

Vol. 37, No. 2

June 2008

PLANETARIAN

Journal of the International Planetarium Society



A whole new dimension...Page 10
The fulldome evolution...Page 14

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PLANETARIAN

June 2008

Vol. 37 No. 2

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June: April 21
September: July 21
December: October 21

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On the Cover: Who looks more natural in 3D glasses than kids? These youngsters are checking out the 'Imiloa Planetarium's new 3D Stereo Universe. Story begins on page 8. Photo courtesy Sky-Skan.

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In Front of the Console



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I have a sign hanging in my office that says "Different is not wrong." It reminds me constantly that people have different ways of doing things: dressing, talking, walking, thinking. That's a good thing, too—"the universe would be a really boring place if people were all the same, wouldn't it," according to Bleamer, the alien main character in Calgary's *Great Space Treasure Hunt*. It would be boring, and it would be stagnant, too. Without other people who do things differently, there would be no progress or innovation. There would be no creativity, and certainly no joy.

I also just re-read *A Wrinkle in Time* by Madeline L'Engle, prompted by the request of an eighth grade teacher whose class was reading it and she wanted to touch on some of the science in the book for her planetarium visit. If, like me, you haven't read the book in the last 40 years or so, pick it up and refresh yourself. It's an allegory that works on many levels. L'Engle wrote it at the height of the Cold War—post-Sputnik, but pre-Yuri Gagarin. In it, she made a strong statement about what happens when "different is wrong," and the ills of living in a completely totalitarian system.

She might have been voicing the early-60's American fear about the growing strength of Russia and its system of government, so different from what we knew in the United States. If it's different, it's wrong, right? But you can

observe the power and results of "different is wrong" in religion, education, and high school hallways, not just in forms of government, so the message in the book is timeless.

This issue of the *Planetarian* brings these separate thoughts together for me.

Once again, this is a truly international issue. Thanks to the efforts of Lars Broman, who celebrates his 50th International News column with this issue, there is planetarium news from 20 IPS affiliates.

The more I read International News, the more I'm reminded that from so many different parts of the world and from so many different people, we are all really the same. We share the same passion for educating others about astronomy and we share the same problems, whether our planetarium is in Nizhny Novgorod, Russia, or in Youngstown, Ohio.

When *A Wrinkle in Time* was written, the thought of empathizing with colleagues in Moscow who faced the loss of their planetarium would have been scandalous. Today, with computers and e-mail uniting the globe, we embrace the fact that people in Russia—or Ghana, or Ukraine, or Portugal, or Rio de Janeiro—are all just the same as us. They aren't different at all.

And, like the heroes in L'Engle's book, we share a common goal: fighting the threatening darkness that the lack of science education brings with it.

Oh, my. That got a little strong, didn't it? Sorry.

I'm personally happy that planetarians, no matter where they're from, are so willing to share their different ways of doing things. Different isn't wrong; different is exciting! Through the pages of the *Planetarian* and regional newsletters, on line through Dome-L and other sites, and through sharing personally at conferences, we all learn new and different ways of reaching our audiences and teaching our lessons.

If Bleamer landed on Earth, I can imagine that planetarians would be among the first there to greet him, say hello, and ask what size dome he has.

If a real short, green, fuzzy alien landed on Earth, however, it would probably be greeted by the military and looked at in fear because it was different. Sigh.

Speaking of Bleamer, Susan Cannon, the source of many of the wonderful children's programs from Calgary Science Centre's production department, has left the planetarium world. Don't mourn too much, however; she's now working with a professor in Geoscience at the University of Calgary "managing projects designed to enhance the quality of science education and science literacy

and improve student engagement in the classroom." I've already wished her all the best and I know the results of her university work will be shared with us.

Normally this bit of news would be in Gibbons Gazette, but it's missing in action this issue. What's New and NASA Space Science News also are on hiatus. But news, like time, marches on, so I'll finish off with some items that otherwise would not have appeared.

In Memory

Jack Callow, a long-time science educator and former director of South Florida Museum and Bishop Planetarium in Bradenton, Florida, passed away on April 3 at the age of 80.

According to his obituary, "He was one of NASA's first lecturers to visit schools throughout the country with its Spacemobile in the early 1960s. He helped explain the space agency's goals as astronaut John Glenn became the first American to orbit the Earth in 1962."

Jack had worked in educational television in Washington D.C. and Pittsburgh before moving to Florida at age 45. At first he worked in a shell and gift shop that he and his wife opened, but later taught middle school science before being hired at South Florida/Bishop in 1977.

He stepped down after less than a year, after suffering his second heart attack in two years at age 49.

Eclipse Webcast

NASA's Sun-Earth Connection Education Forum and the Exploratorium (San Francisco, California) are co-hosting a live webcast from China of the August 1 total solar eclipse. Astronomy educators are invited to link to the satellite feed and registrants will receive free packets of information, program ideas, cultural events, DVDs, and downloads of animations and movies on topics like eclipses, solar variability, space weather and solar cycles.

A special guest will be the Director of the Urumqi National Observatory, Dr. Na Wang, and you'll hear about the latest U.S. and Chinese solar—and lunar—missions.

Go to www.sunearthday.nasa.gov and/or www.exploratorium.edu/eclipse for more information.

Afterschool Universe

Afterschool Universe, a hands-on afterschool astronomy program that explores basic astronomy concepts through engaging activities and takes participants on a journey through the Universe beyond the solar system, is now widely available to afterschool program providers to be run in local communities.

The program is targeted at middle school students. More information is available at universe.nasa.gov/afterschool.

history

06/1984:

SEOS Displays is founded...

04/1997:

Trimension Systems Inc.
is established...

11/2001:

Trimension Systems merges with
parent company, SEOS Displays...

7/7/2007:

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N

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journey

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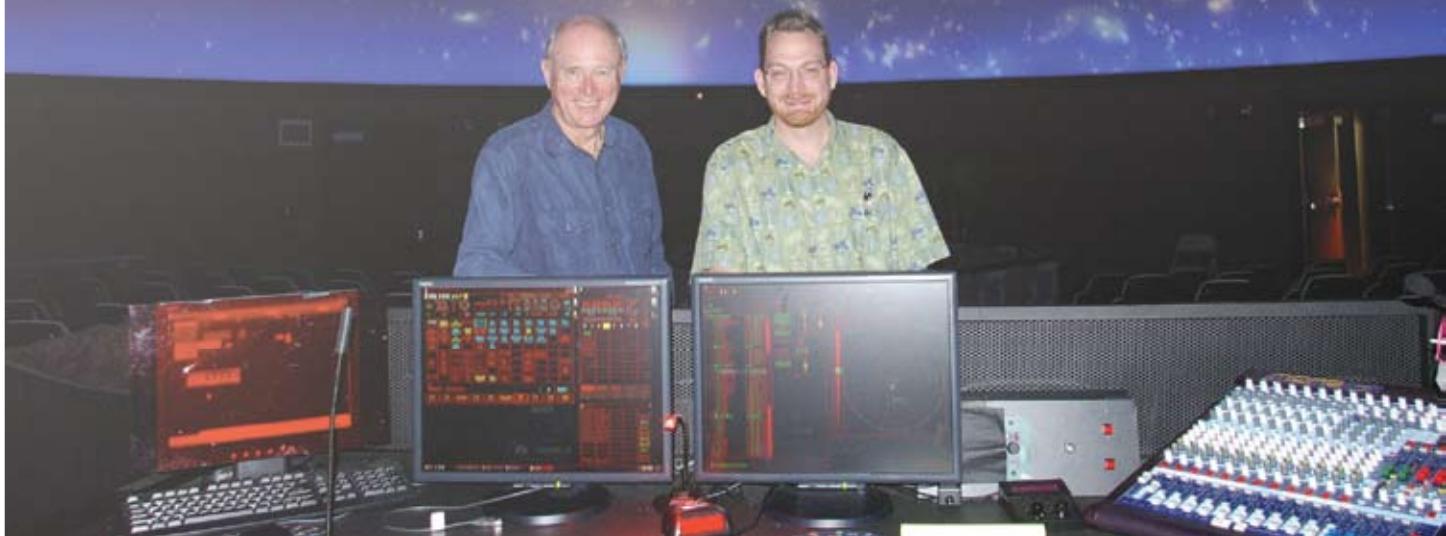
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Another **DIMENSION** in the Planetarium

'Imiloa Explores the 3D Stereo Universe

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Imagine being able to take your audiences to the surface of the moon and making them feel as if they were there with Neil Armstrong and Buzz Aldrin. Looking out, you can see children and adults reaching to touch the lunar surface, gasping in delight. You voyage through the solar system where the planets are not flat images, but orbs in space that seem as if people are almost able to reach out and feel. Traveling outward, you and your audience explore the latest exoplanet discoveries by flying right up to their stars and seeing where new worlds are located. Imagine experiencing the Virgo Cluster, where the galaxies seem to surround you. Does this sound like the holodeck on the Starship *Enterprise*™? Could it be a virtual reality environment from the future?

Actually, it's the virtual reality environment of today at the 'Imiloa Astronomy Center's planetarium, and this is where our story begins...

In 2007, the planetarium at 'Imiloa Astronomy Center of Hawaii was searching for a digital planetarium system that would meet two very distinct needs—a public outreach tool that would allow us to share the cosmos with children and adults in awe-inspiring ways, and a system capable of displaying the most recent scientific discoveries in a way that would captivate and engage astronomers.

Our planetarium is at the base of Mauna Kea, home to the largest astronomical observatories in the world. Given this location, the planetarium needed to deliver imagery that was visually dramatic, scientifically accurate, and extremely realistic. The traditional night sky with stars, constellations, and planets had to be exceptionally good, and the ability to display objects well beyond what we could see with our unaided eyes was of the utmost importance. Real time and playback capabilities were required, but real time power and flexibility were essential for live programming and potential research applications. Of course, being in the planetarium world, budgets, as always, were limited. To realize these goals, new technology and a new "dimension" were required.

The 'Imiloa staff traveled to Edmonton, Alberta, Canada to visit the TELUS World of Sci-

ence for a Digital Dome Symposium and to Domefest in Albuquerque, New Mexico to see a demonstration of Sky-Skan's *definiti™* SXRD (Silicon X-tal Reflective Display) system in stereo 3D. The system used Sony SXRD projectors with a resolution of 4K projecting through specially designed high-definition *definiti* lenses and viewed through Infitec 3D glasses. Digital-Sky 2 provided unparalleled astronomical computing power. This, coupled with Digital Universe, provided a system with the most advanced astronomical datasets currently on the market.

Steve Savage, president of Sky-Skan, set up the demonstrations and 'Imiloa was given the opportunity to put the system through some tough tests following the public demos. 'Imiloa staff explored the astronomical datasets and imagery, pushing the system by jumping around from real time complex data set display to playback and then back again, and moving from 2D to 3D stereoscopic modes. The system software is incredibly user friendly, and I found myself flying through the universe with a mouse using basic instructions. The demonstrations convinced our team that this was the solution to our needs. Real time 3D stereo images of the solar system, Milky Way and multiple galaxy surveys were stunning. Objects jumped off the dome and into the viewers lap and it really added a new dimension, so to speak, to the way a person experienced astronomical content.

Playback content was limited to some short clips, given that no one had permanently installed such a stereoscopic system at that point. This meant some risk. When would feature shows become available? How expensive would they be? If our facility was to be the first in the world with this technology, we would need spectacular content to captivate audiences and leave them wanting more. If one had a 3D stereoscopic system, the audience expectation would be that the programs be spectacular, much better than the old-fashioned 3D movies or even recent 3D IMAX films.



Facing page: A blending of the work done by astronomers using the big telescopes on the summit of Mauna Kea and the visualization abilities of 'Imiloa's newly-upgraded planetarium. Mauna Kea image from istockphoto.com. At the planetarium controls are Dr. Brent Tully (left) with author Shawn Laatsch; photo by Martin George. At right, Max Pugach (top) and Juyeon Lee (center) from Sky-Skan inspect the waiting equipment at 'Imiloa's loading dock. Bottom, an SXRD projector on its stand. Unless otherwise noted, all photos by Shawn Laatsch.



Max (left) and Juyeon (center), this time installing computers. At right, Sky-Skan President Steve Savage stringing cable.



An inherent danger with 3D stereoscopic imagery is that it can be done just for effect, and be too "in your face." How would digital content providers handle this? While these questions did linger, 'Imiloa decided that the real time capabilities and astronomical datasets were of greater importance. Playback content would come, and in the meantime, having a powerful 3D tool that could show the latest astronomical information, from the solar system to the WMAP, would yield live programs that could inspire our audiences and engage the astronomers of the Mauna Kea Observatories.

Installation

Mid-November is a wonderful time to be in Hawaii, especially if one desires to escape

the cold and snow of the Northeastern United States! Being in the tropics, Hilo has temperate weather year round. Pair that with a wonderful view of the Pacific Ocean and you have a very special place to visit in any season. Crates containing computers and their racks, cabling, steel projection stands, and SXRD projectors started arriving on November 13, filling our loading bay. Juyeon Lee and Max Pugach from Sky-Skan arrived the following day to begin the installation of the system. Both were very enthusiastic to be in Hawaii in November. Dan Skwara, Johan Gijsenbergs, and Steve Savage (yes, the president of Sky-Skan does installs) arrived a few days later. It was then that the real fun was to begin.

Install was to be no easy feat, as we had a temporary system running in our dome, and

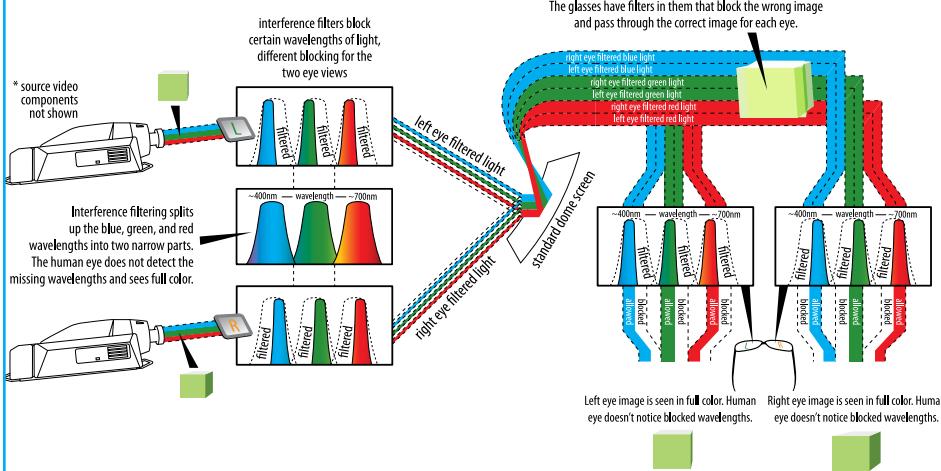
the holiday rush of public visitors meant we could not close down the planetarium. Installing after hours and overnight was required, and so began about a month of very long days, some of which lasted 16-18 hours plus for the planetarium staff. Additionally, 'Imiloa's planetarium theater was not designed for SXRD projectors when it was built. Cove modifications and other construction would be needed. Ingenuity was required to get these projectors in place and get them properly vented into our HVAC system.

After unpacking components and getting organized, our first steps were installing the computer racks. Two racks holding 18 computers were set up. The system has 16 channels of video (4 per SXRD projector), along with a master computer and an audio computer. Each computer has half a terabyte of hard drive space and the graphics cards have 1 gig of ram. Rack installation was rather straightforward because we had racks in place from our temporary system. The new racks were able to be placed in our cove area without any serious modifications.

The next step, getting the SXRD projectors into place, was another story. While we are blessed with wonderful amounts of space in our cove areas, the theater was designed with a cove shelf about half a meter below the spring line. This shelf is roughly a half meter wide and about 15 cm thick, extending for almost the entire circumference of theater (the exception being above the entrance and exit doors). The shelf was constructed using steel studs, and covered with wood. These shelves also concealed conduit which brought power to a variety of outlets around the cove shelf and power to the red working lights in the cove areas.

