"

The planetarium at the Air Force Academy had fought against the decline of slides and projectors from the early 1990s and lost. The Air Force and, I suspect, the Department of Defense in general, instituted a policy to eliminate all "wet" photographic processes so that slide production came to a screeching halt in the 90s. The planetarium had an enormous historical slide collection upon which we still relied but all the new images we wanted had to be digitized and as a result we began supplementing slide projectors with LCD projectors in the planetarium. You may recall that LCD projectors do not have a black, blank screen; it was always blue when no image was present and a not so very dark grey screen when an image, even a "blank" slide, was being projected. At the IPS conference in Canada, we presented plans for our iris mechanism to allow us to blank out the LCD projectors when no slide was projected.

It worked well, but of course did nothing

to maintain slide production at the Academy. If we needed a slide or set of slides we had to "contract" through the purchasing department to have the lowest price bidders make the slides we wanted. This was an utter failure, as the vendors were scattered around the US and were never the same. The vendors had no idea what we were doing in the planetarium with the slides. So, like many planetariums needing quick images for live presentations, the NASA-produced images were liberally taken from the internet and inserted where needed using the LCD or RGB projectors.

Because programming to support cadet classes was so specialized, almost all images were unique and could only be generated in-house, meaning at the US Air Force Academy's Graphic Arts. Since the photo lab was now out of the slide production business, all images were given to us in digital format.

As a result all those programs were converted to use still images from LCD projectors or video images from Barco or Sony RGB projectors. We were being forced into the digital world. Still, as late as 2004, the *Ring World* presentation about Saturn and Cassini was a slide presentation which we would have installed in 2004, had not events leading to the closing occurred. We were maintaining our slide projectors but, seeing the writing on the wall, realized that slides were going to become rare commodities and the news that Kodak, among others, would cease 35mm slide projector production had us planning to become as digital as possible. In fact, we were about to begin digitizing our 15,000 slide collection.

But now, with rumors that the planetarium here may, once again, open, it will be operated non-profit on a very low budget to begin with. All old slide projectors and special effects projectors will have to be re-furnished and used as long as possible. If vendors who still provide slides exist (at a reasonable cost) we would likely use them.

To fight a trend, that is a problem. Individual planetariums cannot hope to stop a trend being driven by the world of business briefings and AV presentations. Businessmen are all going digital; since their briefings are short-lived events the images do not need to be preserved, nor do they need to be high definition or resolution, thus digital media is cheap and ephemeral.

A planetarium, however, wants an image to last, to be high resolution. As nice as the image from a 35mm slide is, there are production problems. The slides are no longer cheap, the chemical processes to make them

are now controlled by the EPA, and the process is no longer cheap. Slides, once they are in hand, require special treatment as they are mounted, and one must keep dust off the images and out of the glass mounts (also not inexpensive). Adding gels or masks is time consuming and labor intensive. Manipulating a digital image does not introduce dust specks; masking and adding gels or words is easily done on the computer. The images are stored on a disk until needed, then called up until no longer needed then back into the computer hardware it goes. Back up is easy and so is distribution. Aside

**What happens when a society loses its competitive edge? Do they revert to older, more primitive methods? The older, more primitive methods usually end up costing more in the long run, but I am afraid that going back will cost more than money.**

from forming a consortium of many planetariums and other special needs institutions, I don't think the trend can be bucked.

As for projectors: if a small company chooses to continue to manufacture and support slide projectors, it will not be a low cost enterprise. Low production runs means high cost, small market share means low profits. Lamp prices will continue to climb. (Of course lamps in the LCD projectors are very high, too.)

We keep seeing that digital resolution is increasing, but I'm sure a still digital image will never match a still photographic slide. But modern planetarium programs have introduced motion into the digital images, and the observer's eye never realizes that the digital image does not have the same resolution as a 35mm slide. So maybe our need for high resolution is not as important as we want it to be.

Can we expect to see a time, no matter how long it takes, when new slide and digital shows can exist together in the profession in comfortable numbers?

What happens when a society loses its competitive edge? Do they revert to older, more primitive methods? The older, more primitive methods usually end up costing more in the long run, but I am afraid that going back will cost more than money. Audiences are fickle; they go to the newest technology. It may be true that schools and less affluent organizations might try to maintain the old technology just as they did with film strips, 16mm movies, slide and sound projectors, film cassettes, and tape recorders, but it's a losing battle, even for

such institutions. It's just too expensive, not only in money but in the message you send your audience—are you up to date at the edge of technology? Or are you maintaining a by-gone era? Of course, there is a small fraction of any audience who will want the old style presentations, just as we maintained a good group of people who came to every star gazer's show, where only a pointer and occasional slides or animation were used.

I think a presentation may contain both digital images and slides, but I suspect that ultimately the slides will be added by the individual program installer if he has license to modify the production in that way. NASA and other organizations may continue to make slides available, but they will do so less as time goes by because of costs, especially as more and more planetariums convert to the digital gospel.

The numbers of domes converting to digital worldwide will eventually plateau out, of course, but how will the demand for slide-based shows have coped with the transition by then?

There are several factors at work here. One is that computers are getting more and more capable of doing all the things we take for granted at the planetarium. Digital equipment and capabilities continue to drop in cost, but production costs are still high. The first may reduce attendance at a planetarium. The second is a method by which a planetarium may draw more customers.

Will the number of planetariums going digital plateau? If the rate of planetarium conversion to digital presentation declines is it a factor of the cost, the technology, or some other social factor? I have not looked at the numbers but here are some questions to ask:

1. Have the rate of new planetariums being established declined?
2. Are any of the new planetariums solely slide based?
3. Are they all mixed media, meaning some digital and some photographic?
4. How many of the new planetariums have no photographic projection capability at all?

I would guess that all planetariums will fall into the latter category, meaning some photographic projection capability exists. The question is: What is the proportion of digital projections to photographic projections?

When I came to the US Air Force Planetarium in 1979 there were about 100 slide or film projectors. The maximum number of photo-image projectors peaked during

the Reagan Administration, when SDI funded the purchase of about 30 special effects projectors, so we had about 130 projectors including motion pictures, slides, film strip, and one shot projectors. Suddenly, when laser disk technology became common, video projectors replaced the motion picture projectors, then PowerPoint (Microsoft's presentation program) came along and we started to use computers to store and project images. Ultimately, prior to closing, we had three LCD projectors, 2 RGB projectors, and Digistar 2. We had all but abandoned the use of the special effects projectors. We still relied heavily upon the panorama system and the all-sky systems, and we looked longingly at the digital systems now referred to as full-dome systems. With such a system we would have happily replaced two 12-panel pan systems and 2 six-panel all-sky systems. Were we different from other planetariums? If we were, it was due to the fact that our staff continued to be cut, so that the time demanded by the older photographic presentations was too much. A staff of two could not create and install old style programs and keep the presentation schedule we were expected to maintain. We had several factors driving us from old style productions to the digital. I suspect that is the norm.

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My personal opinion on the future of traditional slide-based planetariums is that improvements in digital media and digital projection technologies will force an inevitable transition to digital production and display techniques in the next few years—regardless of what we might do to prevent or delay this transition. As typically occurs when any technology advances, however, there will always be a delay between the early adopters and others who are incapable of affording the latest technologies. (How many of us will go out immediately and pre-order an iPhone?) In addition, there are numerous existing planetariums (especially in schools and universities) that have a great challenge to convince their administrations that a large infusion of funds is absolutely necessary immediately, if not sooner.

Most planetariums—even those in schools and universities—already use DLP or other non CRT-based video projectors as a normal portion of their daily programming. As these video projectors achieve greater contrast and brightness, they will eventually meet or exceed the resolution and true black levels of slide projectors. (In fact, currently, at least one manufacturer advertises that their pro-

jectors have achieved true black levels). As video projector prices continue to plummet, I expect that affordable high-resolution, high-contrast video projectors and associated software will be available within 5-10 years. This will mean that high-resolution video projectors with associated fish-eye lenses suitable for a domed theater will probably be able to show Spitz-like stars within 5-10 years. The Holy Grail of Zeiss-like star fields produced by video projectors may take somewhat longer, but they may be available about 10 years from now.

But, sometimes we forget that technology, however advanced, is but a tool for the creative planetarian. Perhaps we need to remember our roots. Our job is to be storytellers. Our industry challenge is to allow innovative and diverse ways of show production at all funding levels, using whatever technologies we can afford. Planetariums and their associated shows (often purchased, but usually adapted) are products of their creative staff. In my view, in order for our industry to survive, planetarians must be allowed to continue to adapt the shows they give to their unique audiences. I believe that the tremendous capacity of planetarians to grow and use newer technologies along with the old is one hallmark of our profession. Without such growth, the whole field could become nothing more than a collection of dusty, domed movie theaters.

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At Independence Planetarium in San Jose, California, we paid attention to what was being said in the industry about the trend toward digital. When Kodak declared they were no longer going to produce slide projectors, it was a clear message to us to begin to wean ourselves away from them. We gradually began to buy computers and software that would allow us to put the slides in digital format. It was cumbersome at first because the technology was in the infant stages. We'd no sooner learn a new way to put the slides in a digital format and to make a new program, and then another type of software would be introduced to the industry.

We are now successfully transforming our old slide programs to digital format using Final Cut Pro. The old slides are copied and put in Photoshop, if needed, to make them brighter and nicer. We use different tech-

niques, developed by master storytellers like Ken Burns, to enhance how the program looks. We own many animation special effects, and can incorporate them into a program to enhance it and make it more interesting to students. In a recent program there was video included in the show, but the timing in the script between the video section and an obvious array of slides across the dome was short, and it caused us to rethink how we could do it all on Final Cut Pro. We copied the slides, put them in Photoshop, sized them and then set them to run across the screen under the video. We made the video and the slides fit the section of the script, and the slides only appeared when the script dictated they should be there. It worked perfectly.

In another program the script was long, and there were many dates relating to historical events. We could see that students who were visual learners and not auditory learners would have trouble following the thought process of the script. In order to help those visual learners, we inserted a time line across the bottom of the screen so it would make more sense to them and they could follow the historical events easier. At this transition stage of our journey from a slide-based planetarium, beginning in 1976, to the present, we are using slides on the sides of the planetarium with the Barco projecting the newly enhanced program burned on a DVD in the middle of the planetarium.

In our industry, our vendors are very vigilant about helping us transition into digital technology. The size of the technology for those of us in small planetariums is getting more reasonable, so we can actually use it and it is becoming more affordable for small planetarium budgets. The vendors are listen-

**The important thing is the message and the knowledge imparted to the audience.**

ing to us at our professional conferences. The conversations we have with the vendors are important. We learn from each other as we journey together along this long pathway of ever-changing technology. Going from slides to digital is just the beginning. It pays to be as flexible as possible and to have a vision of how the program should look.

The important thing is the message and the knowledge imparted to the audience. The planetarium presents a shared community experience of looking at the night sky. For many it is a cherished and memorable

experience which sparks the imagination. For most at Independence Planetarium, it is the information presented by the teacher, the use of the azimuth and meridian and other things that are basic to every planetarium that are interesting to the audiences. It is how it is presented, not whether or not we have slides or digital format that people like. In the end it comes down to the lesson plan, and the presenter that conveys the information in a way that connects with the audience, not necessarily the slide or the video. It is a whole package that works together to provide the beautiful symphony of multimedia presentations that only a planetarium can offer.

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The introduction of digital technology into the slide-based technology of the planetarium field has created an interesting situation. Do planetariums try to stay with the older slide technology, or go to the newer digital/video technology? It is a debate which will never be settled. But before I add my personal thoughts, it is important to know why the slide technology is being diminished.

Back in 2003, Kodak sent out a press release saying that it was stopping the production of slide projectors because there was no longer a demand for them. Kodak was supposed to stop making the projectors in July of 2003 because, according to them, "no one uses slides any more." Well, working 24 hours a day, seven days a week, Kodak had to go into production of those slide projectors until November of 2004, more than a year after they were supposed to stop, because the demand was higher than they thought. Photographic supply stores and warehouses stockpiled the projectors, because there was a demand for the equipment.

What is interesting is that Kodak slide film is still being made, and although digital camera sales have picked up, the use of slide film has not diminished enough to stop production of it. Fuji also makes slide film, and both Kodak and Fuji film can still be purchased in many department stores. So if there was no demand for projectors, then why is the film still being made? The real reason that Kodak discontinued their slide projector production was to lay off employees in their facility. So it wasn't that there was no demand for the projectors, they did it just to save labor costs. So, in reality, it was Kodak that created the scenario of no demand, thereby creating a dilemma for everyone who used slide pro-

jectors.

We now also have a major planetarium show producing company that indicates that they are having trouble finding slide mounts and film for their slides. Yet the slide mounts are still very available, as is the film from Ritz and Wolf camera stores, and directly from Kodak. So, here again, we have a company that has decided, for some reason, to slowly phase out anything that has to do with slides.

Now, in most cases, such as movie theaters, schools, and businesses, the solution was simple: switch to PowerPoint. But in the planetarium field, things are a lot more complicated. Many planetariums were built and run on slide-based technology, whether you were a 60-foot dome in a museum, or a 30-foot dome in a school. Most planetariums in the country are still slide-based, and because this technology is being forcibly phased out, it could spell disaster for a lot of planetariums.

While large museum-based facilities may have the funds to switch over to all dome video or digital systems, smaller planetariums will not be able to. Slide projectors were very inexpensive, could be repaired by the operators, and have a life span of more than thirty years. The new technology runs hundreds of thousands of dollars, cannot be serviced by the regular planetarium operators, and has a life span of just a few years before the technology becomes obsolete. Small schools and museums cannot afford the costs or the staffing for this new technology. This could cause the demise of many planetariums during the next several years.

Along the same lines, many planetariums that cannot afford to switch over might keep their older technology by making repairs, thus causing a "leveling off" of the purchase of the new technology. But at the same time if planetarium companies stop making slide-based shows, even if planetariums have the slide based technology, there will be nothing for them to purchase.

It is an interesting dilemma.

It is unfortunate that the evolutionary course of the planetarium field is the newer digital/video technology. It is this evolution that is turning many planetarium domes into movie theaters, instead of astronomy centers. The personnel are also evolving, which is driving this new technology. When I went into the planetarium field 34 years ago, like most people back then, I went into this field because I wanted to be an astronomy educator. Most people coming into the

planetarium field today are not astronomy people, but technical/video/computer people, who see the dome as a place to advance their technology and not teach astronomy. So these folks think that the latest technology is better. Unfortunately, this is not the case.

When we did the first renovation at the Suits-Bueche Planetarium back in 2003, I chose the slide-based technology. Why? Because slides still give sharper and more colorful images up on the dome. Far superior to any digital or video system. How, as planetariums, can we teach people about the beautiful, clear, colorful images we get from Hubble, and then put them up on domes in video/digital format, all blurred-up and

We always get people telling us that the shows they see in my planetarium are clearer than at planetariums X, Y and Z. And all of those other planetariums they tell me about are using the newer technology.

washed out? Why even teach about Hubble, if we are going to destroy its images up on the dome? We always get people telling us that the shows they see in my planetarium are clearer than at planetariums X, Y and Z. And all of those other planetariums they tell me about are using the newer technology.

If we really care about the quality of what we put on our domes, we should be fighting furiously for the continuation of slide-based programs. But if the technology is not there, and the companies are not there, then, quite frankly, the planetarium field will shrink to just a few major facilities (like back in the 1950's), that can afford to change, and they will just be movie theaters.

Do I want to totally do away with the new technology? No. When a program calls for it, I do use video. Am I concerned about my old slide-based technology? Not in the near future. My new (as of 2003) Kodak slide projectors will last another 25 years, with no upgrades needed. If my museum moves to a new facility, with a larger planetarium, we will go to a Hybrid system with our Chronos, all dome video, and our 23 slide projectors and all of our 30 year-old Sky-Skan special effect projectors. This way, we can run our old classic Loch Ness shows in clear, beautiful color, and also run newer programs if the situation warrants it.

But it is important, for the survival of the planetarium field as an astronomy education resource, to let production companies know

(Please see **Forum** on page 57)



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“Quality presentation technique is the key—equipment is just the tool.” I am certain you have heard that phrase before! Recently Steve Tidey asked me to write some comments about current technology in the planetarium. You can read my response in this issue’s “Forum” column. As I was thinking about my response I was reminded of a few incidents that occurred which made me realize that, although we are experiencing a revolution in the planetarium business, we do not need to feel pressured or disappointed if we cannot get the latest and greatest equipment. Let’s keep our eyes on our goals. If you are inclined and lucky enough to have the needed funds to get updated equipment, that is great. However, we can still give high quality presentations that impress and engage the audience even with “outdated” equipment.

### First Incident

I was setting up my STARLAB in a gymnasium at an area elementary school one day and I stopped to make sure I thanked the

gym teacher for allowing me to use her space. She exclaimed that she was really pleased to be able to accommodate me because every year she could see how excited the children were to have the planetarium in their school. We discussed the simple but amazing technology of the STARLAB, a single slide projector and a small CD player and how impressed the students were with these basic tools. The teacher explained that she too uses a simple tool in her work: a record player! She said that one day a student asked if she would please play her “big CDs” again for class because she loved to hear that music! This teacher used a simple tool to enhance her already quality lessons. This teacher sees no need to upgrade to a high-tech digital sound system and would rather spend her money on more gym equipment. The current system works for her and her students. My source of music is similarly simple: a small portable CD/tape player. It works for me.

### Second Incident

While training a new STARLAB teacher for my former employer, OCM BOCES, I explained that we sometimes use a slide projector during our lessons. The trainee, who was a classroom teacher for the past 10 years, had only used a computer and PowerPoint presentations during her lessons in her classroom. She exclaimed, “Could you please show me how that thing works because I have never used one before!” She kept her thoughts about using such outdated equipment to herself. Later I demonstrated a live lesson for her. I taught a class of 14-year-old students, and used the slide projector to augment a lesson on deep sky objects. My trainee was amazed at how the students enjoyed the slide projector images and how this simple technology, along with a basic analog projector, effectively excited students and touched off an in-depth discussion of the subject matter. OCM BOCES does not have any extra money to update equipment and will probably use a slide projector for at least the next five years! Schools keep booking with us, so the presentation technique carries the day!

### Incident Three

A quality systems engineer recently posed a question to a group that I am associated with, the Technology Alliance of Central New York. He queried, “I am putting together a meeting in April, where the guest speaker will need a slide projector with carousel. Does anyone have such an animal they would be willing to loan me for a night?” Luckily, several of us still have carousel slide projectors and can afford to loan one out for a night! I hope that the slides that this lectur-

er presents will not be filled with words that distract the audience, but with powerful images...the way a good PowerPoint should be designed! You see, the equipment is the tool. Whether high tech or low tech, we still have to be very careful about how we use it.

### Emails Received

Elizabeth Hallahan recently wrote to say:

“Hello Susan - I saw your information on the STARLAB Website. Allow me to introduce myself, my name is Elizabeth Hallahan and I am currently a graduate student pursuing a degree in adolescent education at St. John’s University, with a BS in mathematics, so my area of certification is mathematics.

“The product and everything about STARLAB looks very exciting. I am looking to plan a unit on intermediate level math and wanted to bring in something fun and different. Astrology and the planetarium seem like a very good topic, something the students can relate to. I can see how it can easily tie to science standards, but was wondering how you have utilized it before to tie to NYS math standards.

“I thought perhaps a project approach or a multidisciplinary use could be appropriate but would want the focus to be more on the math standards as opposed to the science standards.

“Could you provide further information, or guide me in the correct direction, or let me know how you have utilized the planetarium theme with a focus on math. I also live close to the Vanderbilt Planetarium so I would incorporate a trip there as well.

“Thanking you in advance for your time and feedback.”

I wrote back to Elizabeth and explained, after I educated her about the differences between astrology and astronomy, some ways to use the planetarium to incorporate measurement/mathematics. Examples included charting and/or graphing the seasonal changes in the length and altitude of the Sun’s path, calculating location using altitude of Polaris and the Sun and all the other facets of navigation, learning the significance of the longitude/latitude and right ascension/declination measurement system and how to use it, and studying patterns and cycles of the Moon and Earth.

Gary Kratzer, in the Winter 2007 *STARLAB e-News*, writes about some other ideas and lessons ([starlab.com/slenews/v1w07.html](http://starlab.com/slenews/v1w07.html)). I am sure that Elizabeth would appreciate hearing more ideas from some of you.

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Some of you may have already read the Dme-L posting from Larry Krumenaker, who is conducting some interesting research dur-

ing 2007 and needs our help.

He wrote: "When every high school is sweating to the reading and math testing of 'No Child Left Behind,' how does an astronomy class manage to exist? And what does the class look like compared to those of previous decades?"

"I am a PhD student at the University of Georgia, and an astronomy educator. I've been a high school physics and astronomy teacher, both in and out of planetarium situations. If high school astronomy teaching interests you, then I would like to invite you to participate in a survey of high school astronomy courses.

"The substance of my dissertation will be looking at the current status and makeup of these courses, how teachers express why the course should exist, and how 'No Child Left Behind' (NCLB) has affected astronomy teaching. The field has not been surveyed since the early 1990's, since before NCLB and even before the full effect of national standards in science or standardized testing in general. The findings could help schools that want to have astronomy courses in the future or maintain them in the present.

"I need teachers who have taught or currently teach a bona fide course in astronomy

at the high school level. It doesn't matter if you are a regular classroom teacher or a planetarium educator. Your name and school identification information will be removed from the dissertation and future published articles so you can be assured of anonymity. If you agree, all you will do is simply take a survey, which may take 30-45 minutes at most. A few teachers will be interviewed. Your voluntary participation in this project will take place at one of three times between January and September of 2007.

"If you would be interested in helping assess the national view of astronomy at the high school level, please contact me by email at [lkrumena@uga.edu](mailto:lkrumena@uga.edu). A more formal invitation to participate will be emailed to you. You may also mail an inquiry to me at Larry Krumenaker, Department of Math and Science Education, 212 Aderhold Hall, University of Georgia, Athens, GA 30306 USA."

While this is a project that pertains to teachers in the USA and the very special circumstances of the "No Child Left Behind" initiative ([www.ed.gov/nclb/landing.jhtml](http://www.ed.gov/nclb/landing.jhtml)), I think we will all be interested in the Larry's findings. He will stratify his results according to whether the teachers used a fixed or

mobile planetarium or no planetarium at all. I have asked him to send me a copy of his completed dissertation. If others would like to discuss how Larry plans to approach this interesting project so that you can participate in it, replicate it, or design one of your own for your specific country, I am sure he would be happy to have communication with you.

## A Week in Italy

Carolyn R. Kaichi (Bishop Museum, Honolulu, Hawaii) was chosen as the lucky 2006 American Planetarian in Italy Contest winner. Her report of that awesome experience is written below. Sounds like she had an exciting, challenging and rewarding trip!

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To learn more details about the American Planetarian in Italy opportunity, please go to: [www.astrofilibresciani.it/Planetari/Week\\_in\\_Italy/Winner\\_Week\\_Italy.htm](http://www.astrofilibresciani.it/Planetari/Week_in_Italy/Winner_Week_Italy.htm).

(Please see **Mobile** on page 57)

## A Week in Italy: Final Report

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2006 Week in Italy winner Carolyn R. Kaichi at the Serafino Zani Observatory. Photo provided by Carolyn Kaichi

When I initially embarked on this adventure to Europe, there were many unknowns that were still unanswered. I believe I had expected more direction on the part of the coordinators and even with my correspondence with Loris there were still a million questions. I had read a few reports from others who had been selected in previous years, but none of the experiences seemed exactly alike except for the STARLAB and planetarium elements. I am somewhat anal and this uneasiness was enhanced by the fact that I had never been to Europe before.