How it works: Interference Filters

A number of methods to filter the left and right eye images have been developed. Each one accomplishes the same task: **blocking light from one projector while allowing it from the other**.
Sky-Skan uses **interference filtering** (also called color notch or wavelength triplet) for full-dome while polarization is an option for flat screens (for more information on flat screen installations, see the data sheet *definiti 3D* projection for flat screens). Here's how interference filtering works in a typical *definiti 3D* theater (other configurations are available):



While the shelves were strong enough to walk on in most places, they were neither of adequate size nor strength to hold the new projectors. In addition to these, there was another obstruction about a meter below the cove shelf—the HVAC return ducts for the theater. This duct work takes up the back half of the theater and is about 1.5 meters in height and 0.75 meters in width.

The solution for the projectors came in the form of steel stands roughly half a meter square by 2 meters in height. These stands were to be bolted into the concrete floors in four locations. At the top of these stands, an adjustable angle platform was attached to lock into the projectors and hold them in place at the correct angle and height. Getting them in place required removing the cove shelving in two areas, one in the north cove just to the right of the console, and the other in the south cove roughly 180 degrees opposite.

These steel projector stands fit tightly against the HVAC duct work in the north cove. In the south cove, only the cove shelf had to be modified, as the HVAC duct work on this side of the theater was located behind the dome above the spring line. It took roughly two days to cut out the shelves, move the electrical work inside, and then rebuild these areas. Max's construction work was impeccable, and once completed, one could not tell that our coves had been altered.

Tedious Drilling for the Stands

Following these transformations, we began the tedious process of drilling through concrete to anchor the projector stands in place. Industrial concrete is amazingly strong, and each hole took several hours. One had to take extreme care that these were placed correctly, and after drilling them out, a small steel anchor was gently tapped into place. Bolts were then ratcheted into place, securing the stands to the floor. Once the stands were in their permanent locations, it took an evening to get all of the projectors hoisted into position. Sony SXRDs are not light, weighing in at 100 kg (225 lbs) each. Placing them on stands a bit over two meters high took three strong brutes. Once in place, a ratchet was used to adjust elevation angles on the projectors.

Fiber optic and CAT5 cables were then strung from projectors to the racks along the cove shelves. Each projector is connected to four IG computers, and a CAT5 line provides communication from DigitalSky and SPICE to the projectors. *difiniti* lenses for the SXRDs were placed into the projectors, and on November 21, the first light from the system was on the dome.

Forty thousand lumens on a 16-m dome is an incredible sight! The Sony SXRD image is stunningly bright compared to other digital projectors, and the colors are unmatched. The



Top: The audience at the opening program prior to donning their 3D glasses; photo by Ian McLennan.
Bottom: Shawn at the computer controls in an up-close demonstration during the opening; photo by Steve Savage.

first views, even before alignment and calibrations, were breathtaking.

Following first light, alignment and calibration of the system was first completed in 2D and then in 3D stereoscopic mode. This detailed and delicate work took a number of evenings. Sky-Skan software combined with the Sony controller allowed for geometric transformations and color corrections. Binoculars were used a number of times to make sure alignments were razor sharp.

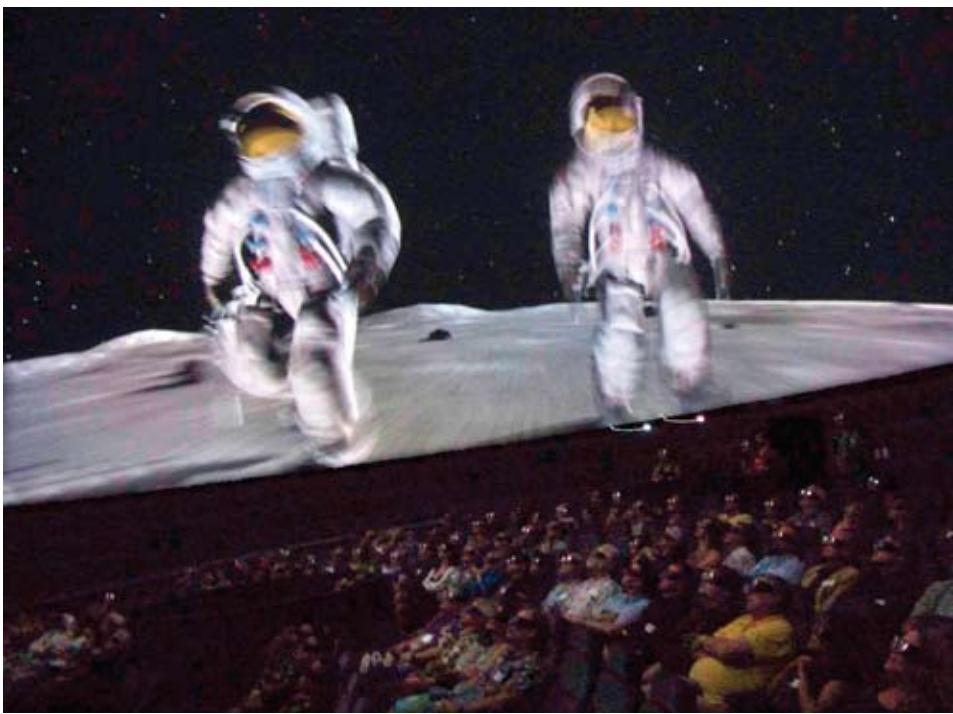
Real time and playback features were tested and put through multiple paces to ensure stability. During this time the Sony SXRD projectors were connected to 'Imiloa's HVAC return ducting. Venting is not required, but is recommended. Venting the projectors into HVAC accomplishes two objectives; first, it reduces

heat in the cove areas, and secondly, it greatly reduces fan noise from the projectors, yielding a quieter theater.

On December 17, installation of the system was complete. The long hours were well worth it, and the system performance was even more spectacular than the demonstrations the 'Imiloa team had witnessed earlier in the year.

Quest for the Opening Show

During Domefest 2007 in Albuquerque, I began looking for a show suitable for launching the new capabilities of the 'Imiloa Planetarium. The decision, I knew, would be of great importance, as the content had to connect with the audience in a spectacular way. The show needed to be in stereo 3D, but I did not want stereo just for effect; instead it needed to



A scene from *Dawn of the Space Age* immersing the audience. Photo by Kirk Pu'uohau-Pummill.

be meaningful and add an emotional connection not possible in a standard 2D setting.

Domefest provided inspiration with the screening of *Dawn of the Space Age* (*DSA*) by Mirage3D. The program tells the inspiring story of the history of spaceflight from Sputnik to current day and highlights the triumph of human exploration and spirit. The 4K imagery was exceptional, but the show was not produced in stereoscopic 3D. Since Mirage3D owner Robin Sip was onsite for the screening, I started chatting with him and asked the big question: "Could you produce this in stereo, and make it available for January of 2008?" While this meant a great deal of re-rendering, he was eager to get *DSA* into the stereo format. We discussed the way this should be done, and what scenes should be considered carefully in regards to how close or far away images appeared. As mentioned earlier, I did not want stereo effects that were too close and uncomfortable, but rather meaningful scenes where stereo could make a connection to the audience in a positive way. Robin thought about my request and said it would be possible to have at least 50% of the show rendered out to stereo by January, and that within a few months of the opening the full show could be in stereo.

The other request I had was to make a 30-minute version of the show, which originally is 45 minutes in length. Our theater turns public shows on the hour and we include a live sky lecture with each show, so a shorter version was imperative for our facility. He agreed to this request as well, and so it was agreed *Dawn of the Space Age* would launch our 3D stereo playback capabilities in

Hilo. Test footage from Robin started arriving in mid-December, and by January we had a wonderful, inspiring show ready for our opening event.

Launch of the First 3D Stereoscopic Planetarium

January 13-14, 2008 were chosen for a special VIP launch of our new Sky-Skan *definiti* SXRD stereoscopic 3D system. This would be the first permanent digital full dome stereo 3D planetarium in the world, and to celebrate we decided to invite planetarians, the directors of the Mauna Kea observatories, and local dignitaries to two days of special activities. Thirty planetarians from Canada, Germany, Holland, Japan, New Zealand, and numerous cities in the United States traveled to Hawaii to take part in the festivities and every observatory on Mauna Kea sent astronomers to participate.

Sunday evening (January 13) kicked off the festivities with Hawaiian cuisine and a chance for planetarians to meet with astronomers and local dignitaries. Dr. Rose Tseng, chancellor of the University of Hawaii-Hilo and Peter Giles, executive director of 'Imiloa Astronomy Center of Hawaii, gave keynote addresses and recognized the work of Sky-Skan, Mirage3D, and the 'Imiloa staff. The group then moved into the planetarium for special presentations by Dr. Paul Coleman and Master Navigator Kalepa Baybayan on "Hawaiian Astronomy" and "Hawaiian Celestial Navigation." This was followed by a stereo 3D flight through the universe by Steve Savage, and finally the premier of *Dawn of Space Age* in 3D stereo by Robin Sip.

Festivities continued the following day with presentations. "Large Scale Structures in the Universe" was the topic for Dr. Brent Tully. Brent brought updated datasets showing new features, such as the north and south pole voids. He was very enthusiastic about presenting in stereo and told participants that "'Imiloa's 3D planetarium has created a new tool for astronomers to visualize and explore large scale structures in the universe and gain insight into the distribution of galaxies."

Dr. Jean Charles Cuillandre and Dr. Stephane Arnouts of the Canada-France-Hawaii Telescope (CFHT) presented a new one degree survey of galaxies, which has a half a million galaxies in a one-degree field of view. The audiences were amazed by the flight through this dataset, which extends almost as far as the Sloan and 2dF Quasars.

Dr. Oliver Guyon from Subaru Observatory flew the participants through exoplanets and shared discoveries about these new worlds, as well as which systems are visible with the naked eye. Planetarians were then awed by Dr. Antonio Chrysostomou, associate director of the James Clerk Maxwell Telescope, who showed the first 3D volumetric views of gas flows in the Whirlpool Galaxy. The image shows a galaxy warped by interactions with its neighbor and gas flow motion within this famous spiral. Then we explored the UKIRT Infrared Deep Sky Survey as Dr. Andy Adamson, associate director of United Kingdom Infrared Telescope, showed us some of the most detailed views of the plane of our own galaxy, the Milky Way, ever observed.

This event was the first time that astronomers were using a planetarium to present in 3D stereo, and the first time planetarians had a professional development opportunity of this magnitude. Following the presentations by astronomers, round table discussions were held exploring partnerships between planetariums and observatories, the use of 3D stereo in the planetarium, and the role of the International Planetarium Society in professional development. The event is what we anticipate to be the first of many opportunities 'Imiloa Astronomy Center of Hawaii is planning for the planetarium field. In the near future (hopefully for the International Year of Astronomy 2009), we plan a major week-long professional institute.

Reaction of the Audience

It has been truly fantastic to see people's reactions and hear their gasps of delight in the dome. Having worked in the planetarium field for close to a quarter century, it amazes me to see the reactions people have in our domes, and 3D stereo takes this to a whole new dimension. It is wonderful to see children and adults so engaged in the experience, to see them reach out to touch the planets, and have

adults tell me they felt as if they were standing next to the LEM on the moon. Attendance at 'Imiloa dramatically increased with the opening of the 3D system in January, and after three months we are still going strong with *Dawn of the Space Age*. We saw a great number of sell-out shows.

In March I ran a show called *3D Hitchhiker's Guide to the Universe*. This was a one-hour tour from Earth out to the limit of the universe as we know it. I had tried a 2D version of this show in December and it did well, but in 3D it was selling out constantly, and audiences were coming back with friends and family. Audience members would often stay around after this program to ask questions and just talk about their thoughts on astronomy.

Our audiences for this show frequently included astronomers from the observatories, folks we normally would rarely see at regular public programs. A number of them approached me following the show to discuss ways to use the system, and the possibility of using our facility for conferences or seminars.

Monthly we do a program called *Mauna Kea Skies* in which we do an in-depth sky tour, followed by a presentation by one of the observatory astronomers. This program now includes flying out to some of their discoveries in 3D stereo. Attendance for this show has in-

creased and we find that many astronomers really enjoy having an opportunity to use the 3D system to present their findings to the public.

Stereoscopic technology has the ability to change the role of a planetarium dramatically. It allows us to teach and entertain in new ways, showing spatial relationships in a dynamic way. A key to really utilizing the technology is having a live knowledgeable presenter, as this creates an experience that goes far beyond what an IMAX or movie theater can provide.

'Imiloa is now viewed as a new resource for astronomers, and local university scientists in a number of fields have discussed showing non-astronomical content in the dome for their classes. Both groups see great potential in this new technology for presenting science.

Astronomers and observatory staff have commented that this new technology "now makes the planetarium useful to astronomers...compared to when all planetariums could do was show the constellations." Some have remarked that they now are able to fly through their observations collected at the summit. Dr. Tully has visited us several times, and feels this new tool will greatly aid in our understanding of large scale structures. He has said this revolutionizes the way astronomical

data is displayed.

'Imiloa's planetarium is working with the observatories and Sky-Skan to bring new data sets into the system. We have held a few special sessions for observatory staff. This system will now aid their research by bringing their data to life and we look forward to sharing their new research with the public and the planetarium community. During IPS2008 in Chicago, the larger community will have a chance to see some of the results of this ongoing work.

Conclusion

The decision to go 3D stereo was perfect for our facility. Sky-Skan's *definiti* 3D system is exceptional and has provided us a tool that engages our audiences in numerous awe-inspiring ways. We have found that astronomers, university instructors, and others are starting to view the planetarium in a new way and are looking to contribute to public programming for our audiences and distribution to others. *Dawn of the Space Age* remains the only full-length playback content available at this time, but more productions are in the works. Stereo 3D is spectacular in real time, and having an enthusiastic, knowledgeable presenter with this system is a powerful combination to bringing in new audiences, and making old audiences return time and time again. ☆



You have seen slides.

You have seen computer animation.

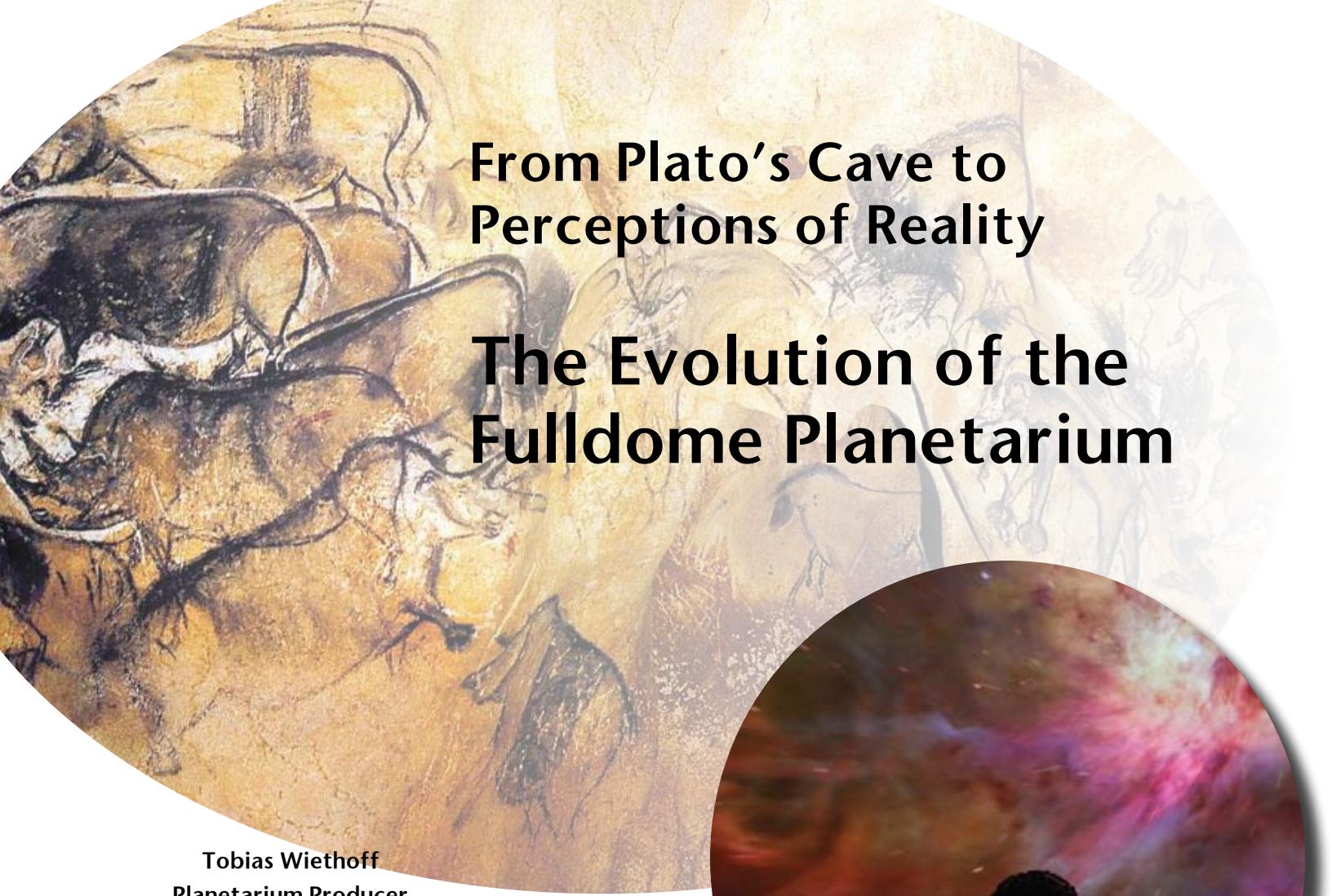
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From Plato's Cave to Perceptions of Reality

The Evolution of the Fulldome Planetarium

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This article is based on the thesis The Fulldome Planetarium which I wrote as part of the master program in Science Communication at the University of Dalarna, Sweden under the supervision of Professor Lars Broman and Dr. Hans Meinl. The Fulldome Planetarium was an ambitious attempt to develop a cultural-historical dissection for immersive video projection systems that are used in a growing number of planetariums today. The investigation includes the impact such a system has on the various aspects of an existing planetarium after it is installed. The Jena Planetarium (the institution with which I am affiliated) served as a case study for this undertaking. This thesis finds that fulldome is certainly more than a combination of all the peripheral audio and visual technologies that have shaped the planetarium space over the course of the last decades. The immersive video technology transforms the planetarium into an establishment with new potentials that can be embraced by examining the conflux of the different attributes and media that form this new institution. The cultural historical-analysis is the focus of this article. The full thesis can be obtained from the author.





1. The Archaic Display

The ability to interpret the weather, create relevant use of the stars for orientation and timekeeping, and to discover patterns upon which we base our predictions of cyclic changes over the course of a year belong to the most fundamental accomplishments of humans. Societies are based upon knowledge which has been communicated to humans

by the display of the celestial dome. At the same time, people of all ages have populated the sky with products of their minds, including sky tales of moral character and valuable knowledge. This type of two-sided relationship seems to be as old as humanity itself.

In primitive pre-religious societies, it was generally believed that it was possible to influence phenomena in the sky (such as rain) by means of observation and imitation; in other words, by the conduct of magic. At a later stage of development, people started to assume the will of divine beings as a driving force behind all things and observation of natural phenomena was intended to interpret and predict the actions of gods. The system of astrology that developed out of this approach brought forth extensive astronomical records, which became a valuable reference point when it was conceived, that systematized observation and comparative analysis could produce insights into the true nature of things.¹

A new scientific world view emerged, largely under the contribution of early astronomers. It spread across the known world with the campaigns of Alexander the Great.² When telescopes today are pointed at the stars, they reach far beyond what is visible with the naked eyes—but it is still done to create knowledge about our world and ourselves.

2. Spaces of Ideas

The 15,000-year-old prehistoric cave paintings at Lascaux and Chauvet in southern France are among the oldest depictive art-

1 The same concepts that led to the development of science eventually had led to the foundation of the “polity.”

2 A ceiling fresco dating from c. 50 BC in the Temple of Dendera in southern Egypt (now at the Louvre) arguably depicts the Egyptian interpretation of Greek constellations. Not only is it a clear example of the spreading of the Greek world view, but it also exemplifies how ceilings and domes have constantly been used to equate the heavens.

works of man. The galleries are comprised of several hundred illustrations, primarily of animals, surrounding the viewer. Though these caves were used primarily for ritualistic ceremonies and share this commonality with spaces of illusion in later historical periods, there is little evidence that they were designed as such.³ These caves represent the prototype of an enclosed space to which humans consciously retreat to confront themselves only with their world of ideas. It seems plausible that the prehistoric cave artists separated themselves from “the real world” to reflect on their position within nature.

In a multitude of variations, the idea of the cave as a projection canvas for the abstract ideas of men reoccurs in the history of culture, the best known example being Plato’s analogy of the cave. In a version of Tristan and Isolde of the 13th century, the author Gottfried von Strassburg presents an idealized variation of the cave as being a perfectly spherical room made from white marble with neither windows nor doors. The smooth, white surface of “the cave of lovers,” as it is described by Strassburg, provides for the exclusion of the outside while offering the least possible distractions for focusing on the inner world. The “canvas” for consciousness is an attribute inherent to modern planetarium domes as well.

The development of architectural domes (in the sense of self-supporting structures with a keystone) is accredited to the Etruscans. Together with their experience they gradually assimilated into the Roman people between 300 and 90 BC, leading to a large number of domed constructions in antiquity. The

Roman Pantheon⁴ is a result of this development and a first-class example for how architectural domes, since their very beginnings, have been created to equate the vault of heaven—the place where gods used to reside. The Pantheon later became an example for master builders of other important domed structures, such as the Byzantine Hagia Sofia.

3. Spaces of Illusion

The Roman tourist resort of the 1st century BC, the city of Pompeii, offered pleasure and entertainment to its visitors. Among the numerous Pompeian frescoes that survived the great eruption of Mt. Vesuvius in 79 BC (and which are commonly known for their obscene content), the first known uses of immersive image strategies can be found.⁵

The room-filling fresco in the Villa of Mysteries, one of Pompeii’s main attractions back then, surrounds the visitor with a 360-degree vision of the unity of time and place.⁶ Meant to serve as a stimulus for a collective intoxication, the fresco at the Villa of Mysteries exemplifies a cultural historical constant in which spaces of illusion are intended to create experiences of ritualistic, religious, or dionysic ecstasy. The growing realism of contemporary digital spaces of illusion and their seemingly unpredictable consequences for the future led to the creation of numerous apocalyptic scenarios in the products of popular culture, that embrace this dionysic and addictive connotation of virtual reality.

4 In Greek: dedicated to all gods

5 The use of immersive spaces for entertainment is not the only point that allows us to draw parallels between Pompeii and modern Las Vegas, which has turned into a center for virtual reality entertainment these days.

6 + 7 Grau (2003) *Virtual Art*, MIT Press



3 Rothert, H. (1956). *Die Kunst der Altsteinzeit* (Fine Art in the Stone Age), Kohlhammer



Ceiling frescoes of St. Ignatius Church in Rome, painted by Andrea Mantegna in 1694. Photo by Anthony Majanlahti; used under Creative Commons permission

A second frequently reoccurring type of virtual reality environment is intended to evoke contemplation of mind and inner peace. An early example of an immersive image space aiming at this opposite site of the emotional spectrum is a fresco at Villa Livia in Primaporta dating from 20 BC that served as a virtual hideaway into an illusionist garden.⁷ Among its successors are landscape panoramas of the 19th century, panorama viewing rooms on nuclear submarines, or the meditative virtual reality piece *Osmose* by artist Char Davis in which the participant navigates through a visual analogy of a tree by controlled breathing.⁸

4. The Painted Heavens

The Italian Renaissance represents an historically important point of convergence for domed constructions and illusionist painting. Even though numerous earlier examples of domes can be found in Byzantium and Mesopotamia that are artistically decorated in a non-figurative manner, it is only now that artists start to treat the dome surface as a single picture environment for figurative painting, aiming to create a space of illusion. The skillful application of the newly developed methods for perspective painting is intended to make the spatial illusion as convincing as possible.

[8 www.medienkunstnetz.de/werke/osmose/](http://www.medienkunstnetz.de/werke/osmose/)

Florentinian architect and painter Filippo Brunelleschi contributed essential fundamentals to this development. Based on the conceptions of his friend Leon Batista Alberti, he developed the central perspective which made spatial illusionist painting possible in the first place. The dome of the cathedral Santa Maria del Fiore was one of the first architectural strokes of a genius in the Renaissance and underlined the new status of domes in architecture.

Mantegna was the first to pick up the ideas on perspective in frescoes and consciously use them to negate the real architectural space. His work in the Camera degli Sposi features the oldest *Sotto in su*⁹ type of painting that creates the illusion of an open ceiling through which the viewer can see the sky. Not only does Mantegna pick up the concept of the ceiling as a resemblance of the sky creatively, but his complete mastership of linear perspective turns the small enclosed space of the chamber into a virtual experience of a much bigger and open space.

His long life and expertise account for the direct influence on many important illusionist painters to follow. Among them were Baldassare Peruzzi¹⁰ and Corregio, who had served as Mantegna's personal assistant for many

⁹ Meaning "seen from below"

¹⁰ Peruzzi designed the Sala prospettiva at Villa Farnesina in Rome that features a virtual overview of the city.

years and became the first to progressively explore the potential of domes to create spaces of illusion.

The spreading and growing acceptance of the works of Copernicus and Descartes during the 1600 and 1700s created the essential pre-conditions for modern sciences. In a counter-movement to this development, the Catholic Church mobilized the massive persuasive impact of ceiling and dome frescoes for promoting counter-reformatory messages to a primarily illiterate audience. In most cases, the dome or ceiling served as a *hypaethral*¹¹ opening, revealing a scene staged in a Christian model of the heavens. This extended between the sublunar sphere, the home of humans, and the empyreum, the place where the gods used to reside.¹² While heliocentrism and the idea of an infinite cosmos slowly manifested themselves in the public mind, the Catholic Church tried hard to work against this, causing the genre of dome and ceiling frescoes to flourish during the Baroque and Rocco.¹³

Andrea Pozzo, who worked as a painter as well as a theorizer, laid out the theoretical groundwork for the creation of the dramatic dome and ceiling painting during this period.¹⁴ In the cultural-historical analysis of

¹¹ In Greek: opening to the sun above

¹² Dante powerfully describes this model in his work.

¹³ Lindemann (1994): *Der gemalte Himmel*

¹⁴ In his tractate *Perspectivae pictorum atque archi-*

dome environments, it is a remarkable anecdote that the central element of this master's most important work, the Church of Sant' Ignazio, is the depiction of a virtual dome that the Jesuit principals were unable to construct for real because they had run out of money.

In 1609 Galileo became the first to ever point a telescope at the night sky and thereby establish modern astronomy; the genre of ceiling frescoes reached its climax at the same time. Representative for the numerous painters that designed ceiling and domes in the Rococo is the great master Gianbattista Tiepolo, whose body of work was allocated over entire Europe. Not only did Tiepolo master his craft to an extent that it became impossible to distinguish between real and illusionary space, he also accomplished "adding life" to some of his main works by taking into account the moving vantage point of the viewer.^{15, 16}

With the advent of classicism the genre of dome and ceiling painting abruptly finds its end. At the same time, the panorama, a new medium for illusionistic experiences, slowly begins to establish itself in Europe's bigger cities.

5. The Panorama

Different from illusionist approaches in the Baroque and Rococo, a panorama aims to resolve the real space completely while making the image space absolute. Upon entering a panorama the viewer gets the impression of having traveled to a different place than his true location.¹⁷ Already around since the late 1800s, panoramas advanced to become the first true mass media in the second half of the 19th century.¹⁸

Standardized canvas sizes make it possible to easily exchange panoramas amongst permanently installed rotundas that existed in almost all European cities towards the end of the 19th century. Smaller, portable rotundas traveled from village to village. An industry that is, in some respects, comparable to the contemporary film industry emerges, with few panorama directors supervising anonymous crowds of panorama artists. Between 1870 and 1900, one hundred million people visited panoramas in Europe. This success story ends with the invention of the cinematograph. The emergence of cinema lets the pan-

tectorum, Pozzo describes the proper application of quadratura (painted architecture) and distortion by means of anamorphosis, a technique still used in dome correction software today.

15 The ceiling painting of the staircase at the Würzburg residence Tiepolo takes into account the moving vantage point of the observer entering the room and ascending the stairs.

16 Pedrocchi (2003), Tiepolo, Dumont

17 The term "telepresence" is used for this phenomenon in reference to Virtual Reality experiences.

18 Oetermann, S.(1997). *The Panorama: History of a Mass Medium*, Zone Books, New York

Ceiling fresco with Trompe l'oeil by Andrea Pozzo, 1703, at the Jesuit Church in Vienna. Photo by Alberto Fernandez Fernandez, used under permission of the GNU Free Documentation license



orama soon fall into oblivion.¹⁹

The role of the panorama in the 19th century resembles what cinema became in the 20th century. Causal to the success of the panorama are changes in society. Social distances and a growing alienation from nature begin to characterize the life of city dwellers. Against payment of an entrance fee, the panorama offers the social experience as well as the opportunity for a virtual trip to compensate for the absence of real experience of nature. Furthermore, governmental propaganda agencies contributed to the boom of panoramas as they discovered the persuasive power of the medium.²⁰

19 Shortly after the invention of the cinematograph, a filmic panorama is presented to the public at the World Fair in Paris in 1900. But rather than being a visionary anticipation of fulldome movies, it must be regarded as continuation of an old tradition with new means.

20 A reason why a disproportional number of panoramas feature battle scenes.

In many of its characteristics as a communal immersive environment, the modern fulldome planetarium has its immediate precursor in the late 19th century panorama. The subject of a "journey" or "voyage" that is essential to the panorama experience has characterized planetarium shows ever since. It has gained new meaning because fulldome technology makes it more possible than ever to virtually access otherwise inaccessible places.

Besides the social aspect of a planetarium visit, the reestablishment of contact with a fundamental experience of nature is an attribute that classical planetariums²¹ already had in common with the panorama. This point can only be amplified by fulldome technology.²²

21 In the case of the planetarium, this is the starry night, which has disappeared from big cities.

22 The spirit of "fairground & circus" as well as "exploration & future" represent emotional connotations of the panorama that can be sensed in the public view of planetariums as well. The opto-mechanical



6. The Projection Planetarium

Planetariums as a tool for astronomical demonstration look back on almost 2000 years of history.²³ Probably the best known modification of planetariums are public astronomical clocks that were gradually installed on public buildings in Europe's growing Renaissance cities, intended to demonstrate a spirit of science.²⁴

Planetariums received their true significance with the emergence of the Copernican revolution as a tool to communicate the new world view. Different types of planetariums began to appear in schools and households for educational and entertainment purposes during the 1700 and 1800s.

Essentially, the modern projection planetarium is a further development of the Gottorf Globe, an accessible celestial globe of 1664. It was designed to overcome the problem of ordinary celestial globes that per se display the sky mirror inverted. This was achieved by immersing the viewer with a replication of the night sky.²⁵ In fact, Oskar von Miller originally did have such a device in mind when he intended to build a Ptolemaic planetarium for the Deutsches Museum in 1913. If it had not been for struggles in engineering it, the fruitful cooperation with Bauersfeld might have

projectors are different from movie projectors; they have never been hidden but put on a pedestal as a kind of "fairground spectacle." Even though opto-mechanical projectors are on a slow retreat now, numerous institutions remain that praise themselves as: "the most modern planetarium of the world!"

²³ For a very good description of the history of the opto-mechanical planetarium, please see Kraupe, T. (2005). *Denn was innen, das ist draussen: Die Geschichte des modernen Planetariums*, Caelum Vol. 2

²⁴ Famous examples are the Strasbourg Cathedral or Prague Town Hall

²⁵ The Gottorf globe was conceived by mathematician Adam Oelarius for the duke Friedrich of Holstein the 3rd.

never happened.