Imagine my surprise after almost 24 straight hours of travel, after Loris had picked me up from the airport in Verona, he announced that I was going on a little "tour" of some of the sights of the area. Blearily I admired the beautiful shore of Lake Garda and the countryside of Brescia. I had arrived shortly after noon (keep in mind Hawaii is exactly 12 hours behind Italian time) and Loris insisted I "stay up" instead of napping, which I would have dearly wanted to do! Instead, I found myself hiking briskly up the mountainside with his family and friends to collect chestnuts—an activity I thoroughly enjoyed. That set the tone for the entire week—one of twists and turns and great experiences.

The next day I met Loris at the Museo Civico Scienze Naturali, where he was instructing a group of first graders. I was waiting for Loris to finish his class so I could show him my PowerPoint and discuss the upcoming week when I found myself in front of the class showing pictures of Hawaii to the children. They were attentive and delightful. Even the teachers, who were initially wary of me and wouldn't allow me to take pictures of the children, were friendly and conversational by the end of the class.

The following day was the official start of my instruction, and Loris picked me up in the morning and drove to the first school. Again, there were little surprises along the way.

I started off my presentation by having the students sit outside of the STARLAB, where I did a power point on Hawaii, its geology and the Hawaiian legend of the islands' creation:

*Pele, the goddess of fire, battles her sister Poliahu, goddess of ice, over a two-timing god. The sisters fight over the ocean, and as Pele touches the water over the area that is now the Hawaiian Islands, the islands are created. Finally the sisters come to rest on the Big Island of Hawaii, where they both reside to this day. Pele reigns over Mauna Loa, the still-active volcano, and Poliahu reigns over Mauna Kea, capped with snow and ice in the winter.*

I then moved into volcanology and the geology of the formation of the Hawaiian Islands, relating it to the Hawaiian legend.

I also showed some highlights of the Bishop Museum and told the story of how the museum began. American businessman Charles Reed Bishop founded the Bishop Museum in 1889 as a tribute to his wife, Princess Bernice Pauahi Bishop. Princess Bernice was next in line to become Queen during the time of the Hawaiian monarchy. Against her family's wishes and to their great disappointment she gave up the throne to marry the commoner and a man of non-Hawaiian descent. Their love transcended her death as Charles dedicated their fortune to educate Hawaii's children by founding both the museum as well as a school.

At this point, we talked about the Polynesian people as explorers and how exploration is inherent in humans from the early explorers to modern day astronauts and scientists. Parts of the presentation were recorded with narration and a soundtrack from a Bishop Museum STARLAB program, which is a large file and can be sent on CD by request (Loris was left with a copy). The PowerPoint also includes a famous legend narrated by a Hawaiian storyteller, about the formation of the Hawaiian Islands:

*Maui, the "Hercules" of Hawaiian mythology, was out fishing with his brothers in the middle of the Pacific with a magic fishhook that was given to him by his grandmother. Maui tells his brothers to paddle without looking at him and promises that they would return with a large catch of fish. Soon the brothers feel a huge tug on Maui's line, and they ask what he has caught. But Maui doesn't tell them and warns them not to look back. Eventually the brothers are overcome by curiosity, and turning to look at Maui, they break the magic spell. They see that Maui has pulled up the bottom of the ocean with his magic fishhook. However, because the spell was broken, Maui was only able to pull up the tallest peaks, not the great continent of land he was trying to reel in. The peaks of the land become the Hawaiian Islands. Suddenly the line snaps, and the fishhook flies up into the sky, where it sticks to become the constellation Ka Makau Nui o Maui, "Maui's Fishhook," known as Scorpius in the West.*

Next we convened in the STARLAB, where it usually took a few minutes to get everyone settled down. Although they were high school students, I find that kids of all ages get very excited, especially if it's the first time they are experiencing a STARLAB program. I was a little surprised that the Italian students behaved identically to American students; some were rowdy, but most were just excited to be there.

In the STARLAB, I began by trying to do a lot of astronomy, as I had thought the previous American educators had done from reading



Caption: Carolyn and the planetarium staff with the "double STARLAB" of the Museum of Constellations (Planetarium of Lumezzane). Photo provided by Carolyn Kaichi

their reports. However, Loris made it clear after the first few sessions that he wanted more folklore and mythology, so I expounded on that. Also, although it was stated that the students had studied English, I had initially thought the classes that attended were students with some astronomy background, but that was not the case. Perhaps in different years the classes attending STARLAB are science classes. but in my case they were all English-language students.

Another myth I told was about Maui and the Sun, and I was able to demonstrate daily motion in the STARLAB while relating that legend.

*The story starts with the Sun, or La, moving too fast across the sky making the days pass too quickly. Maui's grandmother weaves a rope out of her hair and tells Maui to go to the top of the tallest mountain where she lived to catch the Sun. Soon Maui snags the Sun with his grandmother's rope and tells the Sun to slow down. The Sun refuses, so Maui breaks off a few of the Sun's legs (the "rays"). That resulted in the Sun moving slower across the sky and now the days and nights pass at a more reasonable time period. Sometimes La is able to move more quickly across the sky, which causes the winter days to be shorter. Other times*

*La is tired and limps across the sky, which is why the days of summer are longer. The mountain that Maui climbed to catch the sun is on the island of Maui and is named Haleakala. Hale means "house" and a kala means "of the sun." It currently houses a number of astronomical telescopes, some of which study the Sun.*

I then showed the sky of Brescia compared to the sky seen from Hawaii, and showed the position of the North Star at the two latitudes. The North Star, or Polaris, is referred to in Hawaii as Hokupa'a, or "stationary star." I talked about how Hokupa'a is used as a navigational star, not only all over the northern hemisphere, but also by Polynesian navigators, who have 'rediscovered' the lost art of navigating by the stars as their ancestors did thousands of years ago. From there, I showed the Big Dipper and the "pointer stars." I had forgotten that in many places in Europe, the asterism is not referred to as a dipper, and so we talked about the different names: the Cart, the Plow, and the Bear. Then I related the Native American tale about the little bear who woke up in the middle of winter.

*Little Bear woke up in the middle of his hibernation and couldn't get back to sleep. He was hungry and thought, "If I could only get a little snack then I know I'll have no trouble getting back to sleep!" So he got up and stuck his head out of his cave. In the middle of winter where bears live, there is little to eat. So the little bear found himself walking through the barren land with no food in sight. In time he came to a big lake frozen over with ice. Under the ice the bear could see the lake was full of fish. "If I could only get one of those fish, how happy I'd be," thought the bear as he looked for a hole to stick his paw through. At last he found a tiny hole, just big enough for him to stick his little tail through. He thought, "Those fish will see my tail and think it's food, then as they bite at it I'll pull them out and eat them!" So he stuck his tail in and waited. He waited and waited and waited...and fell asleep waiting. He woke up two weeks later to find his tail frozen solid in the ice! So he pulled and pulled and pulled—the more he pulled the longer his tail became, until finally he shot out and flew up into the sky and became the bear with the long tail we see today.*

I pointed out Scorpius and illustrated how the tail of the Scorpion is difficult to see from 45 degrees N latitude in Brescia. I also pointed out the Summer Triangle stars, and told the story from Japan about the holiday called Tanabata.

*The Weaving Goddess Orihime weaves beautiful silk cloth for the people of her land. The handsome herder, Kengyu, falls in love with her and the two spend so much time together they begin to neglect their duties. The King of the Gods, father of Orihime, realizes he must correct this problem so he places the two lovers across a vast river in the sky—the Milky Way. Now Orihime and Kengyu cannot be together except on one day. On the seventh day of the seventh month, a flock of birds fly up to the sky and form a bridge for the two lovers to travel across the river to be with each other for a day. The people of Japan celebrate this day with a national holiday called Tanabata. On this day feasts and celebration take place in recognition of this joyful event.*

I stuck with that format for the rest of the week, going to another high school on the last day—the one with the “magic walls.” I couldn’t get a real handle on what that was, from previous reports, but quickly understood that was simply projecting the STARLAB on blank classroom wall space. At first that seemed like a strange concept, but when I actually did it I realized it wasn’t as bad as I thought it was going to be. The stars showed up quite nicely and although you couldn’t get the effect of a real “sky,” you could effectively show small areas of the sky fairly well. And certainly it was the only way to accommodate the larger numbers of students that were in each session (50+).

For some reason there wasn’t a teacher workshop as I had expected, although on the last day I did present a program at the planetarium in Lumezzane for a group of public and staff of around 15 or so. This was the only time I also met some of Loris’ colleagues, whom I had hoped to meet earlier in the week but never had the opportunity. The planetarium program seemed to be well received and I hope that people understood most of what I was trying to present. The program was the expanded version of my Explorers program that I used during the week.

I believe that I fulfilled my part of this special opportunity and I hope I contributed to the overall pool of knowledge this program was created for. I thoroughly enjoyed the entire experience and would gladly do it again if I had the chance. I cannot say enough about Loris’ hospitality and dedication as a teacher, and by the end of the week I felt like part of his family. His children and friends were warm and accepting and I was extremely fortunate to have met them. But without Loris’ guidance and assistance I would not have had the same incredible adventure this turned out to be. Traveling alone in a country without the language skills would have been pretty intimidating without Loris’ travel tips and encouragement. He encouraged me to take those day trips out to Brescia’s city center, Verona, and Milan when I was a little perplexed by the public transportation. Without his persistence, I would not have experienced half of the amazing sights that I did and now I wish I had more time to spend traveling in that wonderful country. Thank you again to Loris, Jane Sadler at Learning Technologies Inc. for this opportunity, and Susan Button from Quarks to Clusters for your support!”

Aloha, Carolyn

☆

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*(Mobile, continued from page 54)*

The deadline for a 2007 application is April 15. To receive application materials you can write to me or to Loris Ramponi (Associazione Amici dei Planetari, c/o Centro Studi e Ricerche Serafino Zani, Via Bosca 24, 25066 Lumezzane Italia) or fax 0039 30 87 25 45; mobile 348 56 48 190; email info@serafinozani.it or loris@colibrionline.it.

### Special Effects:

You may remember a wonderful contribution to the September 2006 Mobile News column by Russell D. Sampson. At that time Russell shared some ideas about a simple, inexpensive aurora projector. Well, he wrote again to tell me about another marvelously simple and effective “trick of the trade!” Thank you very much for sharing Russell; his “twinkling stars” method appears on Page 58.

Susan’s Note: If you are working with a portable planetarium, you do not have to climb a ladder to reach the projector!

Be sure to check out the “Planetarians’ Calendar of Events” on Page 87 for some workshops of special interest to portable systems.

**Signing Off:** That’s all for now folks. Keep in touch; it is through contributions from you that this column remains interesting and relevant to all of us. ☆

*(Forum, continued from page 53)*

that they need to keep producing classic slide-based shows. Hey, the auto companies don’t stop production of stick-shift cars even though the demand is very low, so why are planetarium production companies phasing out slide-based shows when the majority, a very large majority of planetariums in the country, is still slide-based?

We still need classic slide-based shows. It may be old technology, but it still works damn good!

Steve Russo  
Suits-Bueche Planetarium  
Schenectady Museum  
Schenectady, New York 12308, USA

★★★

The topic you’ve just read responses on was a pretty serious one, so let’s go in the complete opposite direction for the next column and go for something much more potentially light-hearted:

**If you ever become a space tourist (hey, you never know!) what would you most like to do in space? (Keep it clean!).**

If you’d like to share your dreams about the above, write them on the exterior of

Spaceship One and have it parked in my garden, all fuelled up, by the deadline of April 9, 2007.

So, can I let you in on a big discovery I’ve just made? Great! Gather round everybody. Come on, closer, don’t be shy. OK, for the last few days I’ve been slaving over a hot abacus (yeah, right) conducting a rigorous scientific survey of the planetarium profession. And here are my peer-reviewed conclusions. (If you believe that, you’ll believe anything...): the world is continually in a delicate balance; every time somebody outside of the planetarium profession does something incredibly dumb, somebody within our profession does something good and worthwhile which maintains the delicate balance! Disaster is averted! So, until next time, keep doing all that good stuff, because if you don’t, the Earth is in dire peril of tipping over into some weird alternate universe thingy in which our planet orbits two suns so it never gets dark, people never see the stars, space educators aren’t needed, none of the shops stock sticky toffee pudding and custard, nobody has invented ice hockey... Oh, it’s all too horrible to contemplate.

OK, that’s it for now. I’m off to NASA to ask why, if their rocket scientists are so clever, they can only count backwards... ☆

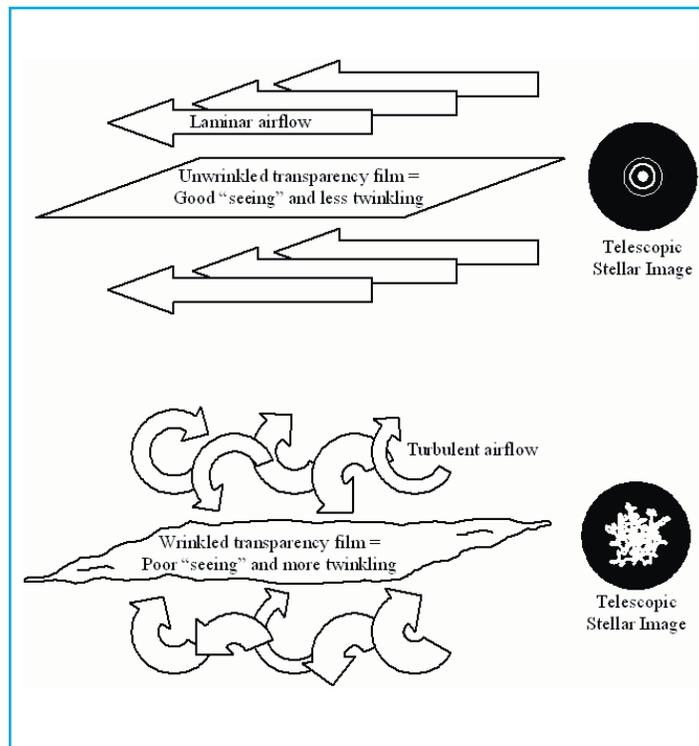
# A Simply Scintillating Demonstration

Russell D. Sampson  
Robert K. Wickware Planetarium  
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One of the most common questions we get in the planetarium is “why do the stars twinkle?” It is such an obvious part of people’s experience of the night sky, but in most of our planetariums the stars appear unnaturally still.

I co-direct a 60-seat planetarium at a liberal arts university. We offer public shows three or four times a semester. One of my favorites was our *Cosmic Question Show*. Here the public was asked to submit their questions and we then prepared a show around a selection of the best submissions. Last semester I received a question asking why the stars twinkle. I produced a short PowerPoint presentation complete with animations, but it was incomplete and somewhat inconsistent with the experience in the planetarium. The presentation stood in glaring contrast to the un-twinkling stars the audience would see from our Spitz A4 star projector. To address this shortcoming, I devised the following demonstration.

In the PowerPoint presentation I explained to the audience that twinkling—or astronomical scintillation—is caused mostly by turbulence in the Earth’s atmosphere. Like the weather, the amount of twinkling can change from minute to minute and day to day and from place to place. Related to scintillation is the distortion of extended astronomical objects by the Earth’s atmosphere—for example the blurring of planetary images. The amount of distortion is often referred to as “seeing.” A good (and somewhat common) analogy is that looking at the stars from the surface of the Earth is like bird watching from the bottom of a swimming pool. The clarity of the birds you see will depend on how calm or



The schematic illustrates laminar airflow which is simulated by an unwrinkled overhead transparency. The schematic to the right represents an idealized and highly magnified image of a diffraction limited star - an image seen under excellent “seeing” conditions when scintillation is also reduced. The lower set of schematics illustrates turbulent airflow which is simulated by the wrinkled transparency film. The turbulence produces poor “seeing” and thus increased twinkling and is illustrated by the corresponding stellar image.

turbulent the surface of the water is.

I then took a blank sheet of overhead transparency film to further demonstrate the phenomenon. Try not to use the cheaper brands since they are more brittle. With the stars on, I turned up the cove-lights, walked to the center of the dome, and held the transparency up to the audience.

I suggested that the Earth’s atmosphere is, for the most part, a clear layer of gases—not unlike a sheet of transparency film. I then told the audience that the “calm” state of the atmosphere (i.e. laminar flow) is like the flat unwrinkled transparency film (see Figure). Under this kind of atmosphere our view of

the stars is relatively undistorted and so the stars do not appear to twinkle as much. At this point you may want to talk about where on the Earth this kind of atmosphere is most common—for example in the middle of the ocean or high off the ground. You may also want to explain how astronomers are always seeking these kinds of places for their observatories in order to get the sharpest views of the stars and planets. The ultimate location with the best seeing is, of course, in outer space.

I then told the audience that when the atmosphere is turbulent it mixes layers of warmer and colder air together. This mixed-up atmosphere is made of countless little cells of warmer and colder air. These little air cells act as lenses that bend the starlight as it passes through our atmosphere.

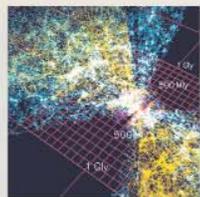
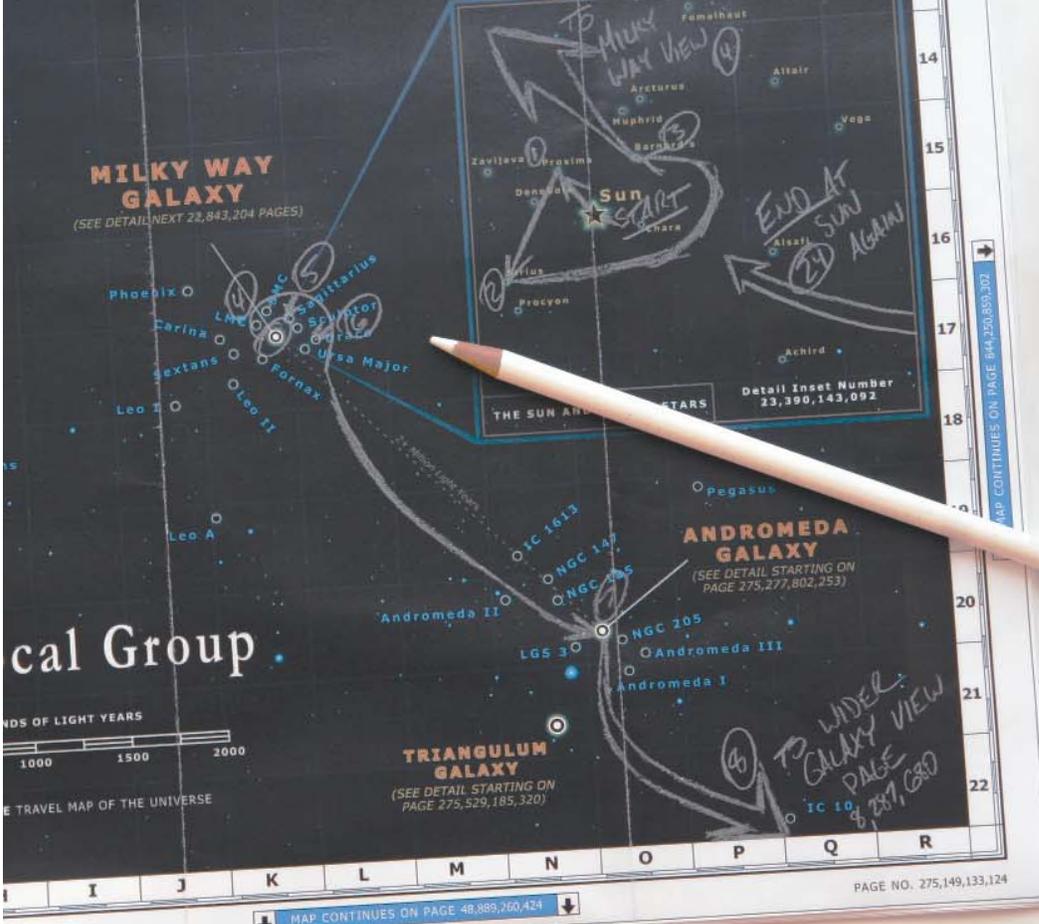
At this point I crushed the overhead transparency with my hands. It’s good to lower your voice and pause just before you do this to add a little drama to the demonstration. I then carefully opened the crushed transparency and revealed to the audience the folds and ripples. I explained that the air’s turbulence acts like little ripples in the atmosphere and these ripples will distort the images of the stars and planets. As the wind carries these ripples in front of the stars the starlight will appear to scintillate or twinkle. At this point I turned off the cove lights and carefully placed the wrinkled transparency in front of the star ball of the Spitz. Again, to add to the theatrical quality of the demonstration, I climbed a ladder to reach the star ball. I then gently waved the transparency in front of the projector and the stars on the dome twinkled. ☆

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Full Dome plug-in for DigitalSky 2



The Digital Universe Plug-in for DigitalSky 2 is a partnership between Sky-Skan and the American Museum of Natural History.

The Digital Universe was developed by the American Museum of Natural History in collaboration with the National Aeronautics and Space Administration (NASA). Copyright 2000-2006, the American Museum of Natural History. All rights reserved.

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# Digital Frontiers



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Digital domes are popping up everywhere. At the start of 2007, there were 248 theaters worldwide listed on Loch Ness Productions' THE FULLDOME THEATER COMPENDIUM ONLINE!<sup>1</sup> Planetariums qualifying for this list include domes ranging from 3m to over 23m, resolutions from 1 million pixels to over 12 million pixels, facilities both fixed and portable, domes both tilted and non-tilted, seating both concentric and unidirectional, and projection systems ranging from one to 11 edge-blended projectors.

How does someone considering a new digital theater sort through this bewildering range of choices? Let's take a closer look at some of the tradeoffs and choices involved in full-dome theater design, from the dome screen to the projector.

## Hemispheric Projection

Raster-based dome video projection has come a long way since the first edge-blended CRT (cathode ray tube) projection systems were demonstrated in early 1997 by Spitz and GOTO Optical. Two factors have accelerated the move away from CRT projectors. First is the inevitable obsolescence of the CRT. With only two major manufacturers remaining, support for this inherently analog technology is clearly waning. The second factor is the low cost and incredible success

of digital projector technologies, including the Texas Instruments' Digital Light Processor (DLP) and Liquid Crystal on Silicon (LCoS) spatial light modulators. Manufacturers of digital projectors have been very helpful in improving projector performance for the planetarium market, including a special iris that boosts contrast. Even with this, contrast remains an issue for digital projectors (one exception: SEOS recently demonstrated the Zorro projector with greatly extended dynamic range). Because of the contrast issue, make sure your system (not individual projectors) has 2000:1 sequential contrast<sup>2</sup> or greater, or you will be disappointed with the black levels, especially if operating in conjunction with an optomechanical star projector. Also, you will want a brightness of 0.5-1.0 foot-Lamberts if possible to achieve film-like color saturation.

The typical DLP based system utilizes 6 projectors, similar to CRT configurations, to cover the hemisphere. Because these projectors are digital with fixed pixels, it is now possible to add an auto-align feature that automatically adjusts geometry, color balancing, and edge-blends. Because of the difficulty of manually aligning multiple projectors on a spherical screen, I personally would demand an auto-align feature for systems with 4 or more projectors, though it will add to the overall cost and not all vendors can deliver auto-alignment. As with all digital projector systems, inquire about lifetime and recurring cost of lamps, which can vary widely. Multi-projector edge-blended systems can scale up to extremely high resolutions, but this comes with an associated increase in system cost and complexity, as shown in Figure 1.

LCoS projectors are now available in much higher resolutions than DLPs, allowing ultra-high resolution full-dome displays with as few as 2 projectors. The Sony SXRD 4k projector boasts a resolution of 4096 x 2160 pixels. Fed by four DVI inputs, each SXRD can cover half of the hemisphere with

an appropriate custom lens, and is offered by several full-dome vendors, including E&S, Sky-Skan and Zeiss. When fed by an 8-pipe render cluster, the result is over 12 million pixels on the dome after vignetting and edge-blending are accounted for. Make sure you see the quality of the projected image (crisp focus across the field) and edge-blend when shopping for such a system (should be a nearly invisible blend for solid colors and black). Also, the SXRD contrast is limited, which could be an issue if operating in conjunction with an optomechanical star projector. This 2-projector full-dome solution is very robust and low-maintenance, and would be high on my list of systems to consider.