The invention of the projection planetarium turned the planetarium into a space of illusion. With a given size of the dome, the true architectural space dissolves, causing the "ahh!" that still can be heard among audiences as a reaction to the rediscovery of the natural night sky when the opto-mechanical projector is turned on today.

Like many important technological accomplishments, the development of the planetarium projector brought forth other significant inventions. As a side project to the projector development, Bauersfeld conceived a method to maximize efficiency when constructing a planetarium dome. He eventually created the first geodesic dome structure, which he derived directly from the icosahedron shape of the Zeiss model 1.²⁶

Ever since the first planetarium opened in Munich in 1925, additional technology has been integrated into planetarium institutions.²⁷ Over the course of the decades, audio, video and eventually immersive slide projection techniques contributed, in shaping the planetarium towards a more and more versatile space of illusion.

7. Technology & Immersion

Common fulldome systems in planetariums offer the possibility to playback pre-rendered all-dome movies as well as the use of real time applications such as a navigable atlas of the universe. Pre-rendered all-dome movies have their technological precursors in large

²⁶ Only four decades later the American Designer R.B. Fuller explored the concept of geodesic domes further without knowing of Bauersfeld. His work on geodesic domes made him world famous.

²⁷ Even at the oldest planetarium still in service, the Zeiss Planetarium Jena, the first presentations in 1926 had been opened with Beethoven's *Die Himmel röhmen* (dt.: praise the heavens) played by a gramophone.

format film that started to appear in the late 20's. In an attempt to expand the common cinematic experience, numerous experiments were tried, including the stimulation of additional senses, very large screens, and even film projection in a dome environment.²⁸

Developments in cinematic technology were brought forward by investments of the US Military that aimed to develop flight simulators to train pilots for combat in Europe during WW2. Flight simulators that allowed a person to interact with a virtual environment are the technological precursors of the real-time features in fulldome planetariums.

The emergence of computer graphics was a great leap forward in flight simulator design. In 1955, Ivan Sutherland, who produced ground breaking work in early computer graphics and who later participated in the foundation of a company primarily dedicated to flight simulator design, published an essay called "The Ultimate Display" in which he essentially laid out the ultimate aim of computer graphics. He envisioned a computer-run virtual space so convincing that it was indistinguishable from reality. This vision received its cultural counterpart in the holodeck of *Star Trek™*.

At about the same time, we find the first examples of the artist removing the planetarium space from its context and exploring it in the sense of Wagner's vision of a *Gesamtkunstwerk*²⁹, immersing the viewer in an artistic vision of sound and light. Technologist and artist Stan Vanderbeek focused on exploring the social aspects of a domed medium. Against the background of the cold war, he conceived global networks of domes that help communities to connect and exchange sound and images in order to build mutual and cross-cultural understanding.³⁰

While the ideas on global effects of societies were just emerging, architect and designer Buckminster Fuller proposed the construction of a giant spherical display he called Geoscope in order to visualize global coherences and make these more comprehensible.

In reaction to the launch of Sputnik and the corresponding crisis in national confidence, the government of the United States restructured science education. Not only did the total number of planetariums worldwide dramatically increase to its first climax around the time of the Apollo missions, but the spectrum of multimedia technology broadened

²⁸ *Vitarama* by Fred Waller in 1939. Waller was largely engaged in the development of alternative cinematic experiences. He is best known for the invention of Cinerama

²⁹ "Total Artwork" is an idea he described in an essay called "The artwork of the future" in 1849; see also Wagner, R. (1849). "Outlines for the Artwork of the Future," *Wagner on Music and Drama: A Compendium of Richard Wagner's Prose Works*, DaCapo.

³⁰ Shaw, J., Weibel P. (2003). *Future Cinema—The Cinematic Imaginary after Film*, MIT Press

significantly.³¹

Technologies like slide-based all sky systems made planetariums the ideal place to relive the trip to the moon. Initiatives were taken by planetarium professionals in conjunction with the movie industry to expand this potential of planetarium space for immersive media experiences even further by adapting developments in large format film like IMAX for dome projection or developing similar systems.³²

The increased potential of the planetarium space to create unique audio visual experiences also expressed itself in emerging laser light shows. Laserium by planetarium professional Ivan Dryer started in 1973 at Griffith Observatory and became the prototype of Pink Floyd planetarium shows around the globe.

While the search for alternative ways of constructing and perceiving reality expressed itself in legalized drug experiments and psychedelic art forms in the 60's and 70's, the following decade seemed to offer a more concrete access to designing and experiencing realities by means of the seemingly limitless possibilities of future computers.³³

Science fiction scenarios laid out by authors like Stanislaw Lem³⁴ or Isaac Asimov started to take concrete shape in the 80's, due to the rapidly growing power in computer graphics. Scott Fisher, an openly admitting sci-fi fan, was substantially involved in the development of head-mounted displays. Fisher picks up on a quote by Alberti, who had described perspective paintings as being a "window into another world" when he refers to virtual reality interfaces as a "door into a virtual world that could become just as complex as reality itself." William Gibson has explored the ultimate consequences of this idea in his 1984 novel *Neuromancer*,³⁵ in which he introduces cyberspace—a parallel virtual world that users

Workers constructing the geodesic dome of the Zeiss Planetarium in Jena; from the planetarium's archives



³¹ The foundation of the company Sky-Skan by former planetarium employees in 1967, specializing in special effects and automation systems, is indicative for this development.

³² Experiments made with 35mm film and fisheye projection at the Fleischman Atmospherium and Planetarium, Nevada, in 1963 led to the foundation of the "Cinema 360 Consortium." It engaged itself in the exploration of 360 degree film projection in planetariums. A highlight of their work was material shot with a specially designed camera during the Challenger mission (STS 41-B) in 1984.

³³ Youngblood sees a driving force in this development in the "sense of spirituality that had entered the science. The non-Euclidean nature of our universe could no longer be explained by pure scientific intelligence but seemed to require a reflection on a more profound and alternate level." Youngblod, G. (1970). *Expanded Cinema*, paperback.

³⁴ Lem is the first to describe the concept of "cyberspace," even though he did not coin the term.

³⁵ Neuromancer' represents the beginning of the "cyberpunk" Genre and is at the basis of numerous other products of popular culture that deal with virtual reality and the ultimate consequences of computer graphics.

from a global network can log on to.

While early virtual reality environments could only be experienced by one person at a time, systems for the communal experience of VR started to appear in the early 90's. In 1992 the first Cave Automated Virtual Environment was presented to the public, an immersive virtual reality space realized by five rear projection screens. At the very same venue, the first single lens dome projection system featuring full color video real-time graphics was presented.

Although a number of real-time calligraphic scan all-dome systems producing black and white line drawings had been installed in planetariums in the 80's, there was hardly enough time for planetarium professionals to explore their full creative potential. By the late 90's computer hard and software had sufficiently advanced so that the first fulldome

systems found their way into planetariums.

8. The Fulldome Planetarium

Much of what the fulldome planetarium will be in the future is determined in its past. Many of the technological trends and applications we see today, such as the networking of domes or real-time applications for visualization of global coherences, have been anticipated by technologists and artists throughout earlier times. Just these examples seem to qualify the fulldome planetarium like no other institution in becoming a venue for some of the discourse on the challenges humanity faces in the 21st century. To embrace the full potential of the fulldome planetarium, we might very well inform ourselves on the ideas of sometimes visionary individuals of all historical epochs who could only dream about the kind of technology we now have at hand. ☆



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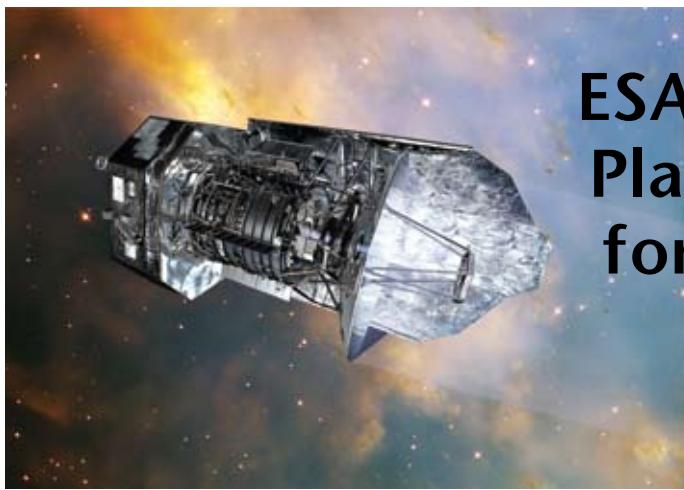
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Artist's impression of the Herschel Telescope.
ESA (Image by AOES Medialab); background:
Hubble Space Telescope, NASA/ESA/STScI

ESA and German-Speaking Planetariums Collaborate for IYA Show Production

Adam Majorosi
European Space Agency

Thomas W. Kraupe
Planetarium Hamburg, Germany

Most of our historic knowledge about the universe is based on findings made by European astronomers like Kepler, Galilei, Cassini, Newton, Herschel, and Planck, not to mention Aristotle, Ptolemy, Archimedes and numerous other scholars and scientists of the past.

Europe's heritage of more than three millennia of astronomical observation and scientific research has formed a matchless scientific community. Astronomy is part of European identity, reaching from highly esteemed research institutes to hundreds of thousands of amateurs and interested laypersons.

Despite spectacular findings and highly acclaimed breakthroughs, the significance of European astronomy seems to be shifting out of the focus of the general public, especially space astronomy with a home base in the "Old World."

The Hubble telescope, with its huge impact in celestial imagery, is rarely identified as an international project despite 25% European involvement and funding. Other missions of less artistic appeal are either not known or not understood.

The European Space Agency (ESA) has identified this problem and is taking action. In the framework of the UN Year of Astronomy 2009, ESA is producing, for the first time, a large, high quality planetarium show dealing with space astronomy and its stunning results.

The storyline of this show begins with the famous Italian Galileo Galilei, who 400 years ago used a telescope for the first time to gaze

at the night sky, thereby changing the way we see the universe and paving the way for modern scientific understanding of the cosmos. The show continues with our current generation of space telescopes, which scan the sky in all wavelengths, and then focuses on ESA cornerstone missions Herschel and Planck, which are ready for launch late this year and which have the potential to initiate the next revolution in our understanding about the universe we live in.

The show will be produced in digital full-dome video format (4k resolution) and will include animations and space imagery shown for the first time. In parallel, a classic version for facilities using analog equipment is being prepared, since they still represent the majority of planetariums in Europe.

Even the storyline of the show will have a European touch. It will combine didactical and educational ingredients with emotional and human elements of cosmic explorations. In order to serve planetariums perfectly for the Year of Astronomy, the release of the show is scheduled for late November 2008.

This show production is being realized via a new cooperation model between planetariums and the ESA. Initiated in Germany, Austria and Switzerland, a pool of interested planetariums and ESA elaborated a concept and road map of how to create a product that would be useful and fit for planetarium purposes and support Europe's contribution to space astronomy.

The first steps in this team effort are more than promising. Most of the large planetariums in the German-speaking countries have signed an agreement and contributed to the production budget, allowing the production to go ahead. Further theatres, especially smaller domes, will hopefully follow.

"Our next step is to adapt the planetarium show to other European languages and bring

it to the planetariums of the world," says project manager Adam Majorosi (contact: adam@majorosi.eu). He said he is confident that the joint project of ESA and planetariums will serve a large market within the international planetarium community. And he added that "by June, we'll know exactly what we can offer to whoever is interested in this new European planetarium show." Indeed, this program might help put European space astronomy back into the spotlight for the public. And, of course, it will fascinate audiences of all nationalities on a high visual and emotional level.

For more information on the Herschel and Planck projects, as well as news and resources on all ESA missions, see www.esa.int/esaCP/index.html.



An artist's impression of the front of the Planck Telescope. ESA - AOES Medialab

Unique double mission: Herschel, which will look at the universe in long-wavelength infrared, and Planck, which will examine the cosmic microwave background, are set to be launched together later this year aboard an Ariane-5 from the Guiana Space Centre, Kourou, French Guiana. They will separate about 2 hours after launch and then head separately to orbit at Lagrange point 2, about 1.5 million km from Earth.

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27 June-2 July IPS Conference

As I write this column, final preparations are being made for IPS 2008 in Chicago. A wonderful program is planned in a marvelous setting and all participants will experience another awesome conference. I look forward to seeing hundreds of my friends and colleagues again as we "Explore the Edge" together at the 19th International Planetarium Society Conference.

26-30 June 2010 IPS Conference

Even as we conclude preparations for 2008, Dr. Omar Fikry is already making preliminary arrangements for our 20th IPS Conference at the Library of Alexandria. So mark your calendars, read up on the history of the ancient city of Alexandria, Egypt and make plans to attend another remarkable conference in 2010.

Ghana Project

You may remember from my December column that as part of the Outreach Committee's efforts to assist planetariums in developing countries, IPS has initiated a pilot project that we hope will lead to future astronomical outreach to many developing countries. I would like to extend the gratitude of all IPS members to the very special people who had the imagination, heart, and tenacity to bring this unique IPS project to fruition. The

sheer magnitude of the time and money for the planning and implementation of the project and the far-reaching impact of such an initiative are overwhelming.

So we give a big thank you and congratulations to:

Jon Elvert: Jon is chair of the IPS Outreach Committee and has provided encouragement and essential assistance to all parties involved in this project. He inspired the Louisiana Art & Science Museum to donate their used MediaGlobe.

Carol Gikas: Carol is president & executive director of the Louisiana Art & Science Museum and the Irene W. Pennington Planetarium. We are extremely grateful for the generosity of the Louisiana Art & Science Museum in donating their MediaGlobe. Even though the projector is old technology to the museum, it will be used by someone who will see it as new and exciting technology.

Dave Weinrich: Dave is the project coordinator, educator, and IPS ambassador to Ghana. He has admirably pulled together all the people and resources to make this project a reality.

Joanne Young: All refurbishing costs and labor for getting the MediaGlobe in shape and training for Dave were provided by Audio Visual Imagineering, and AVI will provide customer support for years to come.

Dr. Jacob Ashong: Jacob had a dream of building Ghana's first science center in Accra and his vision included a planetarium. IPS provided a means for him to get the planetarium and so did Jacob. He provided the active involvement of personnel and resources from Ghana to build a facility to house the projector, ship the projector to Ghana and to establish support staff to operate the planetarium. He is facilitating the planning, the implementation and the future operation of the planetarium.

Ruth Barbley: Ruth is currently a student at Minnesota State University-Moorhead. She is member of the family with whom Dave lived while he was a Peace Corps volunteer in Liberia. Her sister, Glowne, lives in Ghana and is personally acquainted with Jacob Ashong. As a volunteer, Ruth will be assisting Dave with the training of planetarium personal in Ghana.

Dave has been keeping me updat-



Top: Jacob Ashong (in the white shirt) stands in the middle of his dream project discussing building plans for the planetarium in Ghana. Next three photos: The walls are rising; it is obvious that a domed building is being constructed for the MediaGlobe. First three images by Jane ashong; bottom image by William Tackie.

ed on this project. In January, he wrote, "I am planning to go to Ghana around the end of May and return just before the IPS conference. One of my next steps is to start planning the training for the Ghanaian operators. I am glad that I worked with Eileen Starr in teaching some STARLAB workshops and other astronomy workshops. That experience, plus my Peace Corps experience in Liberia and Ghana as well as my sabbatical in Sri Lanka, should be useful."

The MediaGlobe was shipped in early March and Jacob was making rapid progress on constructing the dome. Also in early March, Dave and Ruth went to Orlando, Florida during their university spring break to visit with Joanne and to train on the MediaGlobe. Dave reported, "It is a very easy projector to operate. The key will be to train the operators in some basic astronomy. I also learned how to assemble the projector and do simple maintenance. So I feel adequately prepared in that area. Joanne and her company have bent over backward to help with this project. They have really gone the extra mile!"

On April 16 Dave wrote, "It is getting close for our departure to Ghana. Ruth is leaving on May 10 and I'm leaving 11 days later, on the 21."

I eagerly look forward to Dave's pictures and progress report at the conference in Chicago.

Contact Information: Jon Elvert, jelvert@lasm.org; David Weinrich, weinrich@mnsstate.edu; Jacob Ashong, jacob_ashong@yahoo.com; and Joanne Young, joanne@av-imagineering.com.

Outreach to Portable Planetarium Directors in your Region

I have heard from two new volunteers who are actively working within their affiliate organizations to reach the portable planetarium community in their regions. Dayle Brown, in the GLPA region, and Christi Whitworth, in the SEPA region, will keep us informed of the number of portables in those regions and gather information about their activities and well as spread the good news of IPS. I am grateful to these two new volunteers.

The goal is to have a designated individual in each affiliate organization to pass information from portable dome directors to IPS and from IPS to portable dome directors. IPS officers want to know what is happening in the portable dome world and we want portable dome directors to know that they are not alone; there are resources and ideas to be shared. Many times the portables are not affiliated with any organization because they do not know about the benefits. We must seek them out and keep them informed about activities and opportunities. Typically, I will not be sending news directly to be passed on to

portables. Rather than that, I would like the information in my "Mobile News" column to be passed on through your newsletters and through any electronic news you feel will reach members and perhaps non-members of your affiliate. I would also like regular reports sent to me, at least once a year, for inclusion in my column for portables.

International Year of Astronomy 2009

I am sure we will find out about more activities and materials being designed and created for IYA2009 at the conference in Chicago. We know that in each country planetarians are represented in IYA2009 National Nodes and

Working Groups and they are dedicated to creating the exposure that we need and finding ways to educate and excite students, teachers and the general public about astronomy. You can meet and talk with colleagues at IPS 2008 and get inspired by everyone's IYA2009 plans. Here are just a few projects that I am aware of through email communications:

Agnes Acker, Association of French-Speaking Planetariums, wrote to tell me about the situation in France. She explained, "I am member of the National Committee of the "Annee Mondiale de l'Astronomie" (AMA09, see www.astronomy2009.fr), where I represent in particular the planetariums in France. We are working on many specific operations since March 2007. About 150 projects were submitted coming from associations, planetariums, observatories, universities, and more than 100 received the label AMA09. The French Planetariums (via APLF) will produce, in strong collaboration with the ESO, a show titled The Quest of Our Cosmic Origins, devoted to the mondial project ALMA."* Agnes Acker, ackeragnes@aol.com.

Javier Armentia of the Spanish Planetarium Association wrote, "...the Spanish Node of the IYA2009 has included a representation

* ALMA is the Atacama Large Millimeter Array, an international partnership between the United States (National Science Foundation) and Europe. European participants include the member states of the European Southern Observatory (Belgium, Denmark, France, Germany, Italy, the Netherlands, Sweden and Switzerland), the Centre National de la Recherche Scientifique (France), the Max-Planck Gesellschaft (Germany), the Netherlands Foundation for Research in Astronomy, and the United Kingdom Particle Physics and Astronomy Research Council. - ed.

from the Spanish planetariums and considered them as one of the pillars for the celebration of 2009. The planetarian community actively works inside the node, and promotes activities nationwide in close contact with all the other institutions (National Commission for Astronomy, astronomical institutes, university departments, Spanish astronomers associations) that compose the committee for the Spanish Node. Many of the activities of the IYA in Spain will take place in the planetariums and science centers (as anyone could expect), and the Spanish Association of Planetariums is producing—as a team—two planetarium shows that will air during 2009 in all the Spanish planetariums." Javier Armentia, javarm@pamplanetario.org.

Shawn Laatsch, IPS Treasurer and planetarium director at the Imiloa Astronomy Center of Hawaii, announced "Two of the nation's most advanced planetariums and their producers have partnered with Interstellar Studios, with Imiloa as the lead planetarium, to produce a companion fulldome program to the Public Television broadcast of 400 Years of the Telescope. This collaboration will produce a visual experience of the history of the telescope that will be shown in planetariums throughout the country and the world. Free distribution of this program will be provided to hosting planetariums." Read more at www.400years.org/planetariums.html.

Chuck Bueter of Granger, Indiana, the *Planetarian's* advertising coordinator, wrote to tell me that "Art Klinger (director of the PHM Planetarium in Mishawaka, Indiana) and I recently received a Toyota TAPESTRY grant to introduce students in the planetarium to outdoor lighting issues and to conduct a district-wide experiment outside to quantify the sky glow in our community." See information at www.lettherebenight.com/pltm.html.

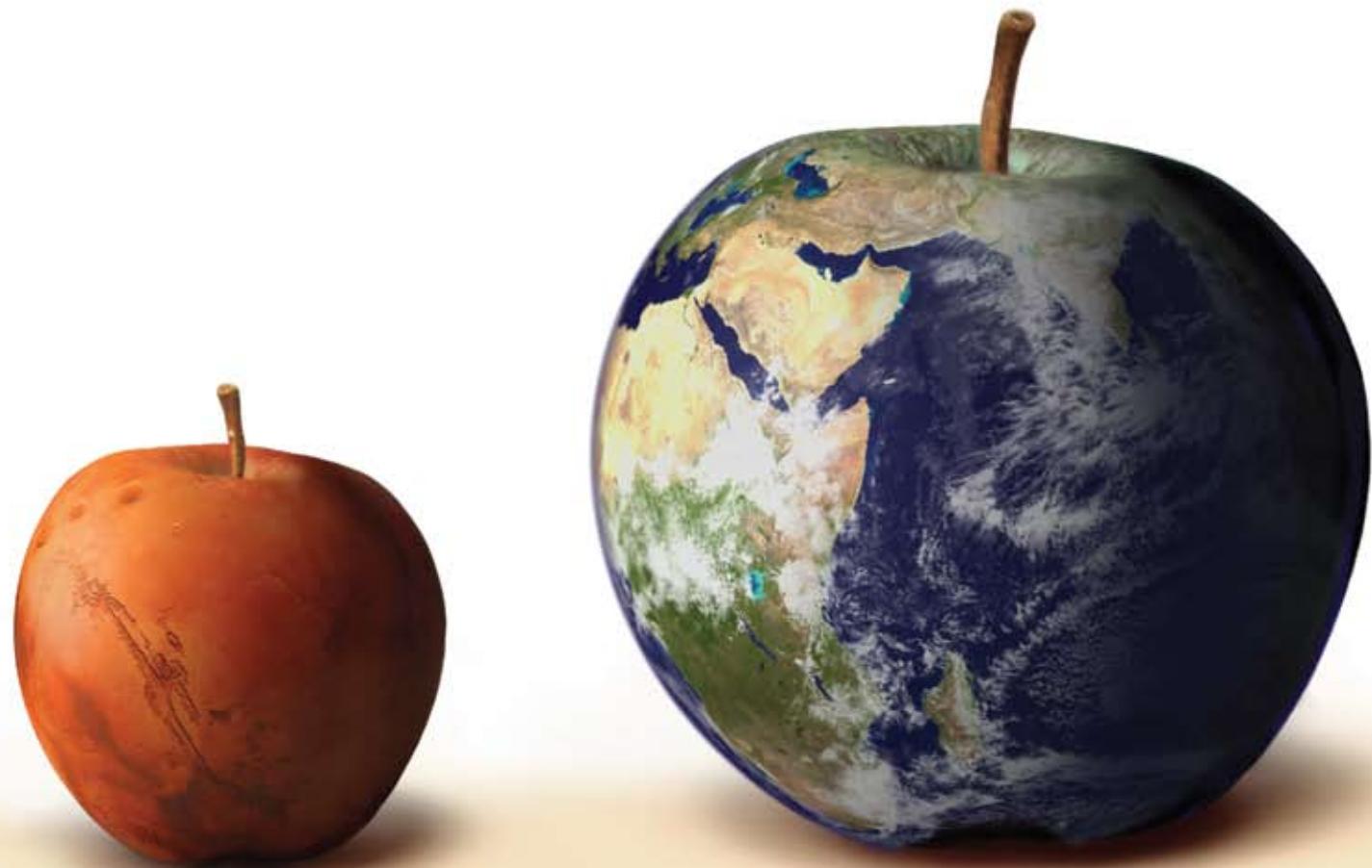
Chuck continues: "While we have a mix of stories and an in-dome activity that support dark-sky advocacy, we want to create some original content that ties the diverse segments together into a common storyline. Specifically, we want to introduce IYA, outdoor lighting issues, the 400 years thing, Galileo, and the implications of his key observations. We have to move fast if we are to get a product into the hands of planetarians in time for IYA2009 (and particularly in time for the March 2009 Globe at Night campaign, an IYA Cornerstone Project).

"We are also considering a novel approach to generate the artwork for the planetarium program and to drive visitors to more information and to new experiences after they leave the dome. Specifically, we are considering creating the equivalent of a "holodeck" in the 3D virtual world of Second Life that would allow visiting avatars (a computer generated archetype) to enter a nighttime environment,

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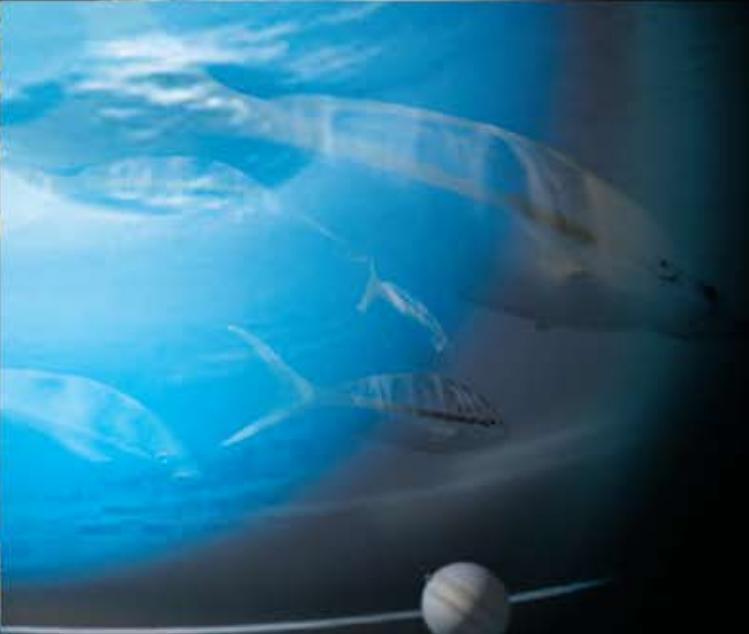
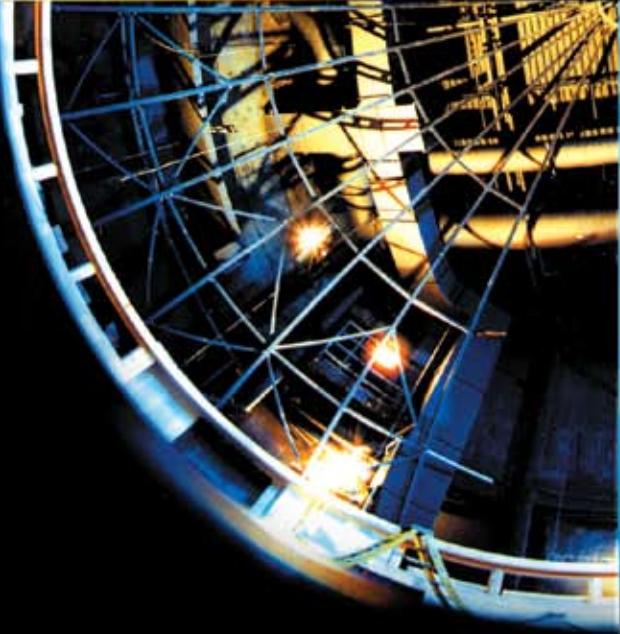
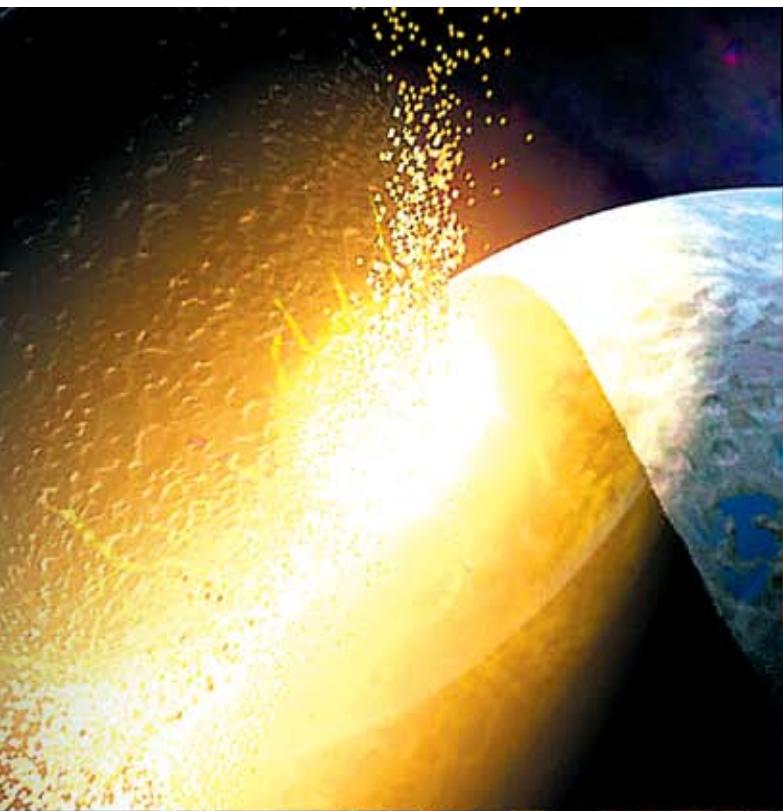
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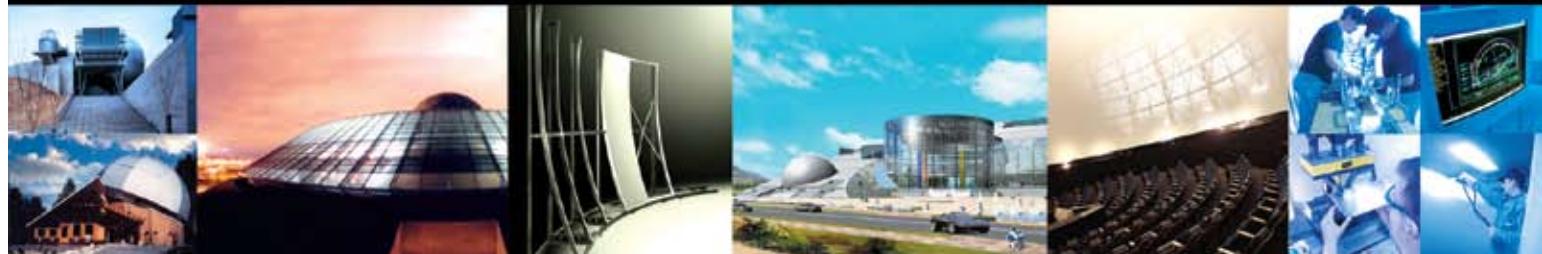
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to alter the outdoor lighting, and to experience how the light pollution changes, for better or for worse, from their actions.

"Within the built SL environment, we could capture video of a narrating avatar for snippets in the planetarium show. That way the planetarium visitor "meets" the avatar narrator in the dome and continues that relationship in the holodeck."

Chuck Bueter, bueter@nightwise.org; for more on Second Life, check out secondlife.com.

Publicity Coordinator for the IPS

Please welcome Jacques Guarinos, of Astronef, Planétarium de Saint-Etienne, as the new publicity coordinator for the International Planetarium Society!

As part of the IPS Outreach Committee, Jacques will be responsible for communicating to the national and international print, radio, television, and electronic media information about the IPS, its activities and achievements, and statements from the Society.