Laser projectors are relative newcomers to the planetarium field. Display lasers are efficient, solid-state light sources and produce beautiful, highly-saturated colors for an extended color gamut that includes hot pinks, deep reds, and lime greens. Zeiss introduced ADLIP to the planetarium market sev-

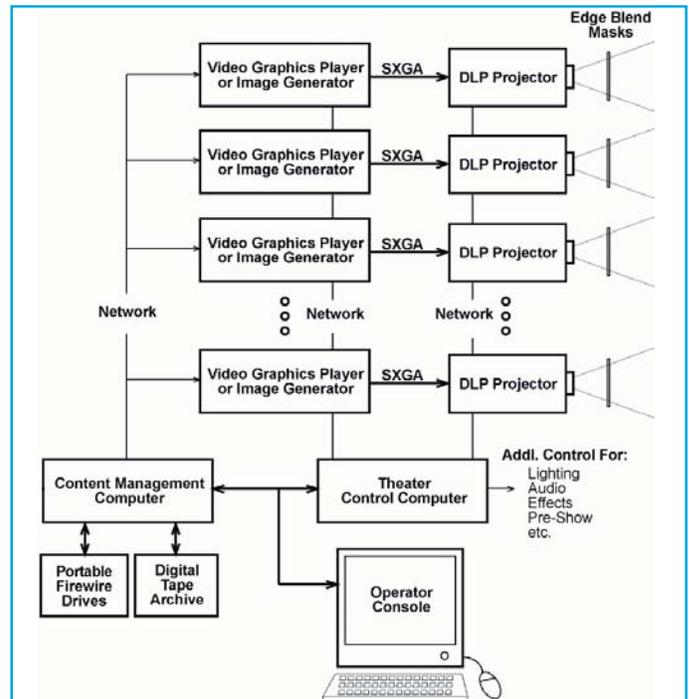


Figure 1. Typical multi-projector edge-blended full-dome projection installation. Diagrams by author.

eral years ago. ADLIP HD utilizes multiple edge-blended scan heads (typically 6) to create a high-resolution, full-dome image. Scan heads are remotely connected to the laser units via fiber optic cables. ADLIP HD resolution is equivalent to DLP and CRT systems, and sequential contrast is very high (30,000:1) allowing the projector to be operated in tandem with optomechanical star projectors without any interference with the starfield. A more recent entrant is the ESLP laser projector from E&S that uses the grat-

ing light valve (GLV) device and mirror scanner. While initially delayed by lingering R&D issues, the ESLP is now shipping and can be seen in action at the newly renovated Griffith Observatory in Los Angeles. Laser projectors have yet to achieve widespread adoption. When shopping for a laser display system, be sure to consider long-term maintenance costs, contrast limitations, and eye safety issues that may affect your theater design.

Many smaller domes are satisfied with single-lens (fisheye) LCoS or DLP projection systems. Long before planetariums covered their domes with raster video, a company called Alternate Realities (later renamed Elumens) was quietly delivering fisheye video projectors to the simulator industry. While not quite cinematic quality, single-lens systems are simple to set up and maintain and can be driven by a single laptop computer, making them an excellent choice for smaller educational planetariums, exhibits, production workstations or portable domes (see Figure 2 for block diagram of a typical single-lens installation). For unidirectional theaters, a higher resolution can be obtained with “truncated hemispherical” systems that utilize the full pixel width of the rectangular frame with the circular fisheye image, thereby truncating the projected image at the rear of the dome. When shopping for these systems, make sure to inspect image focus for flare at the edge of the field, and color convergence.

### Seating Arrangement

As most planetariums already know, there are two basic seating arrangements: concentric and unidirectional. Unidirectional seating is by far the most popular in modern full-dome theaters, allowing stadium-type seating under a tilted dome and drawing the visitor’s eyes towards a central, vertically-oriented focus allowing the use of contemporary storytelling devices. There are numerous variations on unidirectional seating arrangements, including epicentric and chevron, but all are loosely based on the principle of angling individual seats towards the front of the theater.

The classical planetarium has concentric seating with all seats facing the center of the dome and the star projector. The common focus of the show is that area of stars at the zenith, requiring the front-row seats to recline substantially. This, unfortunately, competes with attempts to focus the audience on a presenter standing in the center of

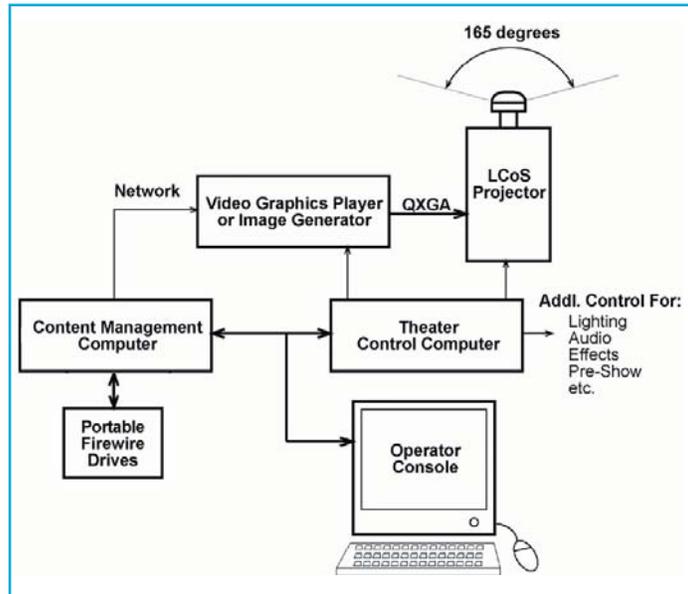


Figure 2. Typical single-projector full-dome projection installation.

the dome. Concentric seating has the advantage that the forward-looking audience is always greater than one dome radii from the dome screen (the first row in unidirectional theaters are often placed so close to the dome that one can clearly see pixels and screen perforations). Concentric seating also nearly doubles theater seating capacity compared to unidirectional designs.

Concentric seating presents serious difficulties when presenting content beyond stars, planets, and 360-degree panoramas, however. Programming featuring characters, text, or specific areas of interest cannot be seen simultaneously by all in the audience (without some severe neck stretching), requiring specialized storytelling techniques. Programming developed for unidirectional theaters cannot easily be adapted to concentric theaters, while the reverse is fairly easily accomplished. Some concentric planetariums simply populate only half of the theater when presenting unidirectional programming.

### Dome Tilt

Unidirectional theaters have the additional choice of dome tilt. By tilting the dome screen, visitors may sit in a more upright position, and a virtual horizon line can be simulated that is true to gravity and includes substantial imagery below the horizon line. Dome tilts range from slight (10 degrees or less) to extreme—up to 25-30 degrees. There are distinct architectural challenges created by small domes with slight tilt having to do with ingress and egress. Ideally, the dome spring-line (or base-ring) is very close to the eye-plane of viewers to maximize the immersive effect. Doorways must fit under

the dome, forcing a high dome height. Tilted domes allow greater height towards the rear to better accommodate doorways.

Extreme dome tilts create other challenges, including visitor disorientation or vertigo. To minimize vertigo, visitors typically enter at a lower level and exit at a higher level, preventing them from having to walk downwards. Another is a possible safety hazard that is created when the seat backs do not rise appreciably above the level of the rows behind them, creating a forward drop-off without a safety rail. I personally find a dome tilt of around 20 degrees a good compromise, offering ample foreground under the horizon, slightly reclined seating, and good clearance at the rear for doorways.

Interestingly, the eye is very tolerant to programming rendered with a particular dome/horizon tilt and played back on a system with a different tilt. One study by Spitz Inc. suggested that a 15 degree camera tilt provided the best results on all dome tilts ranging from 0-30 degrees<sup>3</sup>.

### Dome Screen

When designing a new facility, the most important factor driving cost and performance is the dome diameter. Building costs are impacted by square footage and ceiling height, which are dramatically impacted by even a small increase in dome diameter. Theater revenues and audience throughput are a function of seating capacity, which scales according to area. A 12m tilted dome with unidirectional seating can seat approximately 75-100, while a 15m dome seats 125-200 and a 23m dome, 250-300. Less seats generally indicate greater comfort (wider rows providing additional legroom) and better viewing experience (seats are not too close to the front or sides of the dome screen).

Dedicated digital dome theaters most often use a truncated hemisphere or hypo-hemisphere with 165-170 degree total elevation. This tends to bring the dome center of radius down to eye level and reduces the required ceiling height slightly. Dome screens are typically powder-coated or painted perforated aluminum which is largely transparent to sound and allows free air flow and partial passage of water from fire sprinklers. Dome reflectivity is low to minimize cross-dome scatter that degrades contrast in brighter images. Reflectance (sometimes referred to as “gain”) of 0.3 or even lower is best, assuming that the projection system is

bright enough to tolerate the resulting loss in image brightness. Dome reflectance of over 0.5 will look very washed out with brighter images.

When selecting a perforated aluminum dome screen, be sure to inspect the manufacturer's dome surface for gain uniformity—both across a single panel and from panel-to-panel—and also panel seaming techniques. It is ideal to have a uniform dome surface without visible seams to maximize “sense of presence” by removing “reality cues,” reminders that one is simply sitting under a dome screen.

The trend in recent years is to provide an unobstructed 360° gap between the bottom of the dome and the “knee wall,” creating a very flexible projection cove for the placement of video projectors, lighting and special effects. With changing technologies it is difficult to predict future projection configurations, so built-in flexibility is preferred. I've even designed conduit leading to dome center in “pitless” digital planetariums just in case a centralized projection system is later desired.

Portable domes include positive-pressure inflatable fabrics (very easy to set up, suit-

able for temporary installations), negative pressure fabrics (requires assembly of support frame, suitable for semi-permanent installations), and fiberglass structures (full assembly required, suitable for permanent installations). There is also a very inexpensive “umbrella dome” on the market. Many larger planetariums also have a small portable dome for educational outreach or for show production.

### Other Choices

There are many other choices to be made in designing a digital theater, including audio system (stereo or 5.1 up to 23.1), lighting (LEDs are the best!), digital planetarium engine (typically integral to the display), and more. Many vendors will recommend standard configurations and components. Some institutions prefer to make their own choices, often with the help of a consultant who is familiar with the many tradeoffs involved and their consequences, and who can “watchdog” the vendor to ensure that they deliver as promised. In addition to theater design and resulting “wow factor” of the display, other considerations include recurring maintenance costs, required maintenance

and operational staff, ease of use for programmers and operators, upgrade capability, and risk of obsolescence.

If you are planning a new project or an upgrade, David McConville's [fulldome.org](http://fulldome.org) forum and Ryan Wyatt's [fulldome Yahoo](http://fulldome.yahoo.com) email list ([groups.yahoo.com/group/fulldome/](http://groups.yahoo.com/group/fulldome/)) are invaluable resources for asking questions and hearing the experiences of others. Doing your homework will save you needless headaches and ensure that your theater meets your expectations, both on opening day and over the years to come.

### References

- <sup>1</sup>THE FULLDOME THEATER COMPENDIUM ONLINE! ; [www.lochnessproductions.com/lfco/lfco.html](http://www.lochnessproductions.com/lfco/lfco.html)
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Great Space Treasure Hunt

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The Halloween Show

# NASA Space Science News



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I am honored to have been elected an IPS Fellow recently. I can't hold a candle to the work that all of you do and the knowledge that you have about astronomy, planetarium technology, and education. It has been my delight to work with and for you.

It seems like the last several *Planetarian* deadlines have been just before major NASA news was announced, so I didn't have anything to write about in time for the deadlines. This is catch up time!

## Barbara Morgan on Schedule

First, looking ahead to this summer, the STS-118 shuttle mission is currently scheduled to launch no earlier than June 28. Educator astronaut/mission specialist Barbara Morgan will be onboard to operate the robotic arm as part of the assembly of the International Space Station. A number of special educational activities are being planned in conjunction with the flight, although astronaut Morgan will not be teaching from space. The best way to stay informed about the STS-118 educational activities is to subscribe to the NASA Education Express listserve at [www.nasa.gov/education/express](http://www.nasa.gov/education/express). STS-118 mission information is on-line at [www.nasa.gov/mission\\_pages/shuttle/shuttlemissions/sts118/index](http://www.nasa.gov/mission_pages/shuttle/shuttlemissions/sts118/index).

Two planetary missions will launch this summer: Dawn, which will explore the asteroids Vesta and Ceres, is scheduled to launch no earlier than June 20, 2007, while Phoenix, which will land near Mars' northern polar cap, is scheduled for launch no earlier than August 3.

In September, NASA's Science Mission Directorate released the 2006 Solar System Exploration Roadmap (available online at <http://verity01.jpl.nasa.gov/sse/multi-media/downloads.cfm>). The scientific foundation is a set of fundamental questions:

- How did the Sun's family of planets and minor bodies originate?
- How did our Solar System evolve to its current diverse state?
- What are the characteristics of our Solar System that led to the origins of life?
- How did life begin and evolve on Earth and has it evolved elsewhere in the Solar System?
- What are the hazards and resources in the Solar System environment that will affect the extension of human presence in space?

A unifying theme is habitability—the ability of worlds to support life. Some of the missions envisioned include Europa Explorer, Titan Explorer, Venus Mobile Explorer, Europa Astrobiology Lander, Neptune-Triton Explorer, Saturn Flyby with Shallow Probes, Comet Surface Sample Return, Venus In-Situ Explorer, and South Pole Aiken Basin Sample Return, along with smaller- and medium-class missions, and, of course, research and analysis of the mission results. If even a few of these missions make it off the drawing board to their destinations, we've got a lot to look forward to in the next 30 years. Of course, all of these missions are in addition to the Vision for Space Exploration's emphasis on sending humans to the Moon and Mars.

In late October, NASA announced the semi-finalists vying to be the next Discovery Program mission. According to the program website, the unique approach of the Discovery Program is to increase flight rates, contain total mis-

sion costs, improve performance through the use of new technology, broaden university and industry participation, and increase public awareness of solar system exploration.

According to the press release, NASA has selected concept studies for missions that would return a sample of an enigmatic asteroid, probe the chemistry of Venus' atmosphere, and reveal the interior structure and history of the Earth's Moon. The Origins Spectral Interpretation, Resource Identification and Security (OSIRIS) mission would survey an asteroid and provide the first return of asteroid surface material samples to Earth. Michael Drake of the University of Arizona, Tucson is OSIRIS's principal investigator. NASA's Goddard Space Flight Center, Greenbelt, Maryland would manage the project.

The Vesper mission is a Venus chemistry and dynamics orbiter that would advance our knowledge of the planet's atmospheric composition and dynamics. Gordon Chin of Goddard is Vesper's principal investigator and Goddard would manage the project. The Gravity Recovery and Interior Laboratory (GRAIL) mission would use high-quality gravity field mapping of the Moon to determine its interior structure. Maria Zuber of the Massachusetts Institute of Technology, Cambridge, Massachusetts is GRAIL's principal investigator. NASA's Jet Propulsion Laboratory, Pasadena, California, would manage the project.

Also selected for further study are three missions of opportunity that would make new use of two NASA spacecraft—Stardust and Deep Impact—that have completed their



Astronauts Dafydd "David" R. Williams (left), representing the Canadian Space Agency, and Barbara R. Morgan, both STS-118 mission specialists, wait for the start of a mission training session in the Space Vehicle Mockup Facility at Johnson Space Center. NASA photo.

primary objectives. The Deep Impact eXtended Investigation of Comets (DIXI) mission would use the existing Deep Impact spacecraft for an extended flyby mission to a second comet to take pictures of its nucleus to increase our understanding of the diversity of comets. Michael A'Hearn of the University of Maryland, College Park, is DIXI's principal investigator.

The Extrasolar Planet Observations and Characterization (EPOCh) mission would use the high-resolution camera on the Deep Impact spacecraft to search for the first Earth-sized planets detected around other stars. L. Drake Deming of Goddard is EPOCh's

principal investigator.

The Stardust NExT mission would use the existing Stardust spacecraft to flyby comet Tempel 1 and observe changes since the Deep Impact mission visited it in 2005. Tempel 1 made its closest approach to the Sun in 2005, possibly changing the surface of the comet. Joseph Veverka of Cornell University, Ithaca, NY, is NExT's principal investigator.

### Mars Finalists

In early January, NASA announced the two finalists in the latest round of competitions for scientific missions to Mars. These

two mission concepts now enter a period of further study and design before one of them will be given the green light to go to Mars in the 2011 launch opportunity (Earth-to-Mars launch opportunities occur every 26 months). According to the press release, the Mars Atmosphere and Volatile Evolution mission, or MAVEN, would provide first-of-its-kind measurements and address key questions about Mars climate and habitability and improve understanding of dynamic processes in the upper Martian atmosphere and ionosphere. The principal investigator is Bruce Jakosky, University of Colorado, Boulder. Goddard will provide project management.

The Great Escape mission would directly determine the basic processes in Martian atmospheric evolution by measuring the structure and dynamics of the upper atmosphere. In addition, potentially biogenic atmospheric constituents such as methane would be measured. The principal investigator is Alan Stern, Southwest Research Institute, Boulder, Colorado. Southwest Research Institute, San Antonio, Texas will provide project management.

NASA has selected Alian Wang of Washington University, St. Louis, Missouri to study the chemistry, mineralogy, and astrobiology of Mars using instrumentation on the European Space Agency's ExoMars mission, scheduled for launch in 2013.

Two proposals for technology development studies that may lead to further NASA contributions to ExoMars or other Mars missions also have been selected. Urey Mars Organic and Oxidant Detector would investigate organics and oxidant materials on Mars using three complementary detection systems. The principal investigator is Jeffrey Bada, University of California at San Diego, California.

Mars Organic Molecule Analyzer, or MOMA, would investigate organic molecular signatures and the environment in which they exist using a mass spectrometer and gas chromatograph. The principal investigator is Luann Becker, University of California at Santa Barbara, California.

NASA's twin Solar Terrestrial Relations Observatories (STEREO) were launched October 25, 2006 and will dramatically improve our understanding of the powerful solar eruptions that can send more than a billion tons of the Sun's outer atmosphere hurtling into space: go to [www.nasa.gov/home/hqnews/2006/oct/HQ\\_06340\\_STEREO\\_launch.html](http://www.nasa.gov/home/hqnews/2006/oct/HQ_06340_STEREO_launch.html)). STEREO has already sent back incredible images: see [www.nasa.gov/mission\\_pages/sterEO/news/first\\_light.html](http://www.nasa.gov/mission_pages/sterEO/news/first_light.html).

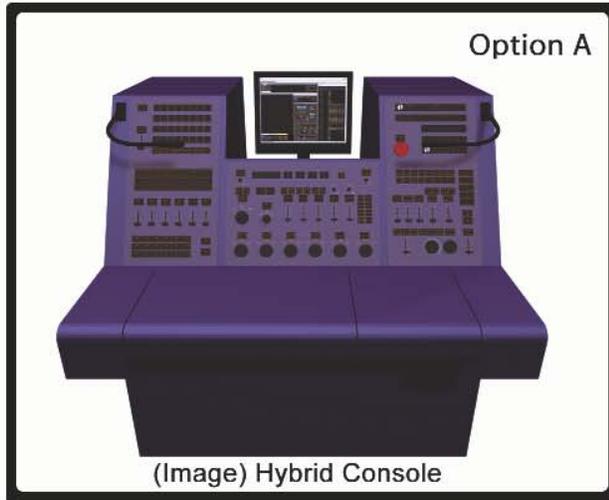
Date	Target	Spacecraft	Event
Feb 28, 2007	Jupiter	New Horizons	Jupiter flyby
Mar 16, 2007 *	International Space Station (ISS)	STS-117	Launch
Apr 25, 2007 *	Earth: Polar Mesospheric Clouds	AIM	Launch
Jun 5, 2007	Venus	MESSENGER	2nd Flyby
Jun 20, 2007 *	Asteroids Vesta and Ceres	Dawn	Launch
Jun 28, 2007 *	ISS	STS-118	Launch
Aug 3, 2007 *	Mars	Phoenix	Launch
Sep 7, 2007 *	ISS	STS-120	Launch
Oct 2007 *	ISS	STS-122	Launch
Oct 7, 2007 *	Gamma Rays	Gamma-ray Large Area Space Telescope (GLAST)	Launch
Dec 2007 *	ISS	STS-123	Launch
Dec 6, 2007 *	Earth's weather	NOAA-N Prime	Launch
May 25, 2008	Mars	Phoenix	Landing
Oct 2008	Universe	Kepler	Launch
Mar 2009	Mars	Dawn	Gravity Assist
Mar 18, 2011	Mercury	MESSENGER	Orbit Insertion
Sep 2011	Asteroid Vesta	Dawn	Arrival
Apr 2012	Asteroid Vesta	Dawn	Departure
Feb 2015	Asteroid Ceres	Dawn	Arrival
Jul 2015	Asteroid Ceres	Dawn	End of primary mission
Jul 14, 2015	Pluto	New Horizons	Encounter
*No earlier than			

(Please see **NASA** on page 68)

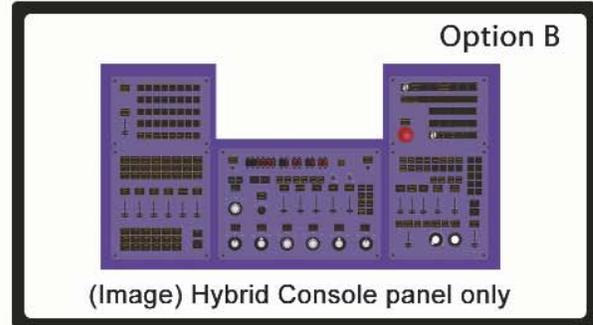
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(Image) SUPER URANUS

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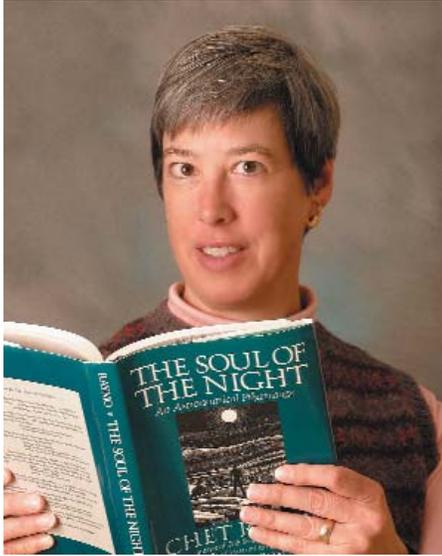
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# Reviews



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How many of you write planetarium programs? Hands? How many write classroom lessons, or scripts for demonstrations in your museum or center? I know there are newspaper column authors out there, and writers of magazine articles. How about web page text? Blogs? Email? Does anyone still write messages on paper with pen or pencil?

As you read what others have written or as you're editing your own work, have you ever "taken a step back" in your mind, and said to yourself, "Now there's a great writing

style"? Or even "Goodness. Do I write like that? My grade school grammar teacher would be horrified!"

Among all the published print on the planet, there are some real gems and there are some clinkers. This column has reviews of both kinds. Read the books if you get a chance. Analyze the styles, and see if there is anything you'd like to incorporate into your own written communication. Or anything that provides pointers on how to do better.

Many thanks to loyal reviewers Francine Jackson, John Schroer, and Ryan Wyatt for this issue's reviews. We'll begin a while back in time, and head out to the far reaches.

## *Uncentering the Earth: Copernicus and the Revolutions of the Heavenly Spheres*

William T. Vollmann, Atlas Books LLC, 10 East 53rd Street, New York, NY 10022, 2006, ISBN 0-393-05969-3, US \$22.95.

Reviewed by Ryan Wyatt, Rose Center for Earth & Space, American Museum of Natural History, New York, NY 10024, USA

William Vollmann prefaces his new book on Copernicus with a page that reads in part: "This book is a member of a series of books about science written mostly by non-scientists. In my own case, the result was an autodidact's exercise in explicating a subject slightly beyond my intellectual competence." The series to which he refers is the Great Discoveries imprint of Atlas Books and W.W. Norton.