Primarily, these communications will be about IPS-related issues. However, from time to time there will be issues on which the IPS wishes to make a statement that reflects the official IPS view on a particular subject.

Feel free to contact him with your congratulations and ideas about how he (and perhaps you) can assist in promoting planetariums and the vital role we play in the world.

If you send him a report on what you are doing for IYA2009, he can compile a report and promote planetariums with that information.

Contact Information: Jacques Guarinos (directeur, Astronef, Planétarium de Saint-Etienne, Espace Fauriel, 28 rue Ponchardier, F-42100 Saint-Etienne, France; phone: +33 (0) 4 77 34 40 85 or +33 (0) 6 07 23 53 62; guarinos@astronef.fr.

Be Proactive to Stay Viable

Speaking of promoting planetariums, we can raise the status of planetariums in general through our new IPS Publicity Coordinator and you can make your planetarium indispensable to your community by being vigilant about "blowing your own horn!"

I cringe at each news item I read about another planetarium closing. I know the reali-

ty is that, no matter what we do, some planetariums will be closed because someone has an agenda that does not include keeping the planetarium open, no matter how valuable it is. We must make our best effort to help ourselves so that we can always at least make a good argument for keeping the planetarium open. Many times this strategy will work.

planetariums can raise the level of scientific literacy in their communities and excite students about furthering their education in the fields of hard sciences. The impact of these things can be measured.

Yes, this also applies to those planetariums housed in a school. In a school situation, the administrators consider measurable outcomes to be the justification needed to pay for having a planetarium. They need to prove to the school board and the taxpayers that the planetarium program is a valuable use of classroom time. The trick is that "measurable outcomes" are valuable, whether they are just perceived or able to be actually quantitatively measured.

For instance, "How does the planetarium assist students to pass tests?" or "What can the planetarium provide, as a laboratory, that the classroom cannot?" Focus on the positive; the planetarium is the most cost- and time-effective means for affectively and cognitively locking in concepts that cannot be experienced by reading textbooks or performing classroom labs. It is imperative that students have the advantage of using the planetarium as a laboratory to examine and confirm space science concepts explored in the classroom.

Here are some words of wisdom from Dr. Douglas Duncan, an astronomer at the University of Colorado and director of Fiske Planetarium. He previously was on the staff of the Hubble Space Telescope, which he left in the early 1990s to be part of the modernization of the Adler Planetarium. (If what follows sounds familiar, an earlier version appeared on Dome-L, and he expands on his thoughts here):

"I've been watching a few planetariums succeed and a larger number fail for many years.

"The ones at risk base their decisions on what technology can they buy and what can they do with it. The ones that succeed base their decisions on "who is my audience, and what can I give them that others can't?"

"The result of the latter thinking is that you don't try to compete with Disney, and you don't buy technology that makes you so expensive your audience can't afford to attend.

"I became aware of these two views when I planned exhibits and programs for the modernization of Adler planetarium in the early 1990s. Before spending large amounts of mon-



Wilbear and his fulldome Adventure Team: Alan Davenport (MAPS), Sharon Shanks (GLPA) and Gary Meibaum (SEPA); story on page 28. Photo by Susan Button.

Please do not wait until it is too late and never lower your guard! Build a support system and make your planetarium an indispensable institution in your community! We must be as expert at marketing our planetariums as we are about running the planetarium.

The first thing is to remind yourself about all the facets of marketing your facility. Perhaps you can do this by networking with staff members at successful planetariums and find out what they are doing right and by rereading "Planetarium Promotion 101: An Introduction to Marketing for the Planetarium Professional." You can find this article at www.ips-planetarium.org/planetarian/articles/planetarium-promotion101.html.

Not only do you have to market your planetarium, you have to be savvy about the financial realities of making the planetarium profitable. Administrators need your help in proving that the planetarium justifies the cost to run it. What is the financial value of the planetarium? Either the planetarium pays its own way by revenues generated through ticket sales and donors or by providing critical benefits to the museum or community. Plan-

ey locally I toured the best science museums in several countries to examine the process by which they made such good programs. I found they all used the same process, and it was audience and goal based. 'Who are we trying to reach? What do we want them to leave with?' (e.g. Knowledge about the 'new' solar system. Excitement about astronomy.) These museums knew their audience far better than any planetarium. They had clear goals, and they measured if the goals were achieved. Technology was used when it supported goals; otherwise not. (Visit the Exploratorium in San Francisco, one of my top museums, and you'll see what I mean.)

"We fill our theater (210 seats) many Friday nights with live talks by interesting astronomers and people such as Phil Plait (the *Bad Astronomy* author). These people talk for free. Admission is \$6. During the week we often have live talks given by astronomy students whom we train in public speaking. Again, cost is minimal and we offer a personal interaction that other venues don't. We know our audience, which in this college town is pretty highly educated. So our advertising emphasizes fun and education. Movies don't offer the latter; neither does Disney. That is the niche for the small planetarium.

"It isn't about technology, folks, it's about the message you can bring to people. A good example is Apple Computer. They know their potential users and make technology to support what users like. A compelling and educational story, with less 'gee whiz' technology is always better than gee whiz special effects supporting a thin message. You should hear the scorching comments of audience members about this when you interview them. Presenting cool science in an accessible way is not the same as dumbing down, or presenting cartoons, and the public knows this. Of course, you need to do interviews—assessment—and listen to your audience, to see for yourself.

"Basing decisions primarily on technology

is one of the largest risk factors I've seen leading to planetariums having trouble."

Contact information: Dr. Douglas Duncan, Department of Astrophysical & Planetary Sciences, University of Colorado; Phone +1 303-735-6141 or +1 303-492-5003; casa.colorado.edu/~dduncan.

And lastly, to keep your planetarium viable, use partnerships to enhance publicity,

It isn't about technology, folks, it's about the message you can bring to people.

save money and connect the planetarium to the community.

You can join with other planetariums and form a block of buying power when purchasing or designing shows. Some producers are even encouraging planetarians to do just that; planetarians are receiving the benefit of lower pricing by forming a block of multiple purchasers!

You can also attend conferences and/or examine the proceedings from regional and IPS conferences. Many times there are papers printed in these proceedings that provide examples of how your colleagues lowered the cost of production through partnering with other planetariums or organizations in their communities.

Take Advantage of Networking

One way to ensure that you keep your planetariums alive is to take advantage of networking. One kind of serendipitous professional collaboration was unveiled at the 2007 GLPA-MAPS-SEPA Conference in Wheeling, West Virginia.

Sharon Shanks, our *Planetarian* editor, is planetarium lecturer at the Ward Beecher Planetarium at the Youngstown State University in Ohio. Sharon imagined and produced a delightful planetarium program for young children. The story centered on Wilbear, a young teddy bear who wanted to fly. Sharon

told us that she had lots of help in creating the final version of this show.

The initial program of slides and video was born thanks to talented university staff, including the narrator and photographer, and the university's public radio station recording studio. A co-worker provided the live action video sequences and Sharon's daughter drew the artwork. Sharon says, "the only actual cost for the program was for slide production."

That show ran successfully for two years. During the second year, children under 7 years of age were invited to a tea party with teddy bear music, punch, bear-shaped cookies and time to listen to a bear story. Coordinating the show with this pre-show activity and making a closer connection with young families in the community increased attendance.

Next came collaboration with two other planetariums. Sharon basically gave the show away for the cost of the DVD and mailing and that was all she meant to do: share a program for young children with colleagues. An order came in from Gary Meibaum, director of the planetarium at the St. Charles Parish Library in Luling, Louisiana. With the help of a Tulane University student, Jason Talley, the show was transformed into fulldome format for their MediaGlobe and a copy was sent back to Sharon in a form compatible with her SciDome projector! Then Sharon sent a full-dome video copy to Alan Davenport, director of the Maynard F. Jordan Planetarium in Orono, Maine. He adapted it for his Mirror Dome projector!

You can read the full story and see images on pages 135-138 in the conference *Proceedings*.

By examining other collaborative efforts you can learn ways to become more effective and cost efficient. You too can make this kind of networking profitable for you and maybe even adapt these methods as "standard operating procedure!" The community of planetariums is relatively small; therefore, we need to keep in mind the necessity of supporting each other and working together. Planetariums should neither be isolated nor be forced to reinvent the wheel.

Contact Information: Sharon Shanks, s.shanks@ysu.edu; Gary Meibaum, gary.meibaum@stcharles.lib.la.us; Alan Davenport, alan@galaxymaine.com.

I look forward to meeting with colleagues in Chicago to further discuss, in person, these ideas and other challenges that face planetariums. I am sure we will all leave with many new perspectives and action plans to insure that planetariums not only survive but also thrive in the future. ★



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Past President's Message



**Martin George, Curator
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As I write this, I have just seen something I'll never forget. It is the new Sky-Skan 3D system at the Imiloa Planetarium in Hilo, Hawaii, run by Shawn Laatsch. Pressures of work caused me to miss the opening of the new system in January, but I snatched a few days immediately after Easter to make a visit there. It's the first such system in the world, and it's breathtaking.

With Shawn at the controls, flying the audience—in a live show—through the Milky Way, I watched as stars passed me by, the effect being so realistic that I could almost feel them brushing past me and was tempted to close my mouth to avoid swallowing one!

Leaving the Milky Way, we arrived at the Virgo Cluster of Galaxies, the enormous ensemble slowly rotating before our eyes so that we could study its members—elliptical and spiral, large and small.

Now, many of you probably know me as a "traditional" planetarian, appreciating the quality of a fine optomechanical star projector to give that true feeling of being out under the stars. My love of that kind of starry night sky has not changed and, as I am sure the several vendors of digital systems would agree, we are still "not there yet" with a digital night

sky. We are, however, getting closer.

That doesn't mean, however, that I am against or dislike digital projection, because it allows us to do so many things that simply can't be done with an optomechanical system. The kinds of shows that are possible with digital systems add so much versatility to our programming.

My experiences there prompted much discussion about where we are heading, and where we have come from. Of course, you need to see the new 3D system to have a full appreciation of what I am talking about—but could we have anticipated this kind of experience 30, 20 or even 10 years ago?

I didn't.

I often think about this—not just with planetarium technology, but in more general terms. There was a time when people lived without radio, television, or medical X-ray imaging. Of course, there are still, unfortunately, many people in the world who do not have easy access to such things. A century ago, the projection planetarium had not been conceived. I'm writing this using a laptop while sitting aboard a flight across the Pacific, with a power supply for my laptop in the seat, and access to so many movies and television programs that it's difficult to choose which one to watch—if I had time, that is. Apart from the cup of tea just served to me, there's little or nothing that I see around me that would not have amazed even the most technically advanced communities a century ago.

What is important about all of this, however, is to never forget that it is we planetarians who are the most important resource in our industry. Even the best planetarium systems in the world could never realise their full potential without an enthusiastic planetarian at the helm, and, as I so often say, the live night sky tour is such an essential part of an presentation.

Another important aspect of digital systems is their ability to handle and update datasets of solar system objects, stars, and galaxies. While I was at Imiloa, Brent Tully was visiting as a guest of Shawn and ran two sessions in which he described his dataset of galaxies, projected onto the dome in 3D. Brent Tully is, of course, one half of the famed Tully-Fisher pairing who, in 1977, produced a landmark paper on their research which showed a clear relation between the absolute magnitudes of galaxies and their HI line profile widths. The widths, of course, are an indication of the speed of rotation of the galaxy, and their study provided a new method of determining galaxy distances.

While in Hawaii, I also paid a visit, for the first time, to the Bishop Museum and was warmly welcomed by Education Director

Mike Shanahan, Planetarium Manager Carolyn Kaichi, and Steve Tierney, who ran the afternoon show in the Jhamandas Watumull Planetarium under its 9.1-m dome. An added attraction was live mid-afternoon solar viewing, also conducted by Steve. Again, the human touch was, as always, appreciated by all.

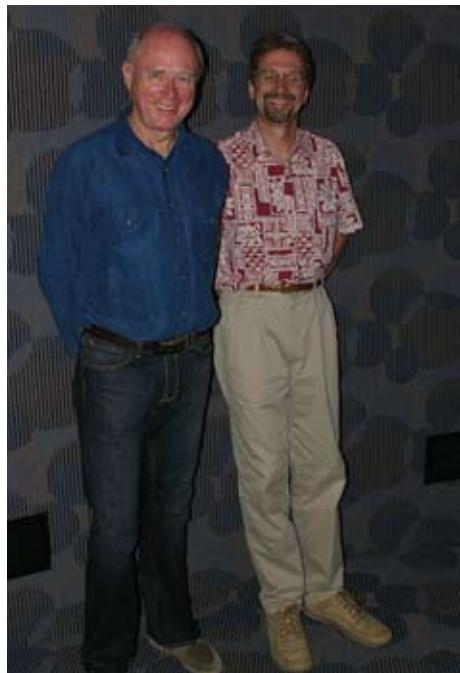
On to different things. By the time you receive this issue of the *Planetarian*, we shall be very close to the time of the 2008 IPS Conference in Chicago, in the USA. I'm hoping to see a large number of you there, and am looking forward to it immensely.

It's also our last IPS gathering before the International Year of Astronomy, the preparations for which, I am sure, have kept you all quite busy. By now, you will be aware that Council has voted "no" to committing IPS funds directly to gain formal involvement in the IYA. As I write this, I shall, as an IAU member, be attempting to secure as much direct involvement as possible without the IPS spending money that could, in the opinion of a considerable majority of Council members, be better spent elsewhere.

The IYA is certainly shaping up to be big, and it is clearly the best opportunity to promote astronomy on a worldwide basis that we have ever had. In addition, of course, it is a great time to promote our planetariums!

To me, as chair of the International Relations Committee, the IYA has another special effect: it is something that will bring the worldwide planetarium and general astronomy communities together still more closely.

On a less happy note, one issue that has been concerning me lately is one that has been brought to the attention of us all through



Dr R. Brent Tully and IPS Fellow Peter Michaud at the Imiloa Planetarium. All photos by Martin George.

Dome-1 and on the World Wide Web. After years of being closed, the Moscow Planetarium faces the possibility of not being able to reopen due to financial problems. We are all aware that there are many planetariums in Russia and other republics of the former Soviet era, and that our fellow planetarians staffing those institutions are an enthusiastic group. Last October, I found myself immersed in this wonderful atmosphere when I visited Nizhny Novgorod (see my report about this visit in the December 2007 issue of the *Planetarian*).

Of course, this is not the first time that we have been saddened by the closure or bleak future of a planetarium and offered our support, and I am aware that in this case, too, many of you have sent supportive emails, which is wonderful. The officers, myself, and the International Relations Committee have been discussing this issue at some length— together, of course, with some of our Russian colleagues—and I am hoping that we can have some positive influence. I am investigating the possibility of making a visit there in the near future to discuss the issue first-hand in Moscow, and will keep you all posted.

Returning to the subject of the upcoming IPS Conference, this is the last opportunity for me to correct a serious omission from my final President's Message in the December 2006 issue! I promised in the September issue of that year to say more about the excellent work performed by our IPS 2006 Service Award recipients and, through a fault of nobody except myself, some vital paragraphs were not included.

As those of you who were present at the Melbourne conference will remember, we were all delighted that Lars Broman, Lee Ann Hennig, Jim Manning, and Dale Smith all received the highest honour the IPS can award—the Service Award.

Lars Broman is a fellow of the IPS and for many years has served and contributed significantly on the IPS Council. Lars' seat on Council has seen him representing the Nordic Planetarium Association for many years, and he was a founding member of that group. Lars has contributed his International News article



Top: The Jhamandas Watumull Planetarium at the Bishop Museum in Honolulu; bottom: Steve Tierney conducting a solar observation session at the Observatory at the Bishop Museum.

in the *Planetarian* for 50 issues now (see Page 50), and has been very active in promoting and supporting the IPS, particularly throughout his region. In addition, Lars' masters' programme in science communication is helping to educate potential planetarians for the future.