Although many of the books in the series (e.g., Rebecca Goldstein's brilliant volume on Gödel and Madison Smartt Bell's capable treatise on Lavoisier) give concise and thorough introductions to famous scientists and their work, Vollmann has produced an absolute embarrassment to the publisher.

Although he gets much of the science correct, his labored prose reflects a level of confusion about the topic that prevents him from describing it lucidly. Core themes emerge, most prominently the aesthetic qualities of the geocentric system, with its elegant nested spheres dividing the imperfect sublunary world from the idealized superlunary realm. In fact, the author seems so captivated by the ancient Greek cosmology that he bemoans its loss and continually drifts back to an Aristotelian viewpoint.

Unfortunately, he thus presents the reader with a constantly shifting perspective—the Ptolemaic, the Copernican, and the modern, often on the same page or within the same paragraph—that disrupts the development of

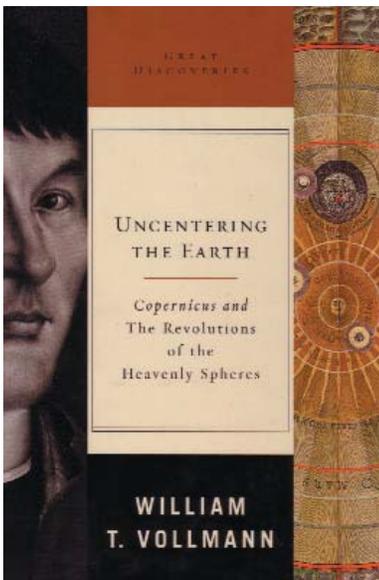
**William Vollmann prefaces his new book on Copernicus with a page that reads in part: "This book is a member of a series of books about science written mostly by non-scientists. In my own case, the result was an autodidact's exercise in explicating a subject slightly beyond my intellectual competence."**

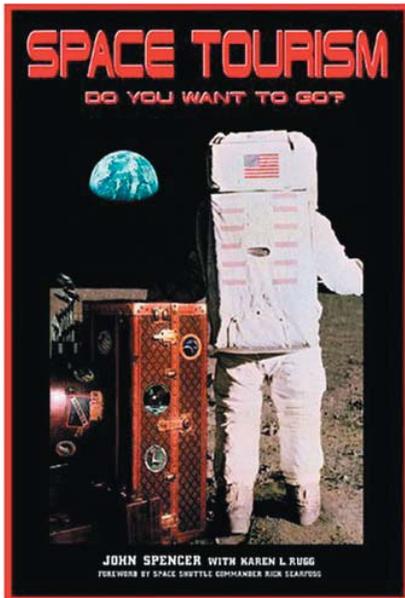
any narrative or conceptual thread. Even more damaging to the overall flow and structure of the book, Vollmann slogs through *De Revolutionibus* chapter by chapter, even when he seems unable to follow the mathematical arguments, and then, as if to share his discomfort, he complains about the experience and highlights particularly knotty and opaque portions of Copernicus's manuscript. The muddled result obfuscates concepts rather than clarifying them, and while a few of the examples give insight into how Copernicus worked, the majority come across as non sequiturs.

Vollmann also gets some of the science dead wrong. The text is littered with minor but annoying flaws: a useless and incorrect formula for angular momentum, fundamentally erroneous diagrams, and scrambled definitions, to name a few. On occasions when an astronomer-editor corrects his work, Vollmann often deflects the correction as a parenthetical or even buries it in an endnote.

At the very least, Vollmann selected appropriate books to tackle his research, and he annotates his work well. His voluminous endnotes and extensive bibliography make it easier to track down places where he has either misinterpreted or simply ignored the work of his predecessors.

Vollmann lends nothing to his topic that other authors haven't already illuminated with greater accuracy, readability, and scholarship. For a more concise history, one would do better to pick up John Henry's succinct and instructive *Moving Heaven and Earth*. For a detailed look at the Copernican system, one should reference Owen Gingerich's extensive work (e.g., many of the collected essays in *The Eye of Heaven*). And for a sense of the aesthetic impulse that underlies the Aristotelian system, one could look at C.S. Lewis's *The Discarded Image*. Vollmann touches on all these ideas, but he mangles them and never manages to sculpt a unifying theme.





### Space Tourism: Do You Want to Go?

John Spencer with Karen L. Rugg, Apogee Books, Burlington, Ontario, Canada, 2004, ISBN 1894959086, US \$20.95.

Reviewed by Francine Jackson, University of Rhode Island Planetarium, Providence, Rhode Island, USA

In November, 1997, Japan's *New Type* magazine asked its young readers, "What would you most like to do before you die?" The most popular ambition: To travel into space.

In 1992, the paper "The Prospects for Space Tourism: Investigation on the Economic and Technological Feasibility of Commercial Passenger Transportation into Low Earth Orbit" was presented at the International Astronomical Federation Congress. In March of 1996, *Ad Astra*, the magazine of the National Space Society, was dedicated entirely to space tourism. In November 1997, Japan's *New Type* magazine asked its young readers, "What would you most like to do before you die?" The most popular ambition: To travel into space. So, why aren't we?

This question had so bothered author John Spencer that he founded the Space Tourism Society to pioneer the frontier of space travel in low Earth orbit, on the premise that the public wants to go. In fact, in March of 1995, Newt Gingerich, speaking at a National Space Society policy seminar, believed that a hotel would be orbiting the Earth by 2015. So, where is it being constructed?

This book is all about the dream. In *Space Tourism*, you can actually feel the cheerlead-

ing rah-rah of Spencer and Rugg, who, in great detail, have come up with a time line for the development of what is—and should be—our next chance for the ultimate vacation. Now, surprisingly, the authors stay clear of any form of development other than tourism; their goal is strictly allowing the average person—of any age—the ability to see what, with few exceptions, only astronauts are capable of enjoying. That just doesn't seem fair to the authors, so they have come up with plans for a space hotel, shuttles to get us there, a mini computer "bot" to direct the traveler to any place he needs to go, and the computer brains to mesh this whole thing together. In fact, about a quarter of this book is titled "The Space Experience," which is the diary of a lottery winner whose prize is an all-expense-paid trip aboard the *Destiny*, the world's first orbital super yacht.

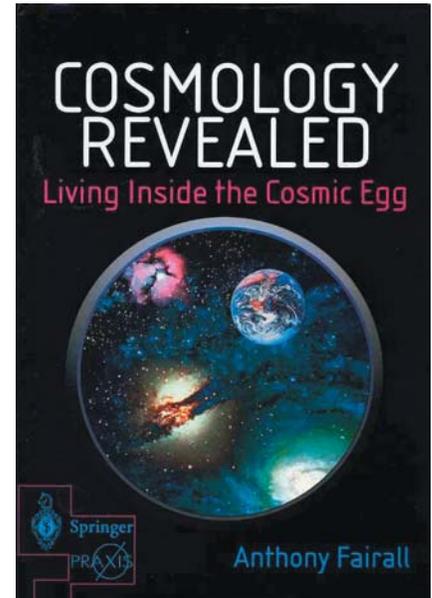
And, what lies at the forefront of this whole design and construction process is the apparent necessity to have everything paid for out of private funds. The entire industry is based on "wealthy private citizens and lottery winners," with the idea that, after this early shot in the arm, the tourism market will be able to sustain itself. The first step, though, is to convert the International Space Station into the first generation private yacht, with others quickly following. Also, the authors don't want us to forget that orbital tourism is just the first step in moving up to the Moon, then Mars. And why not?

Not surprisingly, much of the book reveres Dennis Tito, the first civilian to have paid his own way into space. His liftoff was obviously a catalyst to writing what should be a primer for anyone who has a wish to look down at the Earth. And, it works. If you read this and don't want to follow in Mr. Tito's microgravity footsteps, perhaps you should consider an imagination transplant.

Do you want to go? Read this book first. It may have you chomping at the bit to get off this planet and see it as so very few have been able to. Also, it may have you buying more (or starting to buy) lottery tickets, in hopes that you might be one of the persons responsible for an alternative destination vacation in the very near future.

### *Cosmology Revealed: Living Inside the Cosmic Egg*

Anthony Fairall, Springer-Praxis Books, Chichester, UK, 2001, ISBN 1-85233-322-7, hardbound, US \$44.95.



Reviewed by Francine Jackson, University of Rhode Island Planetarium, Providence, Rhode Island, USA

It seems as if anyone taking a course in astronomy wants to know all about cosmological principles, which, for the most part, are the hardest concepts for a neophyte astronomer to comprehend. Any introductory book on the subject usually assumes more background knowledge than the average reader has. Not so here. Tony Fairall's *Cosmology Revealed: Living Inside the Cosmic Egg* is the product of a person like us, a planetarium director who takes joy in introducing astronomy to the public.

*Cosmic Egg* starts here, at home, then expands our sight straight out of the galaxy, through the depth of the universe, or, "contained within a very large spherical shell...a cosmic egg wherein we live for...eternity. An egg that, like its chocolate counterpart,

To anyone looking to recommend a good book on cosmology, this is ideal.

never hatches. We have no way of ever knowing what is outside." From there we begin the journey both through the universe and through history, learning exactly how we found our way to where we are today. Of course, Edwin Hubble appears very prominently, but so do Vesto Slipher, whose contributions are often passed over; Fred Hoyle, of the alternative steady state; and others perhaps not normally mentioned with respect to this, such as Jaan Einasto and the really historical work of such as Richard

Proctor and the Herschels. The language is clear, concise, and very readable.

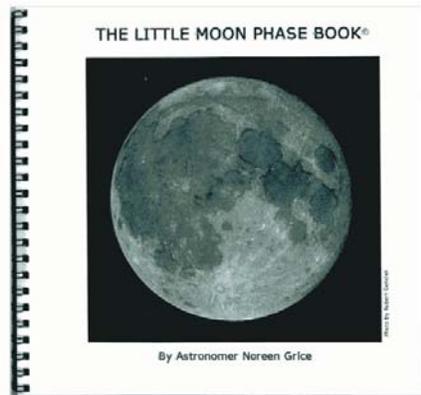
The illustrations and images contained in each chapter are perfect complements to the text. Also, there are two “beautiful” sections, one a set of Hubble images of objects in our galaxy, other galaxies, and the two “distant universe” photographs. The second is a set of three-dimensional images (glasses are in the back) starting here, in our solar system, outward through the galaxy, to the distant galactic neighbors, and ending as close as we can get to the Cosmic Eggshell.

The only downside to this book is the copyright, 2001. As with the rest of astronomy, discoveries happen too fast. *Cosmology Revealed* has everything: it is short, only about 130 pages, but to the point. To anyone looking to recommend a good book on cosmology, this is ideal.

### *The Little Moon Phase Book – English Large Print and Braille/ El Pequeño Libro de las Fases de la Luna – Español*

Noreen Grice, OZONE Publishing Corp., PMB 500 RR-8 Box 1995, Bayamón, Puerto Rico 00956-9676 ([www.ozonepublishing.net](http://www.ozonepublishing.net)), ISBN 0-9773285-0-3 US \$23.95

Reviewed by John Schroer, The New Detroit Science Center, Detroit, Michigan USA



Once in a while I come across a book that gives a new method of teaching astronomy. For many of the visitors to our planetariums, it is just a matter of getting them seated in our theater and starting our presentations. However, what could your theater do for an audience member who is visually challenged or even incapable of sight? How do you communicate the wonders of the universe and the joys of skywatching to someone who has limited vision?

One of the folks working on this problem is Noreen Grice, the planetarium operations coordinator at the Charles Hayden Planetarium in Boston, Massachusetts, USA. Noreen is also president of You Can Do Astronomy ([www.youcandoastronomy.com](http://www.youcandoastronomy.com)) and is the author of the *Little Moon Phase Book*. While only 12 pages long, this little publication has a big goal: helping the

This publication is a must-have for planetarians working with the visually challenged or impaired visitor.

visually challenged explore our nearest neighbor, the Moon. Using a large print font and Braille type underneath, the *Little Book of Moon Phases* takes you on an exploration of the Moon, why there are phases, and what each of the eight phases looks like

The *Little Book* begins with a short introduction to the Moon's motions, how it keeps one side facing towards Earth, and how the Moon's movement in its orbit creates the phases viewed by earthly observers. Noreen then guides her readers on how to use the embossed maps with each major phase.

The Moon is bordered with a hyphenated line. Lunar features are shown in photographic detail, as seen through a telescope. The maria feel like smooth areas, while craters are raised bumps. The area of the Moon not receiving any sunlight is completely smooth. At the upper corner of each page, the phase of the moon is shown as seen by the naked eye, and the sunlit area glows in the dark!

This publication is a must-have for planetarians working with the visually challenged or impaired visitor. ☆

(NASA, continued from page 71)

### **MGS Falls Silent**

After 10 years in space, the Mars Global Surveyor spacecraft went silent in November. NASA has convened an investigation to look in-depth into why MGS went silent and to recommend any processes or procedures that could increase safety for other spacecraft. MGS operated longer at Mars than any other spacecraft in history and for more than four times as long as the prime mission originally planned.

In late January, the Advanced Camera for Surveys on the Hubble Space Telescope also went blank, apparently due to a nasty short circuit. Fortunately, the workhorse Wide Field and Planetary Camera 2 can be pressed back into work, along with the Near Infrared Camera Multi-object Spectrograph (NICMOS) and fine guidance sensors.

The International Polar Year is upon us, with the official start in March 2007. The two-year IPY period runs through March 2009 because the polar research seasons at each pole are 18 months long and they overlap. The Association of Science-Technology

Centers (ASTC) is running an IPY-related project called IGLO (International Action on Global Warming) and their website [www.astc.org/iglo/](http://www.astc.org/iglo/) is likely to be a good source of information and educational activities. In a recent Dome-1 posting, one planetarian reminded us that climate is an astronomical topic—just look at Venus and Mars, for example.

And finally, another reminder to send feedback to your NASA education and outreach contacts on a regular basis, especially about how you use specific NASA resources in your shows, exhibits, programs, etc. This feedback is the only way to show that there is value in working with planetariums. Audience numbers are a valuable metric, and if you can tell us further the age, diversity, etc., of your audiences, that is even better. Remember the old adage: if management doesn't know about it, it didn't happen.

### **Highlights from 2006**

The year 2006 was book-ended by news items from Stardust, NASA's comet sample return mission. The capsule containing pristine samples of Comet Wild 2 returned to

Earth on January 15, 2006, and in December scientists revealed results about a cosmic zoo of particles formed at different times and places within our Solar System. Latest news is at [stardust.jpl.nasa.gov](http://stardust.jpl.nasa.gov).

The Japanese Hinode (“Sunrise”) satellite (formerly known as Solar-B) is also returning extraordinary new images of our Sun ([www.nasa.gov/mission\\_pages/solar-b/index.html](http://www.nasa.gov/mission_pages/solar-b/index.html)) which support many scientists' prediction that the next solar cycle is going to be a big one ([science.nasa.gov/headlines/y2006/21dec\\_cycle24.htm?list958533](http://science.nasa.gov/headlines/y2006/21dec_cycle24.htm?list958533)).

Looking away from our neighborhood, the French/ESA COROT satellite began its mission to peer into the blinding light of nearby stars in an attempt to discover the first rocky planets outside our solar system ([http://www.esa.int/SPECIALS/COROT/SEM\\_YOPQJNVE\\_0.html](http://www.esa.int/SPECIALS/COROT/SEM_YOPQJNVE_0.html)).

A newly-discovered hybrid gamma-ray burst observed by the NASA Swift mission shows us we still have many fascinating things to learn about how these energetic events create black holes and neutron stars: ([http://www.nasa.gov/mission\\_pages/swift/bursts/hybrid\\_grb.html](http://www.nasa.gov/mission_pages/swift/bursts/hybrid_grb.html)). ☆

# General Counsel



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## Planetariums and the ADA

In previous columns I have discussed issues that relate primarily to intellectual property and the rights and responsibilities associated with planetarium shows, music, images, and similar elements. Departing slightly from the general content-oriented focus of my prior columns, in this installment I hope to provide some general background on laws relating to accommodating individuals with disabilities. As usual, this column should be considered a source of basic background information on disability and accommodation law, and not a point-by-point guide to this complex area. Instead, I aim to provide you with the basic legal landscape and some key points so that when confronted with an accommodation concern, you will be better prepared to identify the relevant issues and focus the discussion with your own counsel.

## The Legal Framework

Passed into law in 1990, the Americans with Disabilities Act (“ADA” or “the Act”) serves as the primary source of disability and accommodation law in the United States. According to the legislative declaration of purpose, the ADA was designed to provide the 43 million disabled Americans with a mechanism by which to seek redress for disability-based discrimination.

The ADA is divided into four broad sections, each relating to a specific area of concern. Title I requires employers to provide equal employment opportunities to qualified individuals, regardless of their disability. Title II applies to state and local government activities, and generally requires that government services, programs, and facilities are adequately accessible. Title III imposes similar requirements on private organizations. Finally, Title IV provides accessibility requirements for telecommunications systems and requires public accommodations, whether publicly or privately owned, to provide avenues of effective communication for people with disabilities. Note that there is no distinction between for-profit and nonprofit entities—both would fall under the ambit of Title III.

Although the Act is the principal source of disability and accommodation law in the United States, the Rehabilitation Act of 1973 provides that recipients of federal funding are prohibited from discriminating against individuals with disabilities. Issues relating to the Rehabilitation Act frequently arise in the context of federal grant programs, since government agencies such as the National Science Foundation generally inquire about Rehabilitation Act compliance on the application materials and grant recipients are generally required to warrant compliance with the Rehabilitation Act in the grant contract.

Various states have also implemented anti-discrimination laws aimed at protecting individuals with disabilities. Although federal laws generally trump state laws, in some issues (such as anti-discrimination regulation), whichever law provides the greatest

protection to the public is controlling. As a result, a comprehensive analysis of your accessibility obligations requires a review of both federal and state law. Because state laws are generally verbose and complex, a review of each state’s statutes is beyond the scope of this column, and again illustrates the importance of discussing these issues with your own attorneys.

## Sections with Particular Relevance to Planetariums

Like most organizations operating in the United States, a planetarium (or museum or science center) likely has obligations arising from all four Titles of the ADA. To the extent that a planetarium serves as an employer, for example, it must comply with the provisions of Title I which generally requires that

**Like most organizations operating in the United States, a planetarium (or museum or science center) likely has obligations arising from all four Titles of the ADA.**

employers make reasonable accommodations so that qualified individuals may perform the essential functions of their jobs. The precise contours of Title I, however, are best left to a discussion of labor and employment law. In the remainder of this column, I discuss some of the major points of Titles II and III, the operative provisions of the ADA that are most relevant to planetariums in terms of accommodating disabled visitors.

As I mentioned briefly above, Title II applies to government entities such as states and municipalities. Accordingly, planetariums, museums, and science centers that are owned and operated by government entities, including state-run colleges and universities, are governed by the rules set forth in Title II. In general terms, Title II provides that a public entity may not prohibit a disabled individual from participating in any service, program, or activity solely because of the disability.

Public entities must make “reasonable modifications” to accommodate individuals with disabilities and must provide certain aids to assist such individuals participate in public programs and services, provided, however, that such accommodative aids, services, and modifications do not “fundamentally alter” the nature or character of the programs, and that the costs of the aids, services, and modifications are not passed along to those who benefit from them.

Because integrating individuals with dis-

**General Counsel is intended to serve as a source of general information on legal issues of interest to the planetarium community. Planetariums seeking information on how the principles discussed in a General Counsel column apply to their own circumstances should seek the advice of their own attorneys.**

abilities into mainstream society is a major objective of the ADA, public entities must strive to incorporate their disability accommodations into their ordinary programs and services. While it is permissible to offer separate programming for those afflicted with disabilities, it is unlawful to prohibit an individual from attending an “ordinary” program. For example, a planetarium may offer special showings of its programs with captions to accommodate those with hearing impairments, but it may not prevent a hearing-impaired individual from attending a show without the captions.

Contrary to widespread belief, the ADA does not require that public buildings be equipped with elevators, ramps, and other accommodations. It does, however, require that the programs and services that are offered inside the buildings be made accessible to those with disabilities. A courthouse with courtrooms accessible only by stairway, for example, could comply with the ADA by simply holding court sessions in ground-floor rooms. In the case of new construction or substantial alteration to existing structures, however, public entities are required to ensure that the newly designed facilities are accessible.

Facilities that are privately owned need not concern themselves with Title II, but must instead consider Title III of the ADA which is applicable to any entity that owns a place of “public accommodation” such as a restaurant, hotel, or a museum, science center, or planetarium. The requirements for Title III compliance are relatively similar, requiring public accommodations to provide an integrated setting in which it provides equal access to its goods and/or services to both disabled and non-disabled individuals.

Like public entities, a public accommodation must make reasonable modifications to its policies, practices, and procedures so long as the modifications do not impose an undue burden and do not fundamentally alter the nature or character of the services provided. While public accommodations are required to provide accessible facilities, they are not required to provide personal devices

like wheelchairs or personal services to individuals with disabilities (e.g., assistance with eating).

The rules relating to the modification of existing facilities are slightly different with respect to public accommodations, as they require physical barriers to be modified when “readily achievable,” which has been defined to mean, generally, “easily accomplishable and able to be carried out without much difficulty or expense.” If such modifications are not readily achievable, public accommodations must take alternative measures to ensure that individuals with disabilities have equal access to the accommodation’s services and programs.

As with Title II, Title III mandates that new construction and facility alterations must be accessible provided that incorporating the accessible elements is not “structurally impracticable.” The Act, and various guidelines and other documents interpreting the statutory provisions provide a morass of very specific formulae, standards, and technical explanations relating to what is and is not required under certain conditions and circumstances.

The technical complexity is far beyond the scope of this column and, once again, underscores the importance for consultation with qualified, competent counsel as well as architects familiar with ADA compliance issues before embarking on any sort of new construction or facility renovation project.

### For More Information

Although the complexity of the ADA can be daunting at first, one advantage of such intricacy is that it has led to the development of a great deal of interpretive material designed to help people understand their legal rights and responsibilities. One particularly useful resource for further information is the Department of Justice, the government agency charged with overseeing the implementation and enforcement of the Act. Their ADA web site at <http://www.ada.gov> provides a wealth of information on the various sections of the Act, technical assistance manuals, standards for accessible design, and a slew of other resources.

The Department of Justice also offers an ADA information line at (800) 514-0301, which connects callers directly with ADA specialists who are familiar with various areas of ADA compliance and can offer assistance and advice on a wide range of accessibility-related topics. As of this writing, the information line is staffed Monday through Friday, 9:30 a.m. until 5:30 p.m. Eastern Time, except on Thursday, when it opens at 12:30 p.m.

As I have reiterated several times, the ADA is a remarkably lengthy and complex body of law. While it is difficult to argue against its fundamental goals and objectives, understanding the technical minutiae and complex compliance requirements of the ADA can be overwhelming and frustrating. Fortunately, attorneys, architects, and other professionals are already experts in the field and stand ready to help battle your compliance issues.

Many institutions and certainly most public entities have attorneys either on staff or on call that can discuss, in far more detail than I have presented here, your responsibilities under the ADA and can advise you on issues specific to your circumstances. Armed with a basic understanding of the law and its general requirements, your discussions with the legal and design professionals will be far more useful.

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# President's Message



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## 2006 Election Results

I would like to express a sincere "Thank You" to everyone who recently voted. As a result we have an eminently qualified new president elect, Thomas Mason from Armagh Planetarium, Ireland. Welcome aboard Tom! Congratulations also to Lee Ann Hennig and Shawn Laatsch; we are all grateful for your continued excellent service. I certainly appreciate the chance to work with them, Tom, now Past President Martin George, the entire council, and the various committees as we strive to provide members with services that meet their varied needs. Please contact us with your concerns and suggestions about how IPS can better serve you; we depend on your input!

## What does IPS Offer?

A student recently asked, "Mrs. Button, have you heard about scientists' discovery of a galaxy that seems too massive for current theories?" ([www.universetoday.com/am/publish/distant\\_galaxy\\_too\\_massive.html](http://www.universetoday.com/am/publish/distant_galaxy_too_massive.html))

The discovery he cited indicates that mature stars and large galaxies formed much earlier in cosmic history than was expected. An interesting class discussion ensued and I made the point that this kind of surprise is

what makes science so dynamic and exciting.

I feel very strongly that many people do not understand that IPS, like that galaxy, is surprisingly more massive and mature than the casual observer could detect. It is exciting to examine how impressive it is. Although the International Planetarium Society was formed a mere 36 years ago (the first conference was held in October of 1970), it has quickly evolved into a robust organization and continues to mature as our industry rapidly changes. It quietly provides an enormous amount of assistance to planetarians all over the world.

IPS is a professional organization that is and will continue to be responsive to the needs of its over 700 members from 35 countries. Encouraging the sharing of ideas among its members through conferences, publications, and networking is the primary goal and greatest influence of the Society. By sharing their insights and creative work, IPS members become better planetarians, programmers, artists, technicians, teachers, and so on.

## Challenges for the IPS

Challenges for the IPS council include efforts to increase the visibility of IPS, to encourage new affiliations, and to promote new memberships (to become even more massive!). We are taking steps in that direction immediately. Council recently approved a new initiative in an effort to make IPS more inclusive, to increase visibility, and to introduce non-members to IPS and all that it has to offer. Through this initiative, invitations were sent to planetarians who are not currently IPS members to become an associate of the Society. IPS Associates will electronically receive, free of charge, the IPS News. This will allow colleagues who are not members to glimpse some of the issues and workings that IPS addresses and perhaps entice them to join us in our work and fun. In short, this initiative is designed to spark interest and inform new contacts about IPS activities and benefits. Council will review this offer after two years to determine if it is as effective as we hope.

A second strategy for improving our visibility is to rework and streamline the Outreach Committee. Jon Elvert, the new chair of this committee, will share more specifics on this in the June 2007 issue of the *Planetarian* and you will see some wonderful initiatives born from his efforts.

## Take Advantage of the Benefits

If you are a member of IPS, you can take

advantage of a multitude of benefits. Council hopes that current and new members make use of all the opportunities that IPS now offers in order to get the most out of your membership. You can promote how we serve our membership to others by citing the extensive list of benefits on the IPS website ([www.ips-planetarium.org/or/ips-howto.html](http://www.ips-planetarium.org/or/ips-howto.html)). Just to clarify how complex and beneficial IPS is, I would like to emphasize and make a few comments about points on that list. I have included some points of my own that are intuitive but infrequently used by members. The on-line list is impressively long, so take your time and really think about each one so that you can get the most out of your IPS membership!

IPS members represent schools, colleges and universities, museums, and public facilities of all sizes, including both fixed and portable planetariums as well as digital and analog. Members include directors, teachers, technicians, programmers, writers, artists, media specialists, presenters, vendors, scientists, students, and sponsors and friends of the planetarium and the night sky and multi-media presentations. That means that a variety of interesting people are available to be tapped for advice and resources (and to visit on vacation!).

Speaking of resources, you can gain information from reading our colorful quarterly journal, the *Planetarian*, which is filled with insightful articles and a wide range of feature columns; the *IPS Conference Proceedings* that contain texts of contributed and invited papers and panel discussions; and special publications (see Dale Smith's article elsewhere in this issue of the *Planetarian*). You can keep abreast of current and future events and job openings and find contacts through reading the *IPS News*, the IPS website, and members-only web resources. Members receive many free CDs and discounted subscription rates to IPS video compilations, which deliver still images and extensive video footage from NASA, ESA, and the Space Telescope Science Institute. For the most part, members generally already take advantage of all of those benefits.

## The Privilege of Voting

However, I do not feel that most of you really avail yourselves of the many other privileges and benefits. You have the privilege, as a member, to vote. Members are entitled to one vote per person, either by proxy, by mail (postal or electronic), or fax, on any question pertaining to the Society. Members elect IPS executive officers in this way. Generally only about 35% of qualified members take advantage of their voting opportunities. This is one very important way that you can influence the future of IPS. Another

way, and the strongest, to impact IPS and gain understanding is to run for office.

Yet another excellent way to gain insight and a full sense of membership is to volunteer. IPS has many committees devoted to areas of interest to the membership. Committee chairs accept and recruit volunteers from the membership; hence, members can actively shape the future of IPS and the planetarium profession. Or you can bid to host an IPS conference! Conference bids for 2010 have been accepted from Alexandria, Egypt; Saint-Etienne, France; and Beijing, China. You can read an article from each of these locations elsewhere in this issue of the *Planetarian*. Council will vote on the 2010 site at our meeting in August.

## Donate, Share

You can also affect many aspects of IPS services, to you and fellow members, by answering calls for you to donate and/or share. Members can submit articles for publication in the *Planetarian*. Readers from the international community will be able to benefit from your experience and knowledge. The IPS Education Committee has posted some lessons on the website, and you can share by submitting samples of your own. The next round of the IPS Eugenides script writing competition begins this month (see the call for entries in this issue). The prize money is attractive and you'll earn extra prestige at and for your institution if you enter this contest and then are placed in the top two award categories. At the very least you would be contributing a new show idea for your colleagues. Or you could volunteer to create another special publication on a topic that most interests you.

Monetarily, you can also donate to the Armand Spitz Fund, which is maintained by IPS to fund efforts that further the ideas espoused by Armand Spitz, or to the Star Partners' Fund that was established to aid planetariums in countries with non-convertible currencies and/or facing severe economic problems. You can have a meaningful impact on the International Planetarium Society's goals and interests, beyond your own lifetime and far into the future, by making a charitable gift during your lifetime or as part of your estate. At the same time, you can bring immediate and deferred tax advantages to both you and your heirs.

It is vital that you use IPS to network. Look on the IPS website for news and resources and be sure to make suggestions and update contact information when needed. Read Dome-L, the IPS-sanctioned but privately run and moderated email information service for the world's planetarians. Subscription to Dome-L is free and open to anyone with an active interest in the plane-

tarium profession. IPS has sanctioned Dome-L as a worthy service to the profession; free and open discussion is encouraged and essential. You can always find out more at [www.ipsplanetarium.org/resources/dome.html](http://www.ipsplanetarium.org/resources/dome.html). Whenever possible, attend our biennial conferences, which bring together hundreds of planetarium professionals for paper sessions, invited speakers, workshops, panel discussions, vendor demonstrations, and exhibits. You can volunteer to present a paper, a workshop, or chair a panel. The next IPS Conference will be held at the Adler Planetarium in Chicago, Illinois, USA from 15-20 June 2008. There will be an information link soon on the website.

You also can find colleagues to network with by using the *IPS Directory of the World's Planetariums* and the *IPS Resource Directory*. Members receive a comprehensive CD catalog of planetariums and IPS members worldwide. Also on that CD is a resource directory that is a "yellow pages" listing hundreds of companies and organizations that are in business to provide services for the planetarium community.

And lastly, you are strongly encouraged to voice your opinion. Your IPS affiliate representative (see the directory on Page 2) will present your opinions and concerns at IPS council meetings and during the year through email with council, or you can contact any officer directly to make sure you are heard.

Members can also nominate other deserving IPS members for awards that recognize contributions they have made to our organization and to our profession.

As you can see, there are many opportunities for you to reap the rewards of belonging to the International Planetarium Society. Please avail yourself of these powerful ways to develop professionally and to stretch beyond your own universe. Make the most of your IPS membership!

## The New Presidency

It is with an awesome sense of responsibility, excitement, and determination that I take office as president for these next two years. I realize that I have "big shoes" to fill, as do each of the presidents in turn. Your support and ideas will certainly be appreciated as we tackle the challenges of future development of IPS.

One goal of this presidency is to make

communication more efficient and to increase participation of members by clearly presenting opportunities for you to contribute your special talents in small or big ways. None of us has a lot of free time, but we all have something to offer and a little discretionary time. My job is to inspire you and define easy ways in which you can more fully become participating members. Don't wait for us to ask; speak up if you have an idea.

Another goal is to continue the important work of past presidents: to bring new affiliates and new members into the fold, to support colleagues in developing nations, and to make IPS more responsive to your needs and the changing technologies.

Lastly, for now, I want to see more emphasis on making educational resources available and on setting guidelines for making our shows age appropriate. I realize that many facilities have expanded their domes to become virtual reality chambers of all kinds. I feel strongly, as you know, that there is always an element of education in a presentation, even if the focus of a particular program is primarily entertainment. We must try to understand exactly what impressions we are creating and what learning is taking place. To that end all planetariums

**As you can see, there are many opportunities for you to reap the rewards of belonging to the International Planetarium Society. Please avail yourself of these powerful ways to develop professionally and to stretch beyond your own universe. Make the most of your IPS membership!**

will be encouraged to work together and share experiences, both successes and failures, so that we may all grow in understanding and maximize the impact we deliberately seek. Creativity in science and technology is our universe and it is this "hook" that will inspire students to entertain the idea of becoming the new generation of creative scientists and engineers that the world desperately needs.

## Next Council meeting

The next council meeting will be held during 4-5 August 2007 at the Rio de Janeiro Planetarium in Brazil. Members: please contact your affiliate representative, me, or any other officer well before those dates if you have information, questions and/or concerns that need to be addressed. Do not forget to inform your representative of your preference for the 2010 conference site so that he/she can vote accordingly. ☆

# Past President's Message



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It has been a great pleasure to serve the IPS as president over the past two years, and I'd like to thank the many IPS members who have written so positively to me recently in relation to my role. It's always important to remember, though, that the officers work as a strong team and it is perhaps not widely known that quite apart from their daily communication, the officers do have get-togethers at times other than the council meetings and biennial conferences. A special thanks to Shawn Laatsch and Kim Cooper for making their house in Greenville, North Carolina, USA available for such meetings over my period as president!

## **Congratulations to Tom Mason**

Speaking of the officers, congratulations and a big welcome to Tom Mason, our new president elect! When I wrote my last President's Message, the results of the election were not known but, by the time you read this, Tom will have spent nearly three months as part of the team of officers. Already Tom has become actively involved

in our frequent (usually daily!) and detailed discussions and I, and the other officers, are delighted to be working with him.

I was reflecting recently on some of the special strengths of the IPS, and one in particular that stands out to me is the fact that we have three people in presidential positions at any one time: the president, the president elect, and the past president. It is a system that has served us well for a long time. The two years' experience gained by the president elect are a very important preparation for the two years to be spent as president, and the past president has experience to contribute after having been "in the chair."

An essential part of that strength, though, is the enormous support from both the secretary and the treasurer/membership chair.

Near the end of 2006 I reviewed the committee structure of the IPS and, as I write this message, President Susan Button is happy to leave me with the task of sorting out a few possible changes that may still need to be made.

I made one specific change, however, in December, to one of the ad hoc committees. It is the Language Committee, which I have, after some consideration, renamed the International Relations Committee. I feel that broadening the scope of this committee will serve the IPS well, especially as we reach out to some areas of the world in which we have very few IPS members and in which English may not be the native language. Naturally, this committee can work closely with the Outreach and Membership committees. A big thank you to all who continue to serve on this committee! By the time you read this, I shall hopefully have added a few new members in order that the committee can fulfill this broadened role.

## **Conferences Around the World**

During October and November, while still serving as president, I found myself again travelling around the world. In the last week of October, after attending the very enjoyable one-day expo session at the Adler Planetarium in Chicago, Illinois, USA, I was delighted to attend the Great Lakes Planetarium Association Conference which was held in Merrillville, Indiana, USA. A large gathering, many excellent presentations, fine social events, and visits to local places of interest made for an excellent conference. I was delighted to make many new friends and am currently enjoying reading the GLPA Conference Proceedings, which was distributed to all attendees by Dale Smith very soon after the conference.

A few days later I travelled to Brazil to attend my second conference in two weeks: the Brazilian Planetarium Association (ABP) conference in the city of Vitória, a coastal city about a one hour flight northeast of Rio de Janeiro. A big thank you to ABP members for my very warm welcome and for having me there at their most interesting conference, with special thanks to Sergio Bisch, Alexandre Cherman, Fernando Vieira and Ormis Rossi for their wonderful assistance.

Naturally, the proceedings were conducted in Portuguese, but through the help of our Brazilian colleagues I was able to follow what was happening during the sessions. I was deeply honoured that the ABP flew an interpreter up from Rio de Janeiro for the two talks—one about the IPS and one about Astronomy in Australia—that I presented. The interpretation was performed concurrently and flawlessly. Again, excellent company and several most enjoyable social events made the conference most memorable.

Just before departing for Europe, I was also delighted to visit the planetarium in Rio de



A session at the Brazilian Planetarium Association Conference in Vitória. All photos by Martin George.



The staff of the Munakata Yurix Planetarium in Japan (left); JPS members gathering in the planetarium at the Nagoya City Science Museum, where the Japanese Planetarium Society Conference was held.

Janeiro, which will be the site of our 2007 council meeting this August. Since my last visit in 2004, a number of fine exhibitions have been installed at the planetarium and I strongly recommend to you all to go along to see it if you are in Rio de Janeiro!

After Brazil, I made a short visit to the United Kingdom to meet up with Dr. Gloria Clifton and Gilbert Satterthwaite in London, who showed me around the construction site for the new Greenwich Planetarium. As I write this message, their planned opening date is in the (northern hemisphere) spring of 2007, so it's not far away!

I then made a quick visit to the impressive Heureka Science Centre in Helsinki, Finland, which includes a major planetarium and is planning a significant expansion. Many thanks to the director, Per-Edvin Persson, and Kai Santavuori for showing me around on what was my first visit to the facility.

## Japanese Planetarium Society Conference

December saw me in Japan for a week, mainly to attend the wonderful Japanese Planetarium Society Conference, which was held in Nagoya. Some 250 planetarians attended from all over Japan, and here again I was delighted with the proceedings and met up with many planetarians for the first time. I am very grateful to the JPS, to all of the staff of the Nagoya City Science Centre, and especially to IPS Council Member Shoichi Itoh from the Sugunami Planetarium in Tokyo, for assisting with my visit. Shoichi also did a fine job as my interpreter on no fewer than four occasions when I was speaking.

I was delighted to learn that the Nagoya City Science Centre is planning a major upgrade for its planetarium, which will have

a significantly larger dome in a few years. I strongly recommend a visit!

Following the conference, I had the pleasure of visiting both the planetarium at the Children's Centre in Hiroshima and the Munakata Yurix Planetarium near Fukuoka. So many people contributed to making my visits there very enjoyable, but special thanks are due to Junko Onoda from the Munakata Planetarium for her assistance in organising my visit. At each place, the "bubbly" enthusiasm of the staff was very obvious!

My last official engagement as IPS president took place on December 10, when I had the very great pleasure of opening a new portable planetarium in Queensland, Australia, on Hamilton Island. Ray and Libby Johnson have been the driving force behind the establishment of their dome, which will be used at the resort and will be taken to

schools in the area. Their enthusiasm for astronomy also extends to conducting special stargazing evenings near the resort, adding to the enjoyment of visitors to one of Australia's famous tropical island getaways.

As I now move through my own two-year period as past president, I am looking forward to the continuation of my work as an officer and intend to press on with some specific tasks. We are now very close to having two new affiliates—China and Brazil—and I am hoping very much that this will be confirmed by the time of the council meeting in August. The first official meeting of the new Chinese planetarium group will hopefully take place around mid-year. I am hoping to attend that meeting, which will likely be held in Beijing.

A very happy Autumnal or Spring equinox to you all, depending on your hemisphere! ☆



The Heureka Science Centre in Helsinki, Finland.

# CLARK PLANETARIUM

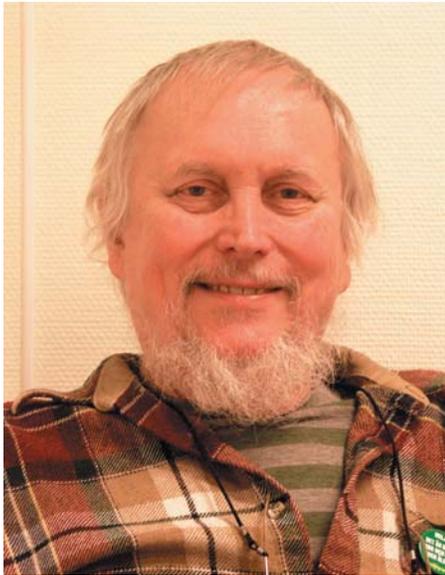
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# International News



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Sweden experienced real space fever in December. Sweden's first astronaut, Dr. Christer Fuglesang, made his first space trip with the Discovery space shuttle 9-22 December, spending many days onboard the International Space Station. Among other tasks, he made three space walks outside the station. Both the launch and the landing, and an interview with Fuglesang in-between by the Swedish Crown Princess Victoria, were broadcast on Swedish TV in real time and viewed by hundreds of thousands of Swedes (in spite of some awkward times; the launch happened in the middle of the night, Swedish time). Many comments by Swedish politicians and astronomers included hopes that this event will make more young Swedish pupils choose a study and job career in science, helping us planetarians along!

The International News column is dependent on contributions from IPS Affiliate Associations all over the world. Many thanks to Agnès Acker, Bart Benjamin, Tony Butterfield, Ignacio Castro, Gail Chaid, Alex Delivorias, Jack Dunn, Alan Dyer, John Hare, Tom Mason, André Milis, Loris Ramponi, Zinaida Sitkova, and Gopinath Subramanian for your contributions. Special thanks are due to Loris Ramponi, info@serafinozani.it.it, who contributes the Calendar of Events. You

are welcome back with new reports, and I look forward to contributions from other associations as well. Upcoming deadlines are 1 April 2007 for the June Planetarian and 1 July for the September issue.

## Association of Dutch-Speaking Planetariums

Have you already visited [buhlplanetarium4.tripod.com/oldestplanetarium.html](http://buhlplanetarium4.tripod.com/oldestplanetarium.html)? The Buhl Planetarium staff is pleased to confirm that the oldest operational planetarium projector in the world still fascinates an increasing number of visitors! The Brussels Planetarium of the Royal Observatory also maintains its outreach program at several science fairs, information and education stands, workshops, and live presentations in inflatable domes, as given at [ec.europa.eu/research/researchersineurope/index\\_en.htm](http://ec.europa.eu/research/researchersineurope/index_en.htm), [www.vlaamsewetenschaapsweek.be](http://www.vlaamsewetenschaapsweek.be), [www.vlaamseruimtevaartdagen.be](http://www.vlaamseruimtevaartdagen.be), and [www.brussels-eureka.be](http://www.brussels-eureka.be).

At Brussels Eureka, the 55th World Exhibition of Innovation, Research and New Technologies, the World Organization of Periodical Press (OMPP) awarded the international prize to the planetarium of the Royal Observatory of Belgium "for all activities and especially for the Planetarium's shows." This will strengthen all planetarium incentives to carry on!

The Dutch Royal Eise Eisinga Planetarium is expanding! The planetarium, located in Franeker, the Netherlands decided to expand

with the acquisition of the monumental property next door, De Tuinkamer (The Garden Room). Originally Eise Eisinga's private house 225 years ago, the planetarium not only continuously enlarged its collection but also welcomed a growing number of visitors. At present, about 35,000 people from the Netherlands and abroad annually visit the planetarium.

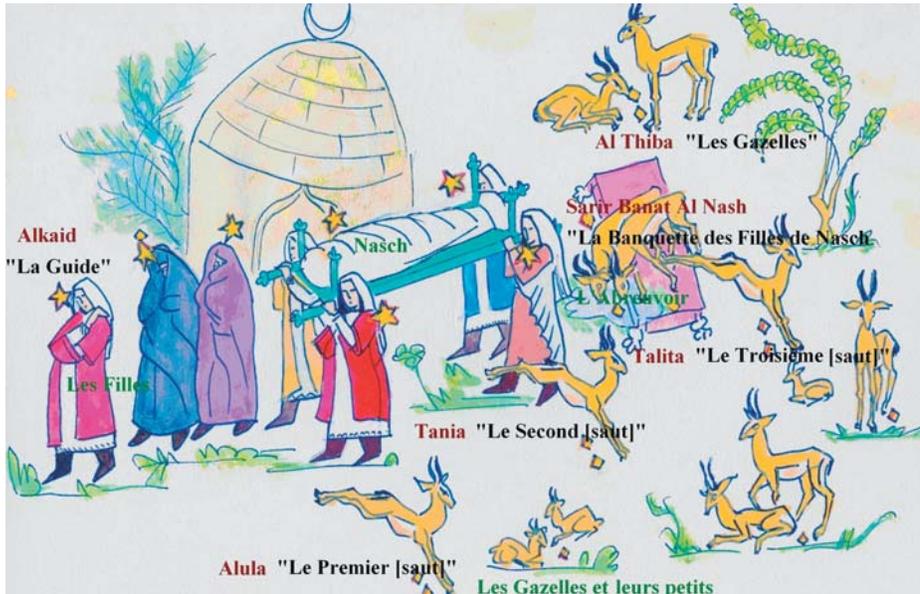
The historical character of De Tuinkamer perfectly matches the Eise Eisinga Planetarium atmosphere. Its actual form dates from 1745 and it previously housed several professors of the Franeker University. Both buildings will join at the rear and include extra museum space and a café. Completion of De Tuinkamer redesign is planned for next winter 2007-2008, without disturbing planetarium visits. This Eise Eisinga Planetarium's 225th anniversary year has been crowned by its Royal predicate and citation in the canonical books on Dutch history.

## Association of French-Speaking Planetariums

The Planetarium of the Cité des Sciences et de l'Industrie (CSI), La Villette-Paris, opened its new configuration on 14 November. A new projector and a digital multimedia environment have been installed by R.S.A.Cosmos, the French planetariums company. The opening was focused on a show created by the Haydn Planetarium in New York, *Search for Life: Are We Alone?* and presented in a beautiful French version by Nelly Dumas, head of the planetarium. The show was admired by a lot



Photo caption: De Tuinkamer and the Eise Eisinga Planetarium in Franeker, the Netherlands. Courtesy of Combi Hommema, Franeker.



Representation of the Great Bear, painted by Roland Laffitte, inspired by the descriptions done by Al-Sûffî from the Arabic constellations Nasch and Gazelles placed in the same part of the sky as the Great Bear. Courtesy of Roland Laffitte, SELEFA.

of people (five presentations were done under the 273-seat dome).

"ALMA and the planetary systems formation" is a new project arises in our community, a show which will be created by APLF and ESO (European Southern Observatory), and technically conducted by a consortium of four planetariums: Montpellier (PI), Toulouse, Saint-Etienne, and Bruxelles.

A first meeting on the project was held in January in Montpellier. The presentation of the show in different countries is planned for spring 2008. If you will be interested by the English, the German, the Italian, the Spanish, the Netherland, or the French version, please contact Jean-Philippe Mercier (head of the Montpellier Planetarium) at [jp.mercier@montpellier-agglo.com](mailto:jp.mercier@montpellier-agglo.com).

Also in development is *The Constellations of the Arabes*, a 5-minute video that will show a well-known part of the sky (the great bear), with different representations along the centuries by various civilisations with a focus on Arabic figures created by Roland Laffitte. The project is being conducted with SELEFA (the Société d'Etudes Lexicographiques et Etymologiques Françaises et Arabes) and the Planetarium Scientific Center of the Alexandrian Library, Egypt. Distribution of the mini-show, in various languages, is planned for spring 2007. For more information, contact Olivier Moreau at [forum-des-sciences.tm.fr](mailto:forum-des-sciences.tm.fr).

The 23rd APLF Conference will take place 17-20 May 2007 in Marseille, Aix-en-Provence, Saint-Michel l'Observatoire. You are kindly invited; contact Marie-France Duval at [Marie-France.Duval@oamp.fr](mailto:Marie-France.Duval@oamp.fr).