Lee Ann Hennig has been involved in the planetarium industry for a very long time and has been a highly valued supporter of the IPS. Lee Ann has been a board member of the Middle Atlantic Planetarium Association (MAPS) for a number of years, and has been very active in the astronomy education field. She is also an IPS fellow.

As well as all of these achievements, though, Lee Ann has fulfilled a very important role within the IPS as secretary since 1994. Her untiring work as an officer, contributing to all of the day-to-day business that the officers

deal with in addition to the particular duties as secretary, has been superb. For example, Council members are especially appreciative of the work that Lee Ann puts into the Council meetings, with the preparation of council packets of information and, of course, the preparation of the minutes, which all members see in the *Planetarian*.

Jim Manning is a former IPS president, having served in that office during 1995-96. He is a Fellow of the IPS, and a Spitz Lecturer. Jim has served as president of the Rocky Mountains Planetarium Association, and has for a long time contributed his What's New column to the *Planetarian*, the flagship publication of the IPS.

Jim is currently the chief executive officer of the Astronomical Society of the Pacific, having formerly (at the time of his award) been head of the Office of Public Outreach at the Space Telescope Science Institute in the USA. He remains close to the planetarium industry and the IPS. He has ensured that the planetarium world is included in materials that are produced, and continues to attend planetarium conferences.

Dale Smith's support of the IPS over a period of many years has been outstanding. Dale is an IPS Fellow, was president in 1999-2000 and is the IPS Publications chair. In this

role he has also been Directory editor, a role that was taken on even before he became Publications chair.

One particular way in which Dale has supported the society has been his dedication to spreading the news about IPS around the world. His work on the Star Partners Scheme, the *Directory* itself, and his extensive travels have been enormously valuable to our society.

Dale is a Spitz Lecturer, was president of the Great Lakes Planetarium Association (GLPA) for an extended term and is a GLPA Galileo award recipient. He is also a fellow of GLPA and served on their board for many years. He has also been proceedings editor for GLPA for quite some time.

We'll be seeing all of these fine planetarians and many, many others in Chicago. I look forward to seeing you there!

NARRATED BY LIAM NEESON
MUSIC BY RICHARD FIOCCA

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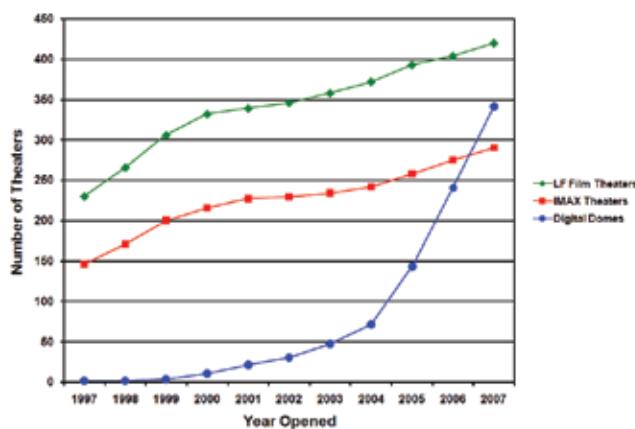
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As of mid-April 2008 there were 383 theaters worldwide listed on the LNP Fulldome Theater Compendium ONLINE,¹ now surpassing the total number of IMAX® theaters worldwide and approaching the combined total of all large-format film theaters as tracked by the LF Examiner.² The table below shows the long term annual trend through the end of 2007, with approximately 100 digital domes in-



1 Fulldome Theater Compendium, www.lochness-productions.com/lfco/lfco.html

2 LF Examiner LFX Database (based on LFX Database search for all theaters); web: lfexaminer.com/searchtheater.asp

stalled per year for the past 2 years.

Theater Openings

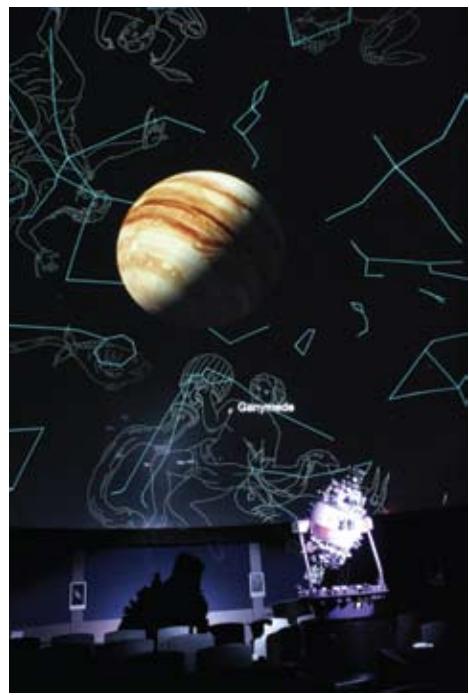
Here are some notable digital dome openings from the past year. Send your press releases and photos to me at the email above to be listed in next year's review.

The new Peter Harrison Planetarium at England's prestigious Royal Observatory in Greenwich opened to the public on May 25, 2007, featuring Evans & Sutherland's new Digistar® 3 Laser projector. The single-lens laser projector provides 16.5 million pixels of ultra-high resolution imagery on the Harrison's 11.5-m dome screen. Her Majesty Queen Elizabeth II attended a royal premiere of the new planetarium show *Star Life*, co-produced by Evans & Sutherland.

Arguably the world's most well known location, the Royal Observatory at Greenwich has been known as a leader in astronomical observation and innovation since its foundation by King Charles II in 1675. It became universally known in the late 19th century when it was chosen in 1884 to be the prime meridian (zero degrees longitude) of the world and the center from which world time zones are measured.

Since its introduction in 2002, over 125 Digistar 3 systems have been sold (27 in 2007 alone), including 10 Digistar 3 Laser systems. Other recent installations include the Stardome Observatory in Auckland, New Zealand, which recently installed a Digistar 3 SXRD system in their 11-m dome (with two Sony SXRD projectors), Shoemart Planetarium in Manila, Philippines (15m dome, Digistar 3 DLP system), and Tidewater Community College in Virginia Beach, Virginia (12-m dome, Digistar 3 Laser system). This June the Guangdong Science Center in Guangzhou, China is scheduled to open as China's largest science center, including an 18-m dome with a Digistar 3 Laser system.

On March 18, 2008, the UK's largest digital planetarium—the INTECH Planetarium in Winchester, UK—opened with a Fidelity Bright system by Global Immersion. (A picture of the interior of the new facility appears on page 53.) The system uses six projectiondesign® F30 sx+ high performance DLP® projectors, providing 16.8 million colors and over 8 million pixels on the 16.5-m tilted dome screen. The system seamlessly ties in playback, real-time content,



Top and center: The exterior and the interior of the Peter Harrison Planetarium at the Royal Observatory in Greenwich, England; photos courtesy E&S. Bottom: The College of San Mateo, California; courtesy GOTO.

lighting and sound via the Global Immersion Media Director, Media Server, Media Playback and Theater Control system—all on a wireless touch screen interface.

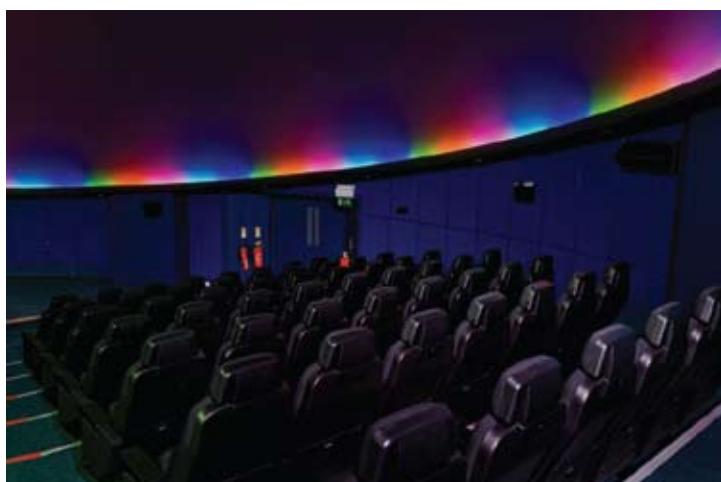
The 176-seat theater includes Uniview™ real-time planetarium software from SCISS AB, an 160-segment LED cove system and an 8.1 surround sound audio system, plus remote diagnostics allowing Global Immersion engineers to access the system from anywhere in the world.

Global Immersion also produced INTECH's opening show, *Neighbourhood Earth*, which is a "presenter-led presentation that can be chopped, changed and customized depending on who is in the audience at the time," according to Jan Breen, media integration specialist at Global Immersion. The INTECH Planetarium hosted the European Workshop in Immersive Cinema on March 29 as part of a post-conference tour that included a tour of Stonehenge in transit from Plymouth to London. Participants were treated to a variety of content, including segments of the opening show and clips from DomeFest 2007 selected by conference attendees using the wireless touch screen controller.

Global Immersion also upgraded the Gates Planetarium at the Denver Museum of Nature and Science with a Fidelity Bright system, and upgraded the Immersive Vision Theater in Plymouth, UK with a fulldome Christie D-ILA projector supplemented with a Zorro® 2015HC light valve projector to provide an ultra-high resolution, true-black projection in front of the audience.

In the past year, two CHRONOS® HYBRID systems (CHRONOS optomechanical star projector with synchronized E&S D3 digital planetarium system) and two standard CHRONOS systems were installed, and three more CHRONOS HYBRID systems are waiting for their buildings to be finished or renovated in the next year. All of these GOTO sales were made by Spitz Inc., GOTO's partner for US installations.

The College of San Mateo, in the San Francisco area, has reopened after its catastrophic



Top: La Villette Planetarium at Cite des Sciences et de l'Industrie in Paris, France; courtesy R.S.A. Cosmos. Next: Sendai Astronomical Observatory, Sendai, Japan; courtesy GOTO. Third: Nashville's new Sudekum Planetarium and Adventure Science Center; courtesy Kris McCall; and Bottom: INTECH Planetarium in Winchester, UK; courtesy Global Immersion.

sprinkler system flood that destroyed their new CHRONOS HYBRID system. In January 2008, a second planetarium system was installed, and instructor Darryl Stanford is once again using the system in daily, live lecture use. Replacement of the Spitz ATM4 theater automation and audio control brings the facility back to 100% of its pre-flood capabilities. This is a beautiful new 40-ft dome in a true showpiece of modern design and function. The adjoining building also includes a state of the art rooftop observatory with roll-off enclosure housing several telescopes used for student research.

At James Madison University in Harrisonburg, Virginia, a CHRONOS HYBRID replaced an older GOTO system which had been in operation since 1968. Dr. William Alexander will use the new theater to bring the latest in modern astronomy together with traditional techniques, using the manual control console which drives both the CHRONOS and the synchronized D3 video system. A new 30-ft Spitz dome and Ash/East Coast audio, LED lighting, and auxiliary video systems also occupy this tilted-floor facility.

Kris McCall reports that Nashville's new Sudekum Planetarium will officially open on June 28—during IPS 2008! The new Sudekum will be the largest planetarium in the fine state of Tennessee, and the first major planetarium in the US using both a GOTO CHIRON optical-mechanical star projector seamlessly integrated with an E&S D3 using dual SXRD projectors. "Not only do we have the best of both worlds, but the possibilities for presentations are almost endless," says Kris, who understandably may not attend IPS this year. Their inaugural show STARS features the amazing animation of the National Space Center in Leicester, UK, the voice talent of Mark Hamill, and a Pip Greasley score performed by the Grammy Award-winning Nashville Symphony Orchestra.

To see their work in progress, go to www.sudekumplanetarium.com. Kris also reminds us that the Sudekum Planetarium and Adventure Science Center are host-



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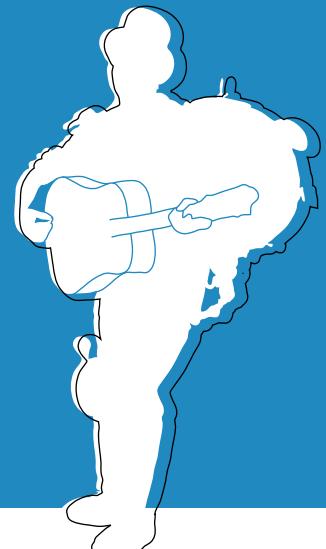


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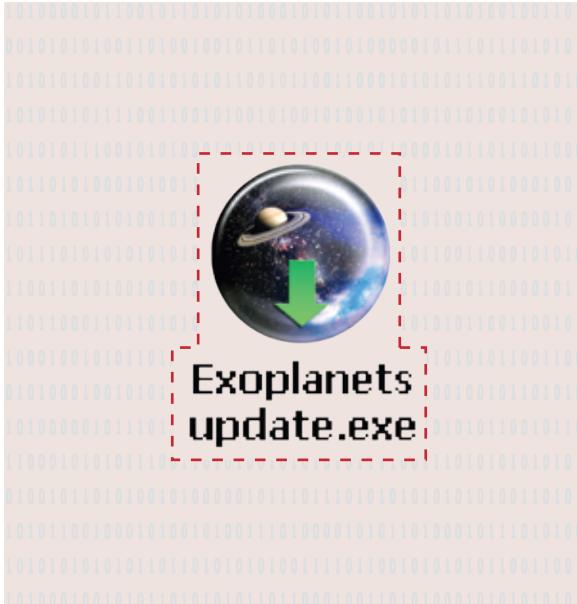
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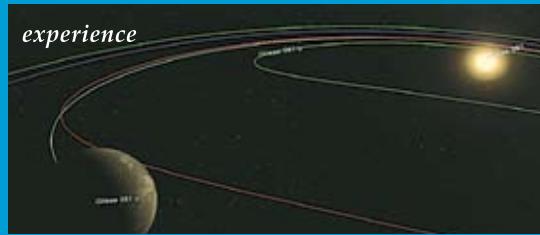
AM ESO announces information about exoplanet Gliese 581 c.

PM The world reads *descriptions* about Gliese 581 c.

The orbit of Gliese 581 c may be within the habitable zone, the area where the heat from nearby star Gliese 581 is able to provide liquid water.

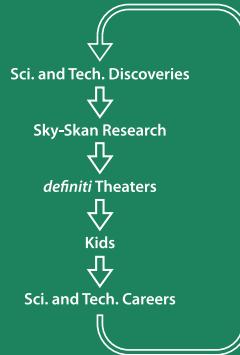
AM In California, Paul Buehler updates his *definiti* theater with a file from Sky-Skan.

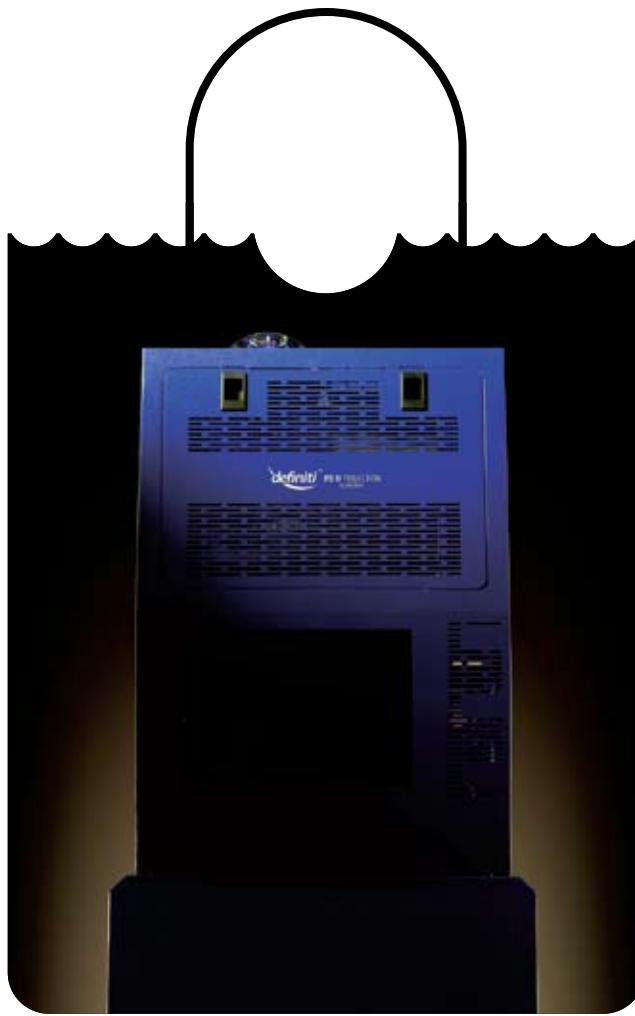
PM Glendale Community College Planetarium students *experience* Gliese 581 c.