## Association of Mexican Planetariums

The Luis E. Erro Planetarium, the largest in Mexico City with 150,000 visitors annually, has undergone a full renovation, modernizing its projection equipment and infrastructure, thanks to a \$1.4 million grant from the Alfredo Harp Helu Foundation and matching funds from the National Polytechnic Institute, the planetarium's parent institution. The planetarium retired its 40-year old Zeiss IV projector and installed an Evans and Sutherland Digistar 3DLP Digital projector, along with a new 18m perforated aluminum projection dome built within the original 20m dome to improve visual images with



Participating planetarians at the XXXV AMPAC Meeting with the Arcadio Poveda Ricalde Planetarium Dome, Merida, Yucatán in the background. Photo by Antonio Sánchez Ibarra.

high reflectivity and a surrounding sound system.

New programs currently being shown are *The Pharaoh's Stars* and *The Sun's Secrets*, and next May new programs will open about the solar system and on pre-Columbian archeoastronomy. The purpose of scientific activity diffusion is to incite the new generation of researchers at their earliest age on new fields of scientific knowledge.

The XXXV AMPAC Annual Meeting was held on 23-24 November at the Arcadio Poveda Ricalde Planetarium in Merida, Yucatan. Newly elected officials are Juan Jose Najera, director of the Arcadio Poveda Planetarium Mérida, Yucatán as president elect; Francisco Javier Alcaráz as secretary and Vanessa García as treasurer, both from the Lic Felipe Rivera Planetarium, Morelia, Michoacán.

The theme of the meeting was "Different Planetariums, same Goal." Various lectures were given by noted researchers and astronomers, among them "The Universe as a Membrane" by Eddy Salazar, "Astronomy Among the Yucatan Maya" by Orlando Casares, and "The Chixulub Crater" by Dr Arcadio Poveda Ricalde, astronomy researcher. The Merida Planetarium is named after him since he is a noted astronomer of Yucatan. Workshops were divided into Digital Theatres, Mobile Planetariums, and OptoMechanical Systems.

Members noted with sadness the decease of Gabriel Muñoz, director of the Morelia Planetarium since its inauguration in 1974 till his departure to teach engineering at the University of Morelia in 2005. Muñoz was an IPS Fellow and will be remembered as an eager and active member, always willing to represent AMPAC on IPS Council Meetings

at IPS International Conferences and at odd-year Council Meetings.

He was instrumental in obtaining the IPS International Conference Meeting held at the Alfa Cultural Center, in Monterrey Mexico, in 1984 and presenting AMPAC's request to be accepted as an IPS Affiliate Member Organization. He contended twice proposing the Morelia Planetarium to be designated as official site for the 2000 and 2008 IPS International Conferences, always transmitting to all of us the warm hospitality of his native land Morelia, Mexico. He will be remembered as a good friend and an enthusiastic promoter of astronomy for children. He is survived by his wife Cielo and daughter.

### British Associations of Planetariums

Bob Mizon mentions his involvement in a dark skies project organized by the Campaign to Protect Rural England ([www.cpre.org/BAA](http://www.cpre.org/BAA)). The Clean Sky project is part of the Campaign for Dark Skies New Year Star Count event (see [www.darkskies.org](http://www.darkskies.org)), a national star count held in January 2007. It is a sad reality that light pollution from poorly-directed and over-bright lamps is present in the starry sky almost everywhere in the UK, and has steadily increased since the 1950s. The CPRE's Night Blight initiative in 2003 drew attention to this, and the British Astronomical Association's Campaign for Dark Skies (CfDS) works continuously to publicize and alleviate the problem.

To gauge the visibility of the stars from various parts of the UK — and with a view to repeating the experiment in the future to try to assess any trend — the CPRE and the CfDS joined forces to set up a national night sky survey (see websites above) by observers in both rural and urban locations. Variables such as atmospheric conditions and differing visual acuity come into play, but meaningful results can emerge if enough people take part now and in the future.

Mario DiMaggio informs that Thinktank Planetarium held its first birthday this past December. During its first calendar year of operation, Birmingham's new planetarium welcomed 60,963 visitors. This is a significant achievement for a small, 70-seat theatre, as the international average for 10m domes is around 41,000 visitors.

Thinktank Planetarium had 20,000 more visitors than this international average figure. It is also worth mentioning that 60% of Thinktank's shows are presenter-led, as evaluation consistently shows that visitors prefer a skilled, live interpreter over a film.

The curator's post at Mills Observatory, Dundee, will fall vacant when Bill Samson retires in March 2007. Any *Planetarian* read-

ers who are interested should email Bill at [bill.samson@dundeeccity.gov.uk](mailto:bill.samson@dundeeccity.gov.uk), requesting him to send out the details as soon as they become available.

Steve Tidey has sent news that as part of his continuing freelance work he has written the first of what will be a series of shows for Aaron McEuan's Salt Lake City-based *Starlight Productions* (Utah, USA).

### Canadian Association of Science Centres

The Montreal Planetarium has opened a new show titled *The Exotic Universe*. Black holes, quasars, gamma ray bursts, supernovae—our universe is full of objects with surprising and sometimes unsettling properties. And what about dark matter and the energy that is driving it to expand ever more quickly? This show invites Montreal patrons to discover an unexpected cosmos—the universe as they've never imagined it before! Work is underway on two new shows slated to open in 2007. In May, a new afternoon show called *The New Solar System* will open. With all the commotion following the new planet definition, and after years of fantastic discoveries about our neighbour worlds in space, it's time to present a new and updated vision of our solar system. Marc Jobin, astronomer at the Montreal Planetarium, is producing the show.

November 2007 will see the start of *In Search of the Galaxy* (working title), a new show for kids 8-10 years old that will replace *The Little Prince's Universe* in Montreal's school show roster. *In Search of the Galaxy* will also be presented to the general public on weekend mornings. The premise: in the year 3025, a young scientist has discovered a way to produce an almost infinite amount



Top: The Perm Planetarium (photo by A. Evsyukova); Bottom: mounting of the observatory dome of the Nizhny Novgorod Planetarium (photo by A. Mityugov). For the Russian Planetarium Society news, see Page 84.

of energy without producing dangerous waste, using a rare crystal found only at the centre of our Milky Way Galaxy. Two young friends start on a journey to get this crystal, using an ill-tempered teleportation machine that will swing them across the Milky Way, only to discover colourful nebulae and young star clusters. Fortunately, their robot-computer will help them find their way back to the black hole at the centre of our galaxy. Will they be able to catch the crystal without falling into the black hole? As John Lennon once wrote: a splendid time is guaranteed for all! This show, which is closely tied with Quebec schools' new astronomy curriculum, will be produced by Pierre Chastenay. For more info, contact him at [chastenay@astro.umontreal.ca](mailto:chastenay@astro.umontreal.ca).

In Winnipeg, the Manitoba Museum's Planetarium will be in production through 2007 for a fall show and exhibit celebrating the first 50 years of spaceflight. The exhibit



Top: Group photo of Western Alliance Conference 2006 attendees outside the University of Nebraska State Museum. Photo by John Nollendorfs. Bottom: Some delegates at the WAC display the T-shirts promoting this year's WAC in Fairbanks, Alaska. Photo by Wilgus Burton. More about the WAC Conference on Page 84.

will celebrate the 50th anniversary of the launch of Sputnik 1 in October 1957, and highlight the space program's impact on the modern world. The planetarium program will follow the space program, but also will highlight the many achievements in astronomy carried out from the ground. For the past several months, the planetarium production team has been involved in exhibit design and construction for the accompanying Science Gallery, so they comment "It will be great to get back to planetarium production again!" Contact Scott Young at scyoung@manitobamuseum.ca.

The major news in Calgary at the TELUS World of Science was the opening in fall 2006 of a new addition to the building, the Creative Kids Museum. This unique children's museum focuses on exhibits and activ-

ities related to creative and performing arts. The popularity of the addition helped drive attendance to record levels for 2006, surpassing the planned goal of 250,000 early in December with a month still to go. As such, attendance at the Discovery Dome theatre did very well this past year, too, though there is some concern that not as high a percentage of visitors are choosing a dome show option in their ticket purchase.

The coming year will see a lot of activity in longer-term planning for what is dubbed Discovery Dome II, a new digital dome theatre in a planned new science centre built at a choice site elsewhere in Calgary. However, for the next three years, the intention is to also use the present dome (now 10 years old) to try out new styles of programs and formats as part of a plan to prototype ideas and

exhibits for the new facility. Contact Alan Dyer at alan.dyer@calgaryscience.ca.

In Vancouver, the line-up of shows at the H.R. MacMillan Space Centre over Christmas featured a new *Christmas on the Coast* program. Produced by Craig McCaw from Roundhouse Productions with great new images by the Space Centre's producer Mike Koziniak, the 35-minute show blended familiar scenes of the west coast with all-Canadian music ranging from Bruce Cockburn and Diana Krall to Lorne Greene's classic reading of *The Night Before Christmas*. Contact Erik Koelemeyer at ekoelemeyer@hrmacmillanspacecentre.com.

In Victoria, the Centre of the Universe Interpretive Centre developed a new cultural astronomy program this past summer about Mayan astronomy. The centre had both a multi-media show and a new Mayan planetarium show, both of which were well received. This past year the CU also took steps to strengthen its ties to its parent organization, the Herzberg Institute of Astrophysics. To that end, not only did the schedule feature guest speakers from HIA, but many programs showcased the contributions made by HIA engineers and astronomers to projects such as ALMA (Atacama Large Millimetre Array), JWST (James Webb Space Telescope), and the TMT (Thirty Metre Telescope). This focus was long overdue—with so many interesting cutting edge projects underway, the CU looks forward to more exciting shows in the future. Contact: Steve Ewald at Steve.Ewald@nrc-cnrc.gc.ca.

### European/Mediterranean Planetarium Association

As we welcome 2007, the Eugenides Foundation's festive activities to commemorate its 50th anniversary are coming to an end. On 7 December 2006, in the Foundation's large auditorium and attended by Greek university provosts and representatives of the higher education and research communities in Greece as well as ministers and other political dignitaries, Greek Prime Minister Konstantinos Karamanlis inaugurated the Foundation's brand new Science and Technology Permanent Exhibitions on Matter and Materials; Communicating: Sound and Image; and Biotechnology. Spanning three floors and covering 1,500 square meters, these interactive exhibitions were designed and constructed by La Cite des Sciences et de l'Industrie in Paris, France.

During this same event, the Eugenides Foundation honored renowned composer Vangelis Papatheanasiou with its commemorative medal and the Eugenides Planetarium presented a special planetarium show, for which Vangelis graciously allowed use of

parts of his *Mythodea* composition, which was originally composed for NASA's 2001 Mars Odyssey space mission. On 12 December the planetarium released its new Christmas planetarium show, *The Christmas Star*, and awarded its millionth visitor, a 10-year-old girl, a special pass that will allow her and her twin sister unlimited and lifelong access to all of its shows.

Perhaps more importantly, not only for the staff of Eugenides Planetarium but for all their planetarium colleagues around the world, this was the first ever demonstration of the capabilities of a full-color, 3D stereo projection in full-dome organized by Sky-Skan and hosted in November. The 3D stereo system consisted of four high-resolution (4k) SXRD Sony projectors equipped with Sky-Skan's definiti HD lens that filled the dome with over 10 million unique pixels which, for stereo 3D, translates into 10 million times 2! In the reception that followed, colleagues from around the world exchanged views and opinions related to the new planetarium technologies and the future of our business.

Finally, the Athens-based Foundation of the Hellenic World, a non-profit cultural institution whose mission is the preservation and dissemination of Hellenic history and tradition, inaugurated its Tholos (meaning dome) in December. Tholos is a brand new, 14m dome theatre of 135 seats that resembles a planetarium, but whose shows will invite its visitors on a tour the various virtually reconstructed sites of ancient Greece. When fully operational, Tholos will be able to project 3D content utilizing its SEOS immersive and interactive system.

## Great Lakes Planetarium Association

**Illinois.** The William Staerkel Planetarium in Champaign recently premiered Adler's *Spirits in the Sky, Thunder on the Land*, along with *Winter Prairie Skies* and *Follow the Drinking Gourd*. They also hosted lectures on alternative energy, science in landscaping, and bird flu. Beginning in January, the Lakeview Museum Planetarium in Peoria offered its *Basic Astronomy Series*, which adapted some of its school shows for public presentation. The Cernan Earth and Space Center in River Grove enjoyed clear skies for its public viewing of the Transit of Mercury in November. In January, the Cernan Center premiered three all-new presentations: Staerkel's *Stellar Extremes*, the *Sky Tellers* series, and LFI's Beatles *Laser Anthology* laser show.

**Indiana.** The Evansville Museum and Koch Planetarium in Evansville received a grant from the National Science Foundation to develop and deliver space-related activities to rural audiences. The \$2.5 million

award will be shared by nine U.S. museums. The Merrillville Community Planetarium in Merrillville has completed the installation of an all-dome video projection system and LED cove lighting. The new equipment made its debut at the recent GLPA conference. The PHM Planetarium Air & Space Museum in Mishawaka had a very successful transit of Mercury viewing session with the help of favorable weather, local amateur astronomers, and the local media.

Dayle Brown of South Bend reports that she is hard at work on the new book *Skylore from Planet Earth: Stories from Around the World...Milky Way*. B. J. Harper, retired planetarium director at Northrop High School in Fort Wayne, received a grant to conduct a telescope making workshop during the sum-



The year 2007 logo of Day of Planetaria. Courtesy of Italian Planetarium Friends Association.

mer of 2007. The Jefferson High School Planetarium in Lafayette will be monitoring the quality of the night sky in the sprawling Lafayette area. They hope to demonstrate a need for a countywide lighting ordinance. The SpaceQuest Planetarium in Indianapolis reports that all of its automated shows have been converted from their old Alesis ADAT to the new HD24 digital format.

**Michigan.** Late last year, the Cranbrook Institute of Science Planetarium in Bloomfield Hills began offering *Holiday Magic*, which was their first foray into full-dome program production. In early 2007 they taught an astronomy course at nearby Lawrence Technological University and offered a telescope users workshop. At Southfield's Vollbrecht Planetarium, Mike Best, who was one of 83 field investigators for Dr. J. Allen Hynek in the 1970s, gave a talk titled *UFOs Are Real* in January.

This winter, the Kalamazoo Valley Museum Planetarium ran Calgary's *In My Backyard*, as well as in-house productions fea-

turing the winter sky and the Underground Railroad. Installation is now underway for their summer show, *Dinosaur Chronicles*. The Longway Planetarium in Flint opened the year with LFI's *Lasers of Oz*. In February, in conjunction with a nearby exhibit, they premiered Bozeman's *Lewis and Clark and the High Frontier*. Girl Scout merit badge programs and new telescope owner workshops returned in January.

During the holiday season, the Abrams Planetarium presented the classic program *Season of Light and George and Oatmeal Save Santa*. Returning in January was *The Last Question*, a show based on the short story by Isaac Asimov. The Chaffee Planetarium staff is producing a new show titled *Solar System Safari* and are collaborating with two laser show companies to develop an all-new seasonal multimedia experience titled *Holiday Magic*. In early 2007, the Shiras Planetarium switched to their new MediaGlobe full-dome projection system. The planetarium recently added an 8-inch telescope and solar filter to their collection of telescopes.

The Delta College Planetarium celebrated its tenth anniversary in February of 2007. NASA exhibits now grace the lobby. Themed weeks were dedicated to various segments of their patrons, including senior citizens, the local astronomy club, the college's own staff and students, local teachers, and donors. Work continues on the Dassault Systemes Planetarium's new show *Bad Astronomy: Myths and Misconceptions*, which is based on Dr. Phil Plait's book. This new planetarium show will be open in the summer of 2007, and will be made available as a show kit to other planetariums.

**Ohio.** The Cleveland Regional Association of Planetariums (CRAP) met at the Euclid Schools Planetarium in September (Fran Ratka, host) and in November at the Midpark High School Planetarium (Len Muni, host). Clouds covered Ohio during the November transit of Mercury, but visitors at the Bowling Green State University Planetarium saw the Moon regardless of the weather during the planetarium's public show run of *Once in a Blue Moon*. At the Ward Beecher Planetarium at Youngstown State University the staff ended the year with *George and Oatmeal Save Santa, Holiday Lights* (an in-house holiday program), and *First Night Under the Stars* for the local First Night celebration. Shows in the new year include Pittsburgh's *Women Hold Up Half the Sky*, the in-house *Evolution: Galaxies, Stars, and Life on Earth*, and the popular "Astronomy 101" series of live talks on all things astronomical.

**Wisconsin/Minnesota.** Brian Wallace at the Forestview Planetarium in Brainerd, Minnesota reported a successful first year of



Eighth graders learn about the Sun in Dalarna University's new 2.5 m planetarium. Photo by Lars Broman

operation. Over 2,000 people saw shows in the new planetarium, which sports a 7.5m (28 ft) Spitz dome with an E&S Digistar 3 SP 2 Projector. Dave Weinrich at the Minnesota State University Moorhead Planetarium recently ran Strassenburgh's *Star of Bethlehem* program in December, followed by Jon Bell's *Bear Tales and Other Grizzly Stories*.

Dave Williams at the St. Cloud State University Planetarium introduced the new show *Black Holes*, based on a show produced by the Science Museum of Virginia. Since he does not have multiple video projectors, Dave merged the show into a single 17-minute iMovie. The University of Wisconsin-La Crosse Planetarium received a one-year extension while the University decides whether to continue funding that facility. Gordon Stewart was hired to operate the planetarium following Bob Allen's retirement.

The Allen F. Blocher Planetarium at the University of Wisconsin-Stevens Point recently presented *Winter Wonders and Season of Light*. In February, they began offering Staerkel's *Stellar Extremes*. At the Charles Horwitz Planetarium in Waukesha, *The StarGazer* was presented in October, Staerkel's *Stellar Extremes* was presented in November, and *Season of Light* concluded 2006. Nearby Gary E. Sampson Planetarium in Wauwatosa presented *Black Holes* in November, *Tis the Season* in December, *Stellar Extremes* in January, and *Zubenelgenubi's Magical Sky* in February.

### Italian Planetaria's Friends Association

30 June will be the final date to participate in the X issue of the international competition "Shadows of Time" for sundial makers, promoted also by Lumezzane Planetarium and Observatory (Brescia). More information, also in English, is found at the address [www.ombredeltempo.it](http://www.ombredeltempo.it).

The next Day of Planetaria will be held on 18 March 2007.

### Nordic Planetarium Association

Per Broman reports that Broman Planetarium has delivered no less than four STARLAB Fibrearc planetariums during the last three months of 2006: two planetariums to Fyn Amt (County) in Odense, Denmark; one planetarium to Viborg Amt, Viborg, Denmark (their second STARLAB); and one planetarium to the Department of Physics at the University of Göteborg, Göteborg, Sweden.

He has also delivered one small Eurodome—just 2.5m (8 ft.) diameter—to Dalarna University, Borlänge, Sweden; this will be used in training both science communication students and solar energy engineering students. It was inaugurated when grade 8 pupils from many schools in Borlänge attending Framtidsmuseet's Energijakten (the Energy Chase) visited Science Communication during eight days in January 2007.

### Pacific Planetarium Association

PPA is hosting the next Western Alliance Conference of Planetariums 22-27 September 2007 in Fairbanks, Alaska. Dr. Neal Brown, University of Alaska Space Grant Director, is Alaska chairperson and is collaborating with many experts in Fairbanks to make this conference unique. The International Geophysical Year and Heliophysical Year and the 50th Anniversary of Sputnik launching will be highlighted at the conference. Susan Kramer is events coordinator. Susan is working on the pre-conference tour, which will begin in Anchorage, Alaska about 15 September.

Those taking the tour will be driven from Anchorage to Denali National Park by bus through the spectacular scenery of Alaska. Two nights in Denali will allow for two tours of different areas of this unique national park. Conference hotels in Anchorage and Fairbanks are the Westmark (\$68 per night per room in Fairbanks for the conference). Lots of update information is available on the Independence Planetarium website. Keep accessing the information for the latest updates for the conference, or call Gail Chaid at Independence Planetarium in San Jose, California at (1) 408-928-9604, [planet.esuhsd.org](http://planet.esuhsd.org) or [planet.esuhsd.org/news/wac\\_ak.html](http://planet.esuhsd.org/news/wac_ak.html).

Alaska Airlines is giving WAC conference participants 10% off regular flight prices. Check the Alaska Triphub Website at [alaska.triphub.com/trip/31402.aspx](http://alaska.triphub.com/trip/31402.aspx) for Alaska Airlines WAC discount information. Formal information will be sent out 1 April 2007 for members of PPA, RMPA, SWAP, GPPA, and vendors. If you are not a member of these associations or a vendor but wish to receive a packet, please contact Gail Chaid at the number above or [chaidg@esuhsd.org](mailto:chaidg@esuhsd.org).

Meanwhile, with the transition of slide technology to digital, Director Chaid at Independence Planetarium has been working with the planetarium's webmaster to preserve old slide programs. Slides have been digitized, as have the old soundtracks. They are then re-mastered in Final Cut Pro and put on DVD. The result is a new presentation that audiences can enjoy. Lesson plans are made and teacher packets put together to supplement the presentation in coordination with California state standards, which has resulted in attendance increases at the planetarium because there are so many new programs offered that coordinate with the standards. The staff has also increased programs that meet the standards for history as well as science.

Near Independence Planetarium in San Jose, California is the planetarium at De Anza College in Cupertino. The sister city in Japan



Top: The Zeiss projector at the new Rangsit Planetarium; and Bottom: Prof. R.Subramanian, director of M.P.Birla Planetarium, Kolkata, along with Mr. Suranant Supawannagit, director of the Rangsit Planetarium and Science Centre. Both photos by Gopinath Subramanian. Another picture of the new Rangsit Planetarium appears on Page 89.

is Toyokawa, where the Konica-Minolta planetarium factory is located. In honor of the original gift of the Minolta projector, the planetarium has been called Minolta. With changes in the industry and the recent upgrades for this 36-year-old planetarium, a new name for the planetarium will be selected. A new Infinium-S Projector will be installed in March along with a new Konica Minolta Super MediaGlobe all-sky digital system, AstroTec dome, LED cove lighting, surround sound, new seats, and a new theatre arrangement. Although the planetarium

will open sometime in April, the grand re-opening will occur in the fall of 2007.

A three-day hands-on symposium on teaching astronomy will be held 3-5 August 2007 at Pomona College sponsored by Astronomical Society of the Pacific. Participants will exchange ideas, techniques, and materials for improving astronomy education. Much of the meeting will be devoted to hands-on techniques so successful for astronomy education, especially in smaller planetariums. For more information, go to [astrosociety.org/events/cosmos/html](http://astrosociety.org/events/cosmos/html).

The planetarium at Los Angeles Valley College has served the community well for 40 years but needed upgrades. After a lot of research, Director David Falk and others determined that the most flexible system for their needs was the Evans & Sutherland/Spitz SciDome. It has now been installed and students, teachers, and the community are enjoying the new system. David and his colleagues have started a scientific visualization certificate program with campus partners Media Arts and Commercial Music departments.

### Planetarium Society of India

A series of lectures were held at the M.P.Birla Planetarium, Kolkata conducted in collaboration with the Alliance Francaise. It included a lecture by Dr. Claude Cohen-Tannoudji, Nobel Prize winner in Physics for 1997. Other very interesting lectures included one on astrophysics by Dr. Jean Audouze and on quantum mechanics by Dr. Alain Aspect.

Prof. R.Subramanian was in Thailand for discussions on the setting up of a very large observatory in Chaingmai. Prof. Gopinath, secretary of the Planetarium Society of India, along with Prof. Subramanian, visited the Rangsit Science Centre, a new facility coming up in the outskirts of Bangkok. Located in Pathun Thani, it is just after Rangsit and located close to some of the new theme parks. Coming under the Ministry of Education of Thailand, it boasts a tilted dome planetarium and an observatory housing a 16-inch Schmidt Cassegrain telescope. The complex has a huge Science Centre which has galleries on various topics. Mr. Suranant Supawannagit, director of the Rangsit Science Centre, explained the various facilities available.

The first floor houses study rooms on various topics where students will be exposed to practical aspects of lessons learnt in the schools. An exhibit on the Sun is impressive with a walk through the interior segments until one suddenly enters into a compact high-tech lecture hall inside. There are areas specifically dedicated to children, where the tiny tots can enjoy themselves. Mr. Suranant explained that the planetarium has been equipped with a Zeiss projector along with the Sky-Skan projection system so that astronomy classes could be conducted for the students using the Zeiss projector.

The Planetarium Society of India is proposing to hold an international meeting where lectures on the theme of development of planetariums in India will be the central focus. The PSI will be sending information to the affiliate organizations soon, so that those intending to visit could make plans well in time. The PSI will look into pro-

viding local hospitality for a few participants. It is proposed to have the meeting sometime in early 2008, when the weather will be very pleasant in India. Prof. Subramanian is also looking into the possibility of having one of the sessions in Bangkok, since he is currently stationed in Bangkok. Most flights to India could be routed through Bangkok with a stopover there.

### Russian Planetarium Association

**Moscow:** A conference on the Faulkes telescope program was held in September 2006 at the Sternberg Astronomical Institute of the Moscow State University. Scientists doing astronomical research and about 70 specialists in astronomical education from Moscow, St. Petersburg, Yekaterinburg, Nizhny Novgorod, Cheboksary, and other Russian cities attended this meeting. Activities on this program in Nizhny Novgorod planetarium will start in 2007.

**Ural:** The latest planetarium show festival was held in Perm in October 2006. Staff members representing planetariums of Barnaul, Bryansk, Ekaterinburg, Kaluga, Kirov, Kostroma, Nizhny Novgorod, Perm, Saratov, and Vladimir were present. Over 10 new planetarium shows were demonstrated during the festival.

**Volga region:** Construction works in the main 16m (53 ft) dome and in the observatory of the Nizhny Novgorod Planetarium resumed in November.

### Southeastern Planetarium Association

SEPA officers as of 1 January 2007 are Adam Thanz, president; Patsy Wilson, past president; Jon Elvert, president elect; Mickey Jo Sorrell, secretary/treasurer; and John Hare, IPS council representative. Terms run for two years.

The 2007 SEPA conference will be held 9-13 October in Wheeling, West Virginia, a joint conference with SEPA, MAPS, and GLPA. Conference Host is Steve Mitch, director of the Benedum Planetarium.

Lafayette, Louisiana has been selected as the 2008 SEPA conference site. This will



Adam Thanz, incoming SEPA President. Photo by John Hare.

mark the second SEPA conference for host Dave Hostetter. The conference dates are 22-26 July. Further information regarding SEPA is available at the website [www.sepa.domes.org](http://www.sepa.domes.org).

### Southwestern Association of Planetariums

The opening of the newest show *It's About Time* in November at the Burke Baker Planetarium at the Houston Museum of Natural Science marked the third upgrade to the theater's full-dome system in the past 8 years. The new show was a part of the theater's change over from Barco CRT video projectors to new Christie DLP video projectors. In a few short weeks the complete planetarium show library was converted over to a new format of edge blending.

For the ultimate upgrade, wedding bells were in the air for the marriage of Scott Young, son of Dr. Carolyn Summers, inside the planetarium on 27 December 2006. If the recent full dome upgrade wasn't enough of a technology challenge, the wedding was video conferenced using projectors in the theater to show images from the bride's family in China and a high definition camera sent a video stream from Houston back to China.

### Western Alliance Conference

Some 67 planetarians gathered in

September in Lincoln, Nebraska at Mueller Planetarium for the Western Alliance Conference. Highlights included two great workshops by Alan Gould and Dr. Cheryl Morrow and a trip to Omaha to visit the King Science Magnet School Planetarium. Dr. Morrow also led the musical group AstroJazz in concert. One lesson learned: The staff at the Mueller Planetarium now knows that if they go full dome, they really need to paint the dome gray. You can't believe how reflective a pure white plaster dome is until you start throwing light all over it!

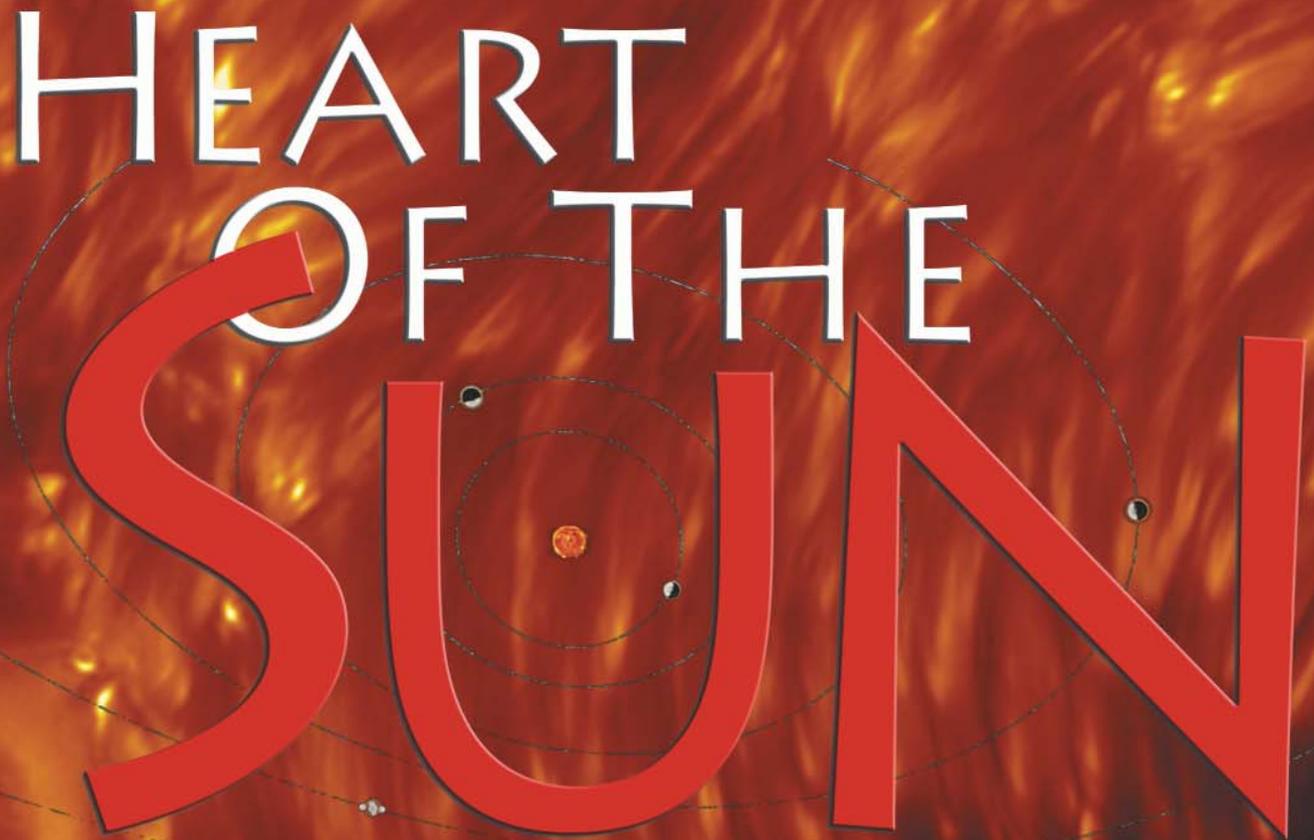
The banquet speaker was Dr. James Rice Jr. of the Mars Exploration Rover science team. Dr. Rice has been a lifelong fan of space travel, both human and robotic, and he gave a stirring talk, now available to the delegates on DVD video. Rice is open to other speaking engagements and can be contact at Mars Space Flight Facility, Arizona State University Department of Geological Sciences, Moer Building Room 131, PO Box 876305, Tempe, AZ 85287-6305 USA, e-mail [jrice@asu.edu](mailto:jrice@asu.edu), (1) 480-965-3205.

Mueller Planetarium's current show is called *What the Heck Is Happening With the Planets?* It is an in-house production based on the number one question Director Jack Dunn has been getting since this summer. It features some incredible new animations from space artist Joe Tucciarone that came from GeoGraphics Imaging. The flight into the Orion Nebula is particularly effective. Since the planetarium has a good CRT projector with real black, the beginning of the flight looks really three dimensional when the constellation of Orion starts zooming at the audience, blending well with the star field.

One more bit of news: Dr. Jose Mena-Werth at the University of Nebraska at Kearney is getting a new 9m (30 ft) planetarium. Their current facility is a 7m (24 ft) dome with a Spitz A-3p star machine and bench seats. The new planetarium will be part of a new classroom building on the campus. ☆

SET THE CONTROLS FOR THE.....

# HEART OF THE SUN



*Our star as you have never seen it before.*

A film by award winning IMAX director  
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NARRATED BY  
**JACK THOMPSON**

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pressed dome master frames played back at normal speed from a workstation. Armed with faster commodity hardware today and using such a playback tool, a production team can see not only when objects enter into frame (and the timecode), but exactly which part of the frame and whether they are noticed by audience members.

#### • File Management

Successful file management played a critical role in ensuring that the *BH* was finished not only early, but under budget. Besides the film and HD footage, the show was constructed from CGI from three different content providers. Colorado-based James L. Arthurs, Inc. provided the dome masters for three animation sequences that added up to 17% of the final show. Spitz Inc. created a 75-second kayak sequence that combined green screen live action and computer animation. Andrew Hamilton from the University of Colorado, Boulder used his real-time software, the Black Hole Flight Simulator, to render 16% of the show, including more than 3.5 minutes of the finale. Finally, NCSA provided not only a whopping 41% of the total running time, but did so by integrating the research results from three separate scientific teams as well as creating five unique visualization sequences of its own.

Throughout the production, dome master sequences were transferred via hard drives shipped through the mail. The production team came up with an efficient procedure for transferring files off the drives and then pushing them through the split, qubifying, and upload pipeline. For a show that would eventually have a final dome master count of 41,189 frames, even the filename convention proved to be important. A final assembly of the individual scenes was not settled on until three months before opening, nearly 90% of the way through the 2-year project timeline. Up until then, scenes were shuffled around, and live footage was inserted as well as dropped. Using a filename convention that was based on the relative frame count in the final show was unwieldy and confusing, since scenes were moved about in the chronology so frequently. The solution turned out to be simple: place all of the files for each scene within its own individual folder, and number the files within each folder the same, i.e. sequentially and always starting with "00001." The scene folders themselves could be reordered into any sequence, but the filename numbering inside each folder would stay the same.

Because the different content providers were sending their sequences at different

stages of completion, including final director's approval, there were often multiple versions of whole scenes on the local production hard drives. Towards the end of the final edit assembly, up to three times the hard drive space necessary for the final frame count were filled up at any given time. This included not only full resolution frames, but 512 x 512 versions for quick scrubbing, a full HD re-render of the dome master for marketing purposes, and backup copies.

#### • New Capture Technologies

Although 70 mm film was mentioned earlier as the format for future live footage acquisition, the technology for video capture continues to advance. HD cameras with 2k resolution have been used to shoot Hollywood feature films (e.g., Panavision's Genesis camera for *Superman Returns*; Gray 2006), while new 4k cameras are currently being developed (e.g., RED Digital Cinema's Red One<sup>3</sup>, Vision Research's Phantom 65<sup>4</sup>).

Wider availability as well as lower costs for 4k HD cameras will help speed the creation of 2k fisheye dome masters. Although these are still not quite at the resolution of large format film, workarounds are possible. Shots that are carefully designed and composed, with attention paid to what objects are on or off frame, can be the source for dome masters using the techniques developed for *BH*. Shooting on video also allows the footage to be immediately played back and verified, so that the camera crew can catch compositional mistakes that occur as a result of the unfamiliarity of fisheye filmmaking. Film scanning costs would be eliminated, since the image sequences would already be in a digital format. Frame rate conversions to a video rate will also not be necessary. The post-production task of removing dust and defects from individual frames will also be less of an issue, since most of the dust was introduced originally by the film scanning.

Finally, several companies have been developing multiple-camera arrays that can record a 360° video environment map. Immersive Media's Telemmersion uses 11 cameras to do nearly spherical live capture. However, because the individual cameras are at VGA (640 x 480) resolution, the image quality of a dome master fragment of the tiled image stream would be insufficient for a large dome. Other companies are concentrating on the defense and security markets, such as iPix's a double fisheye camera pair with capture for each at 1600 x 1200 resolution<sup>5</sup>, and iMove's six-camera array.<sup>6</sup>

The most resolution from a multiple camera array is still, at the time of this writing,

Micoy's 84 camera stereo live capture system<sup>7</sup>. This technology was actually briefly considered for *BH*, and test frames created by the Micoy system looked quite acceptable in the Gates dome. However, at the time of the production, the additional costs for crew and operation of the camera rig as well as post-acquisition stitching of the video streams were more than the show budget could accommodate.

Although promising, multi-camera capture systems do not seem like a viable future alternative to single-camera techniques at this time. The capture resolution needs to match the 2k and (more likely) 4k dome masters, and the price has to come down to make it attractive compared to 4k HD and 70 mm. Much of the high costs for the Micoy array appear to be associated with the engineering staff required to maintain and run the complex systems, the enormous file storage needs, and the image stitching overhead. The bulkiness of the camera rig, nearly a meter across, also makes it difficult to use in the field. Finally, joining together multiple video streams into a seamless scene can be impossible if bright light sources (e.g., the Sun) create internal reflections and lens flares across multiple CCDs. Even though hard drive prices continue to drop while multi-core processing speeds increase, engineering complexity and lighting concerns will remain limiting factors for any multiple camera system.

#### Acknowledgments

The authors would like to Rich Lerner for providing answers to some of our technical questions; Greg Downing for the use of his images; and Nigel Jenkins for providing new versions of the fisheye distance tests when the old ones were unavailable.

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# Planetarian's Calendar of Events

## 2007

- 18 March. **International Day of Planetariums.** [www.planetaritaliani.it](http://www.planetaritaliani.it)
- 22-23 April. Annual Meeting of German Speaking Planetaria, Zeiss Schwaz Planetarium, Schwaz, Austria.
- 17-20 May. Meeting of Association of French-Speaking Planetariums (APLF), Marseille - Aix en Provence - St. Michel l'Observatoire, France. [aplf@astro.u-strasbg.fr](mailto:aplf@astro.u-strasbg.fr), <http://www.aplf-planetariums.org>.
- 31 May-2 June. European collaborative for science, industry and technology exhibitions (ECSITE) Annual Conference in Lisbon, Portugal. [www.ecsite.net](http://www.ecsite.net)
- 16-20 July. Spitz Digital Institute, Chadds Ford, PA, USA, Contact: Joyce Towne at [jtowne@spitzinc.com](mailto:jtowne@spitzinc.com) or [www.spitzinc.com/institute](http://www.spitzinc.com/institute)
- 4-5 August. International Planetarium Society Council Meeting, Rio de Janeiro Planetarium, Brazil. Host: Alexandre Cherman.
- 6-8 September. Forth European Meeting for Itinerant Planetaria: Bratislava, Slovakia. Contact Vidovenec Marian at [marianvidovenec@orangemail.sk](mailto:marianvidovenec@orangemail.sk) and [marianvidovenec@orangemail.sk](mailto:marianvidovenec@orangemail.sk); see also [www.suh.sk/ips2007](http://www.suh.sk/ips2007)
- 20-22 September. Western Alliance Conference (all planetariums west of the Mississippi River), Fairbanks, Alaska.

- Contact: Gail Chaid [chaidg@esuhsd.org](mailto:chaidg@esuhsd.org)
- 7 October. XXII National Meeting of Italian Planetaria, Milan, Italy, [www.planetaritaliani.it](http://www.planetaritaliani.it)
- 9-13 October. Triple Conjunction Planetarium Conference with the Mid-Atlantic Planetarium Society (MAPS), South Eastern Planetarium Association (SEPA), and Great Lakes Planetarium Association (GLPA). Host: Benedum Planetarium, Benedum Natural Science Center, Oglebay Resort, Wheeling, West Virginia USA. Contact: Steve Mitch, [smitch@oglebay-resort.com](mailto:smitch@oglebay-resort.com), [www.oglebay-resort.com/goodzoo/planetarium.htm](http://www.oglebay-resort.com/goodzoo/planetarium.htm)
- 13-16 October. Association of Science-Technology Centers (ASTC) Annual Conference, California Science Center, Los Angeles, California, USA. [www.astc.org](http://www.astc.org)
- 31 December. Deadline for entries for the 2007 IPS/Eugenides Foundation Scriptwriting Competition.

## 2008

- January. Nordic Planetarium Conference, Jaermuseet, Stavanger, Norway. Host Ivar Nakken, [ivar.nakken@mail.nu](mailto:ivar.nakken@mail.nu).
- 15-20 June. **19th International Planetarium Society Conference**, Adler Planetarium, Chicago.

- 15-19 June. 5th Science Centre World Congress, Toronto, Ontario, Canada.
- 22-26 July. Southeastern Planetarium Association (SEPA) annual conference, The Lafayette Natural History Museum & Planetarium, Lafayette, Louisiana, USA. Contact: [dhostetter@lafayettegov.net](mailto:dhostetter@lafayettegov.net).
- 18-21 October. Association of Science-Technology Centers (ASTC) Annual Conference, The Franklin Institute, Philadelphia, Pennsylvania, USA. [www.astc.org](http://www.astc.org)

## Deadlines for "A Week in Italy"

- 15 April 2007, planetarians from the United States
- 31 August 2007, planetarians from France
- 30 September 2007, planetarians from Spain
- For more information on the "Week in Italy, go to:  
[www.astrofilibresciani.it/Planetari/Week\\_in\\_Italy/-Week\\_Italy.htm](http://www.astrofilibresciani.it/Planetari/Week_in_Italy/-Week_Italy.htm)

For corrections and new information for the Calendar of Events, please send a message to Loris Ramponi at [info@serafinozani.it](mailto:info@serafinozani.it)

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## Endnotes

<sup>1</sup>The exceptions that we know of are: *The Heart of the Sun* (2006; dir. John Weiley), a fulldome documentary that makes heavy use of footage from the IMAX film *SolarMAX*; *Dinosaur Prophecy* (2006; dir. Tom Casey), which contains HD video composited into computer graphics (CG); *Optical Nervous System* (2004; dir. David McConville), a 2-minute short; *R+J* (2003; dir. Harald Singer), a fulldome retelling of *Romeo and Juliet* from LivinGlobe; and *Popmania* (1998; Spitz), a music retrospective show for a partially filled dome using video composited into CG. Note that only the first two in this brief list are documentary science programs.

<sup>2</sup>A dome master is a standardized file format by which fulldome movies are distributed. It consists of content inside a circle within a square image. The image inside the circle is mapped to the hemispherical display surface of the dome using an equidistant polar azimuthal projection.

<sup>3</sup>[red.com](http://red.com)

<sup>4</sup>[www.visionresearch.com/phantom65.html](http://www.visionresearch.com/phantom65.html)

<sup>5</sup>[www.ipix.com/cv\\_360.html](http://www.ipix.com/cv_360.html)

<sup>6</sup>[www.imoveinc.com/press/030505.pdf#search=%22imove%20geoview%203000%22](http://www.imoveinc.com/press/030505.pdf#search=%22imove%20geoview%203000%22)

<sup>7</sup>[www.micoy.com/immersive\\_video](http://www.micoy.com/immersive_video) ☆



**James P. Hughes**  
**Planetarium Producer**  
**Henry Buhl, Jr. Planetarium**  
**& Observatory**  
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**hughesj@**  
**carnegiesciencecenter.org**

Upgrades, Upgrades, Upgrades

Well I finally did it...I went out and I got myself a camera phone! My old phone was broken and I was resisting going to the phone store since I knew how crowded they can get right after work. Once inside the phone store, I'd have to sign a new 2-year contract to get a new phone for free. Working for so many years for a non-profit tends to make you a bit of a spendthrift.

Now I understand that a lot of you are joining an online community called **SKYPE** ([www.skype.com](http://www.skype.com)), where you can make long distance calls for free! I can remember Past IPS President **Terence Murtagh** giving a talk at the IPS conference in Cocoa Beach, Florida back in 1994. He took pictures of conference attendees as they were entering the banquet hall and then ran back to download them onto his computer so that he could display the images during his address to attendees.

"Ooooooooooh! Aaaaaaaah!" went the crowd!

I've resisted upgrading my cell phone because I want to avoid the trap that the phone company is setting for me. Once I can take pictures with my cell phone, then I'll want to send them to friends and family, increasing my phone usage and increasing their profits. I even waited until the digital camera I wanted to buy for the planetarium dropped in price by \$300 before I would purchase it. I resisted fulldome video until I thought that the projectors could come as close to film resolution as possible.

Now I weigh the difference between image quality and file size in my 4kx4k dome and I wince when I see the photos my 1.2 mega-pixel camera phone takes. My new phone can take pictures and movies, play songs and download ring tones, and even help me find the nearest pizza shop. Its icons and navigation buttons are too small, but as they say, "less is more," right? But it is fun to have my dad's photo pop up when he calls me on my new phone. Isn't technology something? I now wonder if I can have his voice as a ring tone shouting, "Jaaammeesss," when he calls?

## It Was Once Cutting Edge

I recently purchased some vintage *National Geographic* magazines at a church bazaar. They were mostly from the mid-1950s and they have some great advertisements inside. The desert climates of Arizona and California are prominently featured in the travel ads, as are the job offers from all the high-tech aerospace companies that sprang up in that region of the country at the dawn of the space age.

Other ads extol the joys of 3D photography and slide shows and one **Kodak** ad features the picture of a proud-looking slide projector, its lens thrusting out from the photo, with the words "The Showman" blazoned underneath! Wow, I thought, with that one brown bakelite beauty you could position a constellation picture anywhere you needed to with the right number of wooden wedges and a properly opaqued slide.

Now I simply click on a little box and I can fade up a constellation picture in any of one of a million colors and I don't have to worry about breathing in all the dust from the cove shelf that I fear may have been lined with asbestos fireproofing material. For as much as technology has changed, I still rely on an artist, a light bulb, and a lens to project my shows. I wonder how many of you are holding onto those single shot projectors and you would be interested in set-

ting up an internet store to make them available to others who need them, similar to the folks I mentioned in my last column down in Florida at the **BCC Planetarium**?

## New at GLPA

The members of Great Lakes Planetarium Society have a new **online store** where you can purchase items and pay for membership using a credit card. Purchases are safe and secure, and made through PayPal, but you don't need a PayPal account. Membership, show kits, videos, tips booklets, scripts and resource materials can all be bought online through the GLPA Online Store simply by visiting it at [www.glpaweb.org/index.htm](http://www.glpaweb.org/index.htm). There are even a few items that are available to non-members.

## Ah, That First Conference

My first planetarium conference was at the original **Hayden Planetarium** at the **American Museum of Natural History** in New York in 1985 for a Middle Atlantic Planetarium Society Conference. I took a People's Express flight from Pittsburgh to New York via Newark, New Jersey. People's Express was a walk-up airline and they even took your payment right on the plane. My, how times have changed! I took the bus into the city from Newark and tried to walk from Times Square up to 81st street. Okay, so I was a little naïve, but you should know that my hometown downtown area can be crossed on foot in about half an hour.

After getting a city bus to help relieve my aching feet, I arrived at the planetarium and wandered inside in amazement. There were talks and lunch and a special evening performance by space music artists **Mark Petersen**, **John Serrie**, and **Barry Hayes**. The keynote address was "Why I Hate Astronomers" by **Isaac Asimov**. I left a little early to catch a train over to Brooklyn because I was trying to pinch pennies by staying at the house of a relative of a coworker, so I missed Asimov's talk (wince again), but the one part of the conference that had a huge impact on me was having the chance to go inside the production offices of the planetarium and stand shoulder to shoulder with **Helmet K. Wimmer**. I had seen his work in planetarium shows that we had purchased from the Hayden—panoramas that looked three-dimensional, even though they were slides. He not only illustrated Hayden shows, but with his talent and proximity to the New York publishing community, he illustrated astronomical concepts for countless magazine articles and books.

During my behind the scenes tour, Wimmer revealed his technique of sculpting on the illustration board so that the artwork literally jumped out at the viewer. I was

hooked, and I knew that I needed to look no further for what I wanted to do with the rest of my life. He passed away last March at the age of 80 at his home in Florida; see Page 91 for a tribute. I'd like to pay special thanks and send our condolences to his friends and family on his passing. We also send our thanks and...

### Condolences to...

...the friends and family of **Dr. Rolf Erik Zimmerman**, who passed away on January 26, 2007. For 27 years, since its founding in 1974 until his retirement in 2001, Erik served as the director of the **Robert J. Novins Planetarium** at Ocean County College in Toms River, New Jersey.

Born in 1941 in Newark, New Jersey, Erik developed a life-long interest in astronomy and built a small planetarium at his home when he was in junior high. He built his first telescope while in high school, and also founded a high school astronomy club. He went on to Pomona College in Claremont, California, and received his PhD from the University of California-Los Angeles in astrophysics, the first to do so from UCLA cum laude.

He was a lecturer at the Adler Planetarium in Chicago while on summer breaks from school while still an undergraduate.

After receiving his PhD, he was a professor at Michigan State University in East Lansing, Michigan and at Kean College in Union, New Jersey, before taking the position at Ocean County College. He continued to teach after retirement.

He was a founding member of ASTRA, the Astronomical Society of the Toms River Area, and served as its president from 1977 to 2001. He also was a longtime officer of the Middle Atlantic Planetarium Society and a member of the International Planetarium Society.

He is survived by his wife, Gayle; sons Brad, Brendan, Stephen, and Erik; a sister; eight grandchildren; and many nieces and nephews.

His family requests that memorials take the form of donations to the Susan G. Komen Foundation.

...to the friends and family of **Bradford Washburn**, founder of the **Museum of Science** in Boston, who passed away on January 10, 2007. He was 96. Washburn is known for his adventurous spirit and his numerous mountain climbing expeditions. The Museum of Science was opened in 1951 and was the model for the popular science centers of today. After later adding the Charles Hayden Planetarium and the world-famous 2.5 million-volt Van de Graaff generator, the Museum of Science continues to fulfill Washburn's intent to bringing science

to life. He retired in 1980.

### Do You Blog?

We've recently added a blog feature to our website, and I am curious how many of you are starting a similar feature on your websites. I know that today's young people spend a lot of time blogging and I'm not surprised that the word processing program that I am using to type this column in doesn't even recognize the word blog. It asks me to correct it—giving me the following suggestions for correction; bog, bloc, blot, blob and blow. Blogs invite the establishment of a community—just like a professional organization (like IPS).

As planetarians, we get together four times a year through this publication and we exchange ideas and information. I know that blogging and online communities are changing the way we communicate, just like digital projectors are changing the way we educate.

Last year we did some special musical programming and quite a few of the people attending said they learned about the show on the bands page on myspace.com. Doing some research on the web, I found a few blogs that may be of interest to you. One had a nice description of a planetarium at [astro.profpage.com/archives/99](http://astro.profpage.com/archives/99), although it is written by an anonymous astronomy professor (he may be from the west coast, since he has advertisements for real estate near San Francisco) who states that he doesn't have a planetarium and probably never will due to the high cost. This is a perfect example of an online journal.

With all the various download options

and with plenty of topic links and additional links to other space-related blogs, this site puts the "web" in "website."

Another online journal that I like is from someone very familiar to our group, **Ryan Wyatt** from the Hayden Planetarium in New York. His Visualizing Science page at [ryanwyatt.livejournal.com](http://ryanwyatt.livejournal.com) is a science visualizer's answer to the Astronomy Picture of the Day site. Let me know if you have a favorite blog or online journal.

### Music Under The Stars!

I had hoped to hear from a few of you about your special musical programming, but alas, I didn't hear from a single person. I did, however, stumble across a fine program that is being run out of **Montgomery College Planetarium** in Takoma Park/Silver Spring, Maryland. **Dr. Harold Williams**, an astrophysicist and planetarium/physics lab coordinator, runs a very active live music program on selected Saturday nights throughout the academic year. With bands with names like **Unlucky Atlas**, **Aligning Minds** and **SpaceSeed**, it sounds as if you'll be in for a cosmic good time. If you're in the area any time soon and would like to attend, check the website at [www.montgomerycollege.edu/Departments/planet/planet/shows.html](http://www.montgomerycollege.edu/Departments/planet/planet/shows.html) for schedule details. Star parties follow the live musical and laser show performance on clear nights!

The rock band **Guster** performed at the Charles Hayden Planetarium in Boston this past December. This alternative rock played a thank you concert for Bostonians to promote its latest album *Ganging Up On The Sun*. The group formed in the city 15 years ago.



The new Rangsit Planetarium in Bangkok, Thailand; see related story on Page 83. Photo courtesy of Glenn Smith of Sky-Skan Inc.

## Book 'em Dan-O

**Jack Horkheimer** of the **Miami Museum of Science and Planetarium** recently celebrated the release of his first book, *Stargazing with Jack Horkheimer: Cosmic Comics for the Sky Watcher*. This comic-book style, 87-page book is designed for children and includes a variety of lessons on science and astronomy.

**Martin Ratcliffe** (IPS past president) is the editor of a new book out titled *State of the Universe 2007*. Jointly published by Springer and Praxis Publishing from the UK, *State of the Universe 2007* is promised to be an annual survey of astronomical images, discoveries, and events. The book contains chapters written by leading astronomers and educators.

Are you working on a special project or publication? Tell us all about it here in a future issue by emailing me all the details.

## Did you know...

...that a planetarium called the **Nihonbashi HD: DVD Planetarium** opened on December 15, 2006 in Tokyo, Japan? Designed as a temporary installation through June 30, 2007, this specially-created facility will present a show called *Hokusai's Universe (Hokusai no Uchu)*. Produced by

planetarium creator **Takayuki Ohira** with stage direction from **Amon Miyamoto**, this show also features artwork by **Hokusai Katushika**, famed for his Edo Period (1603-1867) Ukiyoe art of Japanese woodblock prints. The soundtrack features the voice talents of several Japanese actors and actresses, including **Ken Ogata**, **Ryuta Sato**, and **Eriko Sato**. The show also features a Megastar II planetarium projector capable of projecting precision images of about 5 million stars! Visit them on the web (if you read Japanese) at [www.tfm.co.jp/star/](http://www.tfm.co.jp/star/)

...that there is a website devoted to **Abandoned & Little Known Airfields**? There is, and it can be found at [www.airfields-free-man.com/index.htm](http://www.airfields-free-man.com/index.htm). **Paul Freeman** has compiled a list of 1367 airfield in the United States and includes photos of some pretty interesting domed structures used for radar equipment.

...that the **Rangsit Planetarium** in Bangkok, Thailand is now complete after a 5-year delay? An opening ceremony took place on February 21, 2007 to unveil a new

Zeiss STARMaster projector and a 6-projector full dome projection system from Sky-Skan, Inc.

...that **Dr. Laura Danly** is now the curator of education at **Griffith Observatory** in Los Angeles, California? Dr. Danly was formerly the senior manager of astrophysics education at the American Museum of Natural History in New York and most recently served as curator of space science at the Denver Museum of Natural History. Danly also has been an assistant astronomer and project scientist for education at Space Telescope Science Institute in Baltimore, and associate director for public outreach at the Maryland Space Grant Consortium, also in Baltimore.

...that staff members of the **Barnaul**



Dr. Laura Danly, new curator of education at the Griffith Observatory in Los Angeles, California. Photo courtesy of Marcus Weddle of Sky-Skan Inc.

**Planetarium** in Russia have been recently inundated with calls regarding falling fireballs in the region? News reports have mentioned that Natalia Pavlova and her other research fellows are collecting sighting info to determine possible meteoric landing sites.

...that a new planetarium is now open at the **Museo Elder in Las Palmas**, Gran Canaria? Located on the third largest of the Canary Islands off the west coast of Africa, you can take a virtual tour with a very impressive flash presentation at [www.museoelder.org/indexflash.html](http://www.museoelder.org/indexflash.html). I really like their slogan: "The Museum is not a Mausoleum, it is a Fair for the Intelligence!"

...that the **Verizon Foundation** has given a \$500,000 grant to the **Discovery Center for Science and Technology** in Thousand Oaks, California at the Thousand Oaks City Council meeting on January 9, 2007? The Discovery Center plans to use some of the grant money to fund the creation of the Verizon Community Clubhouse, the centerpiece of the Sci-Tech Exploration Center. The Verizon Clubhouse will feature hands-

on workshops and studios filled with cutting-edge technologies, many developed in Ventura County by schools and businesses in fields such as telecommunications, biotechnology, and aerospace. The ceiling of the Verizon Clubhouse will be domed to accommodate a digital planetarium projection system.

The Discovery Center is already using this STARLAB projector to offer planetarium shows at schools and community events, using a portable dome also funded by Verizon. The Discovery Center still needs to raise another \$45 million required to build the Clubhouse, which it plans to design over the next two years. Okay, so now I don't feel so bad about the high cost of my phone bill.

## Out of Town Visitors

Now that I have been initiated into the full-dome community, I also have had the pleasure of meeting some new planetarians who were out and about looking at new systems. Late last year I was visited by **Sam Tsoi**, senior technical officer from the **Hong Kong Space Museum**; **Chee-Kuen Yip**, chief science curator from the **Hong Kong Science Museum**; and **Gu Jieyan**, deputy director of the Public Education Department of the **Shanghai Science & Technology Museum**. It turns out that they all arrived on the same day, leaving no time for me to get any photos to share with you. If only I had my new camera phone back then, I could have uploaded them to a MySpace page and shared them with you all online!

Also, don't forget to plan on attending the **Triple Conjunction East Conference** this year in Wheeling, West Virginia at the **Oglebay Resort and Conference Center** from October 9-13 with a side trip to my *real* space on October 11. Members from MAPS, SEPA and GLPA with all be coming to this rare alignment of planetarium professionals, and I hope that a few of our international colleagues will also attend!

With all of you descending on our area later this year, I'm wondering if I shouldn't set up a rummage sale of my own since we still have a lot of equipment we aren't using anymore. Let me know if you have any interests or needs.

I'd like to take one final opportunity thank all of you who remember me each quarter with your news and pictures for this column. I couldn't do it without you. I hope to make some changes over the next few issues and I'd like to know what type of news and features you'd like to see here. Please send me your ideas. I look forward to hearing from you at the address listed at the front of this column! ☆

# Helmut K. Wimmer

## 1925-2006

Planetarium art—indeed, astronomical art—owes a great debt to Helmut Wimmer. After a recommendation from long-time Hayden Planetarium lecturer Henry Neely, Helmut was brought on to the American Museum-Hayden Planetarium staff as art coordinator in 1955. Neely had encountered Helmut by chance, and was impressed by his obvious talent and personality. At the Hayden, Helmut developed many innovative art techniques for the Hayden sky shows. It was there that he began to perfect his use of the airbrush. Only superlatives can describe his ultimate career.

Helmut Karl Wimmer was born in Munich in 1925. At the age of 14 he was apprenticed to a sculptor and architectural model maker. While serving in the German army at 18, he was captured by Czech partisans and turned over to the Russians. As a prisoner of war, he was sent to Gorky, where his talents were noticed by the overseers. He was soon assigned to a team to repair the ornamental plaster works of the government buildings in Gorky. He was freed in 1949 and made his way to Munich, a story in itself.

Seeking what he hoped would be a better life for his wife, Francie, and their daughter, Monica, he made his way to New York in 1954. A second daughter, Nina, was born a few years later in the US. He soon began his career at the American Museum-Hayden Planetarium, retiring from there in 1987.

Though skilled in painting, his seeking a view of the third dimension required something beyond the ordinary paintbrush. He could achieve better results by using the airbrush, even though it was unfamiliar to him at the time. He used masks and templates to get sharp lines, like edges of spherical stars and planets. Raising the masks would permit a softening of the edges for nebular boundaries. Helmut was bold in his experimentation with different materials and techniques. When an astronomical concept was explained, he visualized its illustration. He then transferred his view to paper. To experiment with composition, Helmut often sprayed plastic over the finished portion of a work. If unsatisfied, he could wipe it off without damaging the good part and add something different. The result was always closer to the desired concept.

Over the years, Helmut drew so many pictures of the Earth that he could paint it from any point of view, no longer needing a globe or map. He could also represent constellations from memory. Of course, Helmut learned his English along with his astronomy while he did all the art illustrations for the shows. A problem, however, surfaced in Germany. He could not tell his family and friends there about his astronomical work, because he didn't have the technical German vocabulary.

One of the Hayden staff members, Franklyn M. Branley, was a very successful author of science books for children. Many of his astronomy books were illustrated by Helmut. This exposure got Helmut numerous assignments from other authors and publishers,

including illustrating several textbooks. His skill often earned him a co-author credit on the books he illustrated.

His work frequently appeared in the American Museum magazine, *Natural History*, as well as many others. His colorful schematic concept of black hole phenomena has been copied extensively, sometimes without proper credit. But those of us familiar with Helmut's work can identify it almost immediately in any publication.

It was the practice at the Hayden to change shows over one night. Technicians would change the various projectors and special effects. Helmut would change all the slides in the several slide projectors, and everywhere else a slide was needed. What went where was in his head. For hours each change night, Helmut would climb a ladder scores of times. It was ultimately made easier when a wheeled scaffold was used, but he had to climb it, too, just not so often. There

were times when the staff tried to make the work a bit less onerous by playing his favorite song, "Dark Moon" by Loretta Lynn.

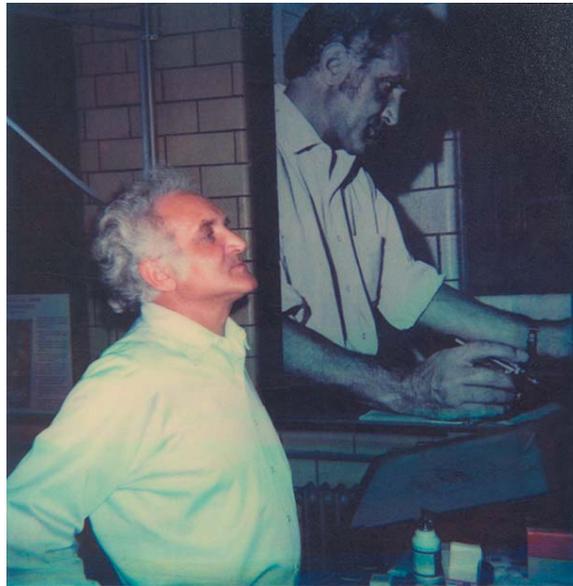
One show was titled *Six Men Who Changed the Universe*. For a hallway exhibit, Helmut made busts of the six, Ptolemy, Copernicus, Galileo, Newton, Einstein, and Hubble. He was a sculptor again, perfecting the clay busts before casting them in plaster. He worked from illustrations of each of the men, except for Ptolemy, of course. In Ptolemy's case Helmut was accused of making him look suspiciously like Helmut himself.

His humor was infectious, and once used in a show. We had wanted to have a movable Earth projected onto the dome. He coated a glass ball with wax. In the wax, he scraped the geographic features. Fluoric acid was to be used to etch the exposed glass. He had almost finished it on a Friday afternoon, but the technicians etched it Monday morning before he got to work. In

shows, we were able to joke that our German artist had succeeded where Hitler failed: He had wiped the British Isles off the map.

Helmut's last years were troubled by Alzheimer's disease, and he had suffered a stroke. Although his vigor failed him toward the end of his life, his lively work will last for years, well beyond the end of our own. His significant contribution to the reputation of the Hayden, and to the field of astronomical art, cannot be suggested by this brief note. He is most definitely a pioneer in the field. His name may not have been listed among the staff members of the Museum, but he was always a well-respected colleague of ours.

Helmut Wimmer is survived by his wife, Francie, daughters Monica and Nina, and by three grandchildren.



Helmut K. Wimmer, 1925-2006

image provided by Hayden Planetarium

by Kenneth L. Franklin

Former Chairman and Astronomer Emeritus  
American Museum-Hayden Planetarium

# Last Light



**April S. Whitt**  
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December's issue had news from the Australia conference. This one has bits and pieces from the Pluto issue. Our audiences are still asking, "How do you feel about Pluto being demoted?" Hmmmm.

Dave Hostetter shared some news from the South Eastern Planetarium Association meeting in Florida last June. Phil Groce fell 4 feet down the elevator shaft in the planetarium, pulled the cartilage in his right ribs, and sprained his left wrist. He had to go to the hospital emergency room, but showed up later in the hospitality suite all wrapped up but having a good time.

We heard his crash in the dark (it was during the constellation shoot-out), then the plaintive words, "It's Phil. I fell. It hurts."

By the time the lights came up, someone had already coined the phrase "Fell Groce."

"At least he's talking."

"Yes, but that's normal."

"Maybe it's an involuntary response."

By the next day we had signs posted: "Phil Groce finally fell fully four feet."

"Phil Groce slipped here."

All I can say is that it's a good thing he has a sense of humor. He took the "ribbing" very gracefully. The very best part is that after all that, he was the winner of the Campbell Award, so he got some actual respect, too. Of course, when he won his door prize, the "Free Fall Phil" chanting started.

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Time exists so everything doesn't happen at once.

Space exists so it doesn't all happen to you.

Signature tagline from Scott Young, Manitoba Museum

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From Jim Beaber: "I enclose a quote from the following article in the *New York Times Picayune* that might make us all want to stop and think:

FOOTIE-ON-THE-WATER, ENGLAND - Fresh on the heels of the Pluto coup, the International Astronomical Union (IAU) is considering new regulatory language that would redefine how personnel and workers in planetariums are termed.

The IAU's head of the Supercommittee for Non-necessary Items and Terms (SNIT), Dr. Margaret Watcherskies, announced that the IAU is considering whether planetarium workers and personnel are truly "astronomers" and/or "astronomy educators". Dr. Watcherskies cited blogs, various postings in internet chat rooms, and other material as examples that planetarium workers and personnel are confused and hostile people, and are likely causing confusion and hostility in the general public over Pluto.

Frankly, we're a bit disappointed in the planetarium community," said Dr. Watcherskies. "We expected full compliance with the only official governing body for naming stuff. In the universe, I mean. This is rebellion, and we mean to crush these people."

The proposed change would have planetarium workers and personnel now classified as "Citizens Related to the Astronomy Profession" (CRAP). Response in the astronomical community has been varied, with many astronomers frankly surprised that planetariums actually still exist.

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With thanks to Don and Nancy, and courtesy of insider Betsy Wilson:

PRAGUE - The international committee of astronomers decided this week to remove Pluto from the list of planets. A spokesman released this statement, "We're awfully sorry to have to let Pluto go, but this restructuring is necessary to move this solar system forward. We've got to tighten our asteroid belt and make difficult decisions. We've really enjoyed working with Pluto in the past and wish it no ill will. We look on this event as a great opportunity to revitalize our system."

Behind the scenes, however, things were reportedly more heated. Rumors abound that Pluto orbited slower than other planets, often appearing sluggish and possibly intoxicated. Some have reportedly complained

about off color jokes directed at Uranus. Lawsuits by several asteroids demanding inclusion in the solar system reportedly also motivated the committee to take a hard line on planet definition. An original plan to use the word "Pluton" was rejected by their lawyers as demeaning and discriminatory.

Others have defended Pluto, claiming the decision to downsize was based on unjust discrimination. One anonymous insider claimed, "It's a new solar system, and if you're not wearing rings, or you're too small, you're just not flashy enough for the kids today. Besides, the committee was always uncomfortable with the attraction between Pluto and its long-term partner, Charon. It's just prejudice, I tell you."

Pluto's press agent released this statement, "While Pluto is saddened by this turn of events, it's not bitter, rather Pluto looks on this as an opportunity to explore new and exciting projects."

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To: Dome L

I'm sure that by the time this is posted, there will already be a decision made about what is, or is not, a planet. It's already evident that any decision is going to leave some group or other upset. Part of this attachment might be based in fond memories in learning about the solar system, and perhaps (at least subconsciously) on the association of the planet with Mickey Mouse's dog. It might seem as though history and tradition have created a deep and abiding love for this lonely little planet, but this is a mistake. At best, any feelings we have can only be plutonic.  
Jim Beaber

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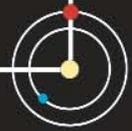
## Despite Planetary Downgrade, Pluto Is Still Disney's Dog Star

BURBANK, CALIF - In reaction to news today that Pluto was demoted to the status of dwarf planet, the Seven Dwarfs issued their own short statement:

Although we think it's DOPEY that Pluto has been downgraded to a dwarf planet, which has made some people GRUMPY and others just SLEEPY, we are not BASHFUL in saying we would be HAPPY if Disney's Pluto would join us as an eighth dwarf. We think this is just what the DOC ordered and is nothing to SNEEZE at.

As Mickey Mouse's faithful companion, Pluto made his debut in 1930, the same year that scientists discovered what they believed was a ninth planet.

Said a white-gloved, yellow-shoed source close to Disney's top dog, "I think the whole thing is goofy. Pluto has never been interested in astronomy before, other than maybe an occasional howl at the moon." ☆



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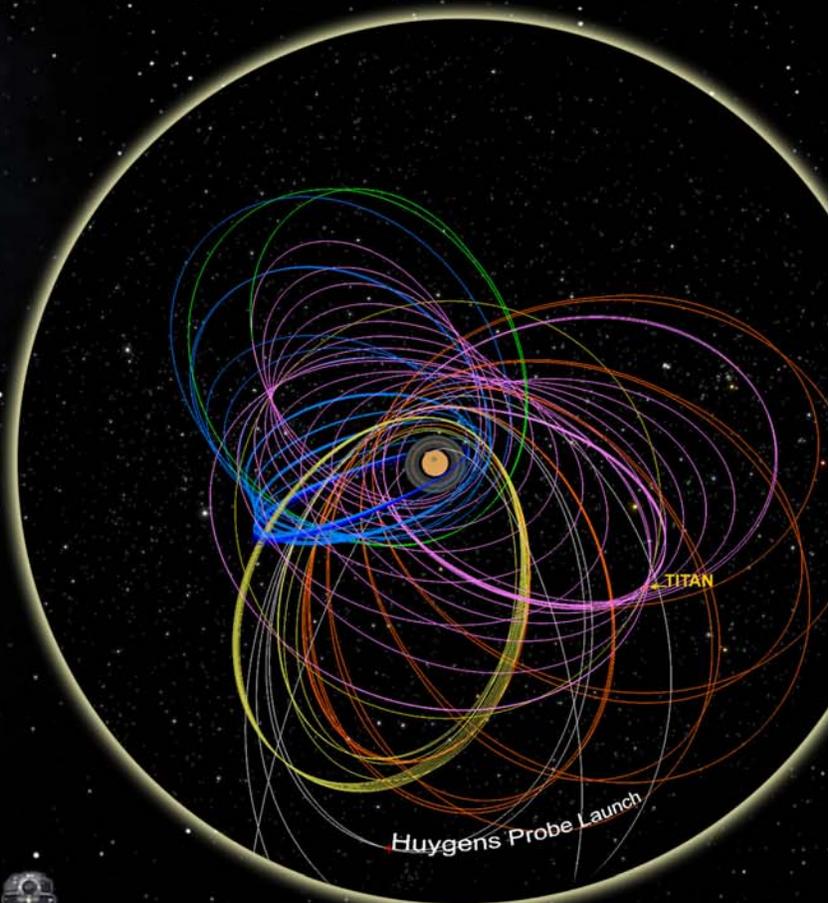
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