"The ability to show how this exoplanetary system might look in near real-time (as if we could fly the planetarium directly to the system itself) cannot be understated. It is vital to how we work here and to how we teach our students."

Paul Buehler,
Glendale Community College Planetarium





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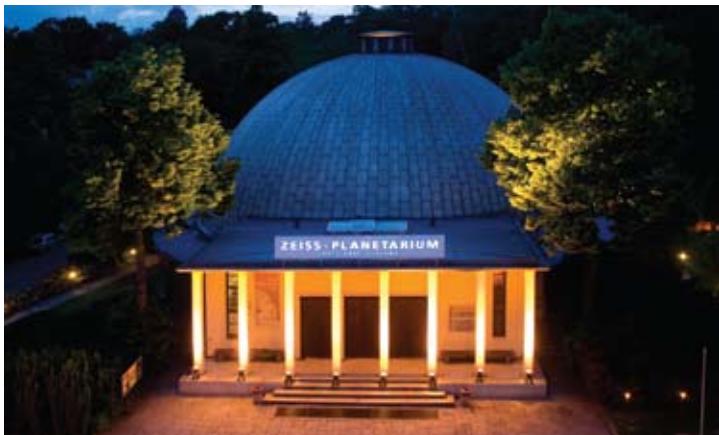
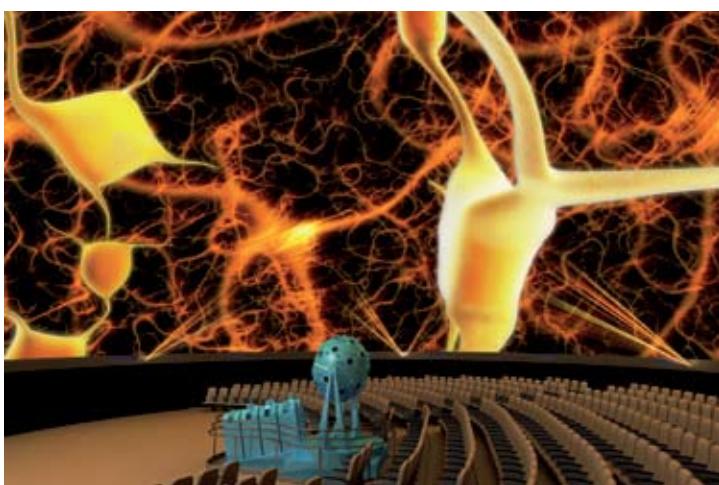
No matter where you set up a *definiti PD II*, you'll be using the same tools that the world's top full-dome theaters enjoy. For more information contact Sky-Skan at SkySkan.com.

ing the regional Southeastern Planetarium Association (SEPA) conference June 16 through 20, 2009.

Minolta has been busy installing MediaGlobe® planetariums with 11 recent installations, including the Heritage Planetarium in Maryville, Tennessee; the Timmons Planetarium at Furman University in Greenville, South Carolina; the Millholland Planetarium at Catawba Science Center in Hickory, North Carolina; and The Omnisphere at the Natural Science Center in Greensboro, North Carolina. The Timmons Planetarium is actually a 7.3-m dome suspended over a classroom, and is one of the few planetariums in the world with picture windows!

The Seomjingang River Observatory in GokSeong, South Korea opened last year with an R.S.A. Cosmos InSpaceSystem™ DLP 2C system featuring two BARCO SIM5 projectors and RSA Fish-Eye lenses in an 8-m dome. Planetarium Director Dr. Kim was impressed by the precise representation of astronomical phenomena, saying that the "starfield was satisfying even though it was represented by data projectors." R.S.A. Cosmos also upgraded the La Villette Planetarium at Cite des Sciences et de l'Industrie in Paris, France. The InSpace-System DLP-8C projection system uses BARCO SIM5 projectors with a 6+2 configuration (six-projector hemispheric coverage with doubled projectors for increased brightness), a 12.1 digital surround sound system and LED cove lighting in the 21.5-m diameter Spitz dome.

Spitz now has over 35 SciDome installations featuring a special digital planetarium version of Starry Night software. In February a new SciDome planetarium in Izmir, Turkey opened at private school Izmir Özel Türk Koleji with a 9.1-m, tilted planetarium dome. Izmir is located in western Turkey by the Aegean Sea. The theater's unique design includes a wall of south-facing, floor-to-ceiling windows. Heavy curtains can be opened, allowing bright sunshine to stream into the room, or the curtains can be closed for total darkness in the planetarium.



Top: Timmons Planetarium at Furman University in Greenville, SC (courtesy Minolta); next below: De Anza College Planetarium in Cupertino, California (courtesy De Anza College); and bottom two: inside and outside the Zeiss Planetarium in Jena, Germany (courtesy Zeiss Planetarium)

In March the La Torre Del Sole Planetarium in Brembate di Sopra, Italy opened with a new Spitz SciDome theater. The new planetarium facility houses an observatory located at the top of a converted 28-m water tower, and is located in the Lombardy region of Italy, 45 kilometers northeast of Milan. Next to the observatory is a viewing platform with a coelostat that projects an image of the sun at the tower's base.

On January 14, 2008 Sky-Skan announced the upgrade of the Imiloa Astronomy Center of Hawai'i Planetarium to the first permanent *definiti*® 3D theater with four cinema-quality Sony SXRD™ 4K digital projectors, *definiti* HD lenses, DigitalSky 2 visualization software, and 3D stereoscopic technology from Infitec. (For more, see the feature story on page 8.)

Sky-Skan contributed to the renovation of the De Anza College Planetarium in Cupertino, California with a *definiti* HD digital system using two Sony SXRD 4K digital projectors. The 15.2-m dome is "beautiful, bright and colorful," according to Planetarium Technical Director Karl von Ahnen. The DigitalSky 2 software can be linked to follow the motions of the new Konica Minolta Infinium-S star projector, providing "tiny, bright, realistic stars plus all the flexibility and power of the digital system."

Sky-Skan also recently upgraded the Holt Planetarium at the University of California Berkeley's Lawrence Hall of Science with a custom two-projector *definiti* full-dome system in its 6-m dome. Planetarium Director Alan Gould reports that the Lawrence Hall of Science is converting their audience participation shows to full-dome format and developing new shows for full-dome as audience participation programs as well. Eventually all the *Planetarium Activities for Student Success (PASS)* series of audience participation shows will be available in full-dome format.

In November, 2007 Ciudad de les Artes y las Ciencias, L'Hemisfèric (the City of the Arts and Sciences Planetarium) in Valencia, Spain supplemented their Zeiss Universarium Model VIII

TD optomechanical planetarium projector with a Zeiss powerdome® digital projection system with the Uniview live visualization platform from SCISS AB. Valencia is a stunning facility that was host to IPS 2004.

Other recent powerdome openings include the Lakeview Museum in Peoria, Illinois (January, 2008) and the Kuwait National Planetarium and Kuwait Science Club featuring a powerdome 4DOME high fidelity playback system with high performance Sony projectors and SCISS AB's Uniview.

It was just over a year ago that Zeiss Planetarium in Jena, Germany upgraded with a new Zeiss ADLIP laser projector. The Zeiss Planetarium Jena is the world's oldest planetarium still in service, running shows since 1926. It was the fourth planetarium to open after Mu-

nich, Dusseldorf and Wuppertal. While the latter three were destroyed in World War 2, Jena was mostly spared from bombing and reopened after a short closure. The theater hosts 260 seats, a Zeiss ADLIP all-dome System, and a Universarium IX star projector as well as laser show equipment.

Fulldome Summit and DomeFest 2008

If you are planning to attend IPS 2008 at the Adler Planetarium in Chicago, Illinois this June/July (www.ips2008.org), don't forget to register for the July 3 Fulldome Summit and DomeFest 2008. The Summit is a special session of IPS co-organized by Ryan Wyatt, chair of the IPS Fulldome Video Committee, Dan Neafus of the Denver Museum of Nature and

Science, and myself.

Fulldome Summit registration is free for IPS attendees (or \$25 for non-IPS attendees), and there is an additional \$50 fee for DomeFest attendance. Summit events include kick-off of IMERSA (the new Immersive Media, Entertainment, Research and Science Academy), a keynote speech by the former Digital Cinema Initiative's CTO Walt Ordway, and papers and panels focused on the Future of Fulldome. DomeFest events include "The Making Of..." sessions from fulldome producers, real-time interactive demonstrations, and, of course, the DomeFest 2008 Juried Show.

Find out more at the DomeFest website: www.ips-planetarium.org/fulldome/ips2008.html. ★

KidsCall Calls on Planetariums Around the World

Thomas W. Kraupe

Planetarium Hamburg, Germany

The international community of planetariums and the World Future Council (WFC) have common concerns and values. The WFC consists of 50 respected pioneers and visionaries from all five continents. Members come from governments, parliaments, civil society, business, science, and cultural institutions. Together they form a voice that emphasizes our responsibility as global citizens and speak up for the rights of future generations.



The Council's founder, Jakob von Uexküll, has become an international figure since he established the Right Livelihood Award in 1980, better known as the "Alternative Nobel Prize" (see www.worldfuturecouncil.org for more information).

Since WFC has its base in Hamburg, Germany, it was a natural match for Planetarium Hamburg to cooperate with this high-profile, non-governmental organization.

One result of this ongoing cooperation which is meant to be beneficial for all planetariums worldwide focuses on a project called "KidsCall."

KidsCall, the youth campaign of the World Future Council, addresses the children of the world. They are invited to express their concerns and wishes regarding climate change and environmental destruction to the Group of

Eight politicians (Canada, France, Germany, Italy, Japan, Russia, the United Kingdom and the United States) in letters, emails, videos, and pictures. Please find more information, including a wonderful PowerPoint Presentation about climate change, at the campaign website www.kidscall.de.

To support these goals, Planetarium Hamburg, in cooperation with KidsCall, has created a fulldome trailer and, for non-digital planetariums, a set of alskies, which we provide you for free. You can download them at www.planetarium-hamburg.de/kidscall.

We would be delighted if you could show the trailer or the alskies before, after or even during your planetarium shows for children/families and hence integrate this as a meaningful tool into your own strategy of creating awareness for our planet.

The trailer encourages viewers to reflect

upon our planet's place in the universe. We are sure that you can make this project part of the educational work you do every day. The projection of this trailer or of the alskies on your planetarium dome offers a great chance to draw children's attention to our environment and our cosmos. The trailer has already been distributed to planetariums in Germany and has been received with great interest.

The KidsCall campaign is non-commercial and not affiliated to any political party. The campaign wants to help kids and teenagers to think about and creatively express their concerns and worries related to climate change. There are many possibilities for your planetariums to expand the project by drawing on your own creative program and involving children visiting your dome. This initiative would surely be interesting for school groups. The trailer will be offered to your planetarium free of charge. It should, however, not be changed or used for other purposes.

Comments, ideas and feedback are important to us, as is the future of kids on our blue planet Earth. If you need more information about KidsCall, please contact Caren Herbstritt of the KidsCall team via phone (+49 40-30 70 91 428) or email (caren@worldfuturecouncil.org).

If you need more information or help installing the KidsCall fulldome trailer or using the alsky set on your projection system, please contact Tim Florian Horn at Planetarium Hamburg, timflorian.horn@planetarium-hamburg.de. ★

Educational Horizons



Steve Tidey
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Well, howdly-doodly-diddly, as Flanders might say. (A few seconds before Homer probably throws something at him).¹

Let's see, now, you've turned the page. Darn! Now I'm really going to have to get my act together for once and write something pretty fast. And it had better be worth reading. Wow, that'll be a first...

So the pressure's on. Erm, ah, uhm. Oh, crikey, my head's empty. No change there, then...

You know what? If I were you, I shouldn't bother skipping this bit and going to the end of the column; I haven't written it yet.

I can tell by the look of horror on your face that you've noticed there's a new picture of me at the top of this column. Yes, it took a while, but I succeeded in my mission and finally found a camera with a lens made of glass strong enough to not crack when it's pointed at me.

Enough, already. Down to business. In this issue's column, I would like to look at some of the wide variety of places where one can find astronomy education taking place across the world. There's nowhere near enough space here to cover all the examples in detail, so I

have cherry-picked a few to get your thought juices flowing. I've taken my cue for this from a quote by the great Andrew Fraknoi that I recently stumbled upon. In 1996 he wrote,

Where does astronomy education take place? Those readers who teach will probably say it takes place in a classroom like theirs-anywhere from first grade through university. But I want to argue that astronomy education happens in many other places other than the formal classroom. It happens in hundreds of planetaria and museums. It happens at meetings of amateur astronomy groups. It happens when someone reads a newspaper, or when they watch tv or listen to the radio. It happens when someone is engrossed in a popular book on astronomy or reads *Sky & Telescope*. It happens in youth groups taking an overnight hike, and learning about the stars. It happens when someone surfs the astronomy resources on the Internet. When we consider astronomy education, its triumphs and tribulations, we must be sure that we do not focus too narrowly on academia, and omit the many places it can and does happen outside the classroom.²

So, how far and wide do these efforts stretch across the world? Well, there are approximately 100 or more countries that have some form of organized astronomy education, either professional or amateur. Of those, roughly half adhere to the International Astronomical Union, and less than half would be considered to be fully developed economies. In many developing countries there are literally a handful of astronomy educators who shoulder all the work. So there's much food for thought there, especially for those of us in the west who can sometimes get frustrated at not having even more resources to add to what are already sumptuous amounts, compared to many other countries.

The Practical Problems

Let's consider for a moment the daunting practical problems faced by astronomy educators in under-developed countries. Oh boy, where do I start? There's so much choice. How about a paltry amount of teaching materials, the books and magazines that are available to kids are terribly out of date, they have extremely limited access to computers, poor

telecommunications infrastructure, and unreliable mail, fax, phone lines. Shall I go on? I could, but I can see you are wincing already. Well, OK, just one more. The so-called World Wide Web is a dream far out of reach for many in these countries. So near, yet so far. It's almost like the name we've given the Internet is cruelly mocking them. They probably laugh sardonically every time they think about it. And the way things are going in the west (especially with the environmental concerns), there will come a time when key astronomy-related magazines and journals (and, eventually, many books) will only be available online. The gap between the haves and have-nots will then grow much wider.

And it's not as though educators in those countries can partially solve the problem by writing their own books on astronomy; generally speaking, there are not perceived to be enough astronomy students in many small under-developed countries to make the publication of such books financially viable. So in some respects, it doesn't matter where the educators turn, they're always looking down a blind alley. Not surprisingly, all this makes me (and, I hope, you, too) feel very privileged to be where we are, if you are accustomed to the riches that surround us in the wealthier countries.

So here's the deal, folks. The only way many countries can counter this mountain blocking their progress in astronomy education is to ensure that their educators are as up to date as possible on news and educational initiatives. The IAU has sponsored many educators from less developed countries to attend meetings around the world, and the IPS does its bit, too, of course. There is always room for improvement, so don't underestimate the importance of seeing these good people at IPS conferences and other meetings. As big a deal as it is for the likes of you and I in the west to go to conferences, it's an even bigger occasion, perhaps a once-in-a-lifetime opportunity, for those educators from the poorer countries. Attending just one conference can potentially push astronomy education ahead in one country by a substantial margin, especially if the educator is a one-person band, which, in some places, is almost the case.

So, if you attend the IPS conference in Chicago in June, seek out these educators and point them in the direction of your favorite astronomy education resources. We always like to feel we're possibly changing in some small, favorable way the life of some of the kids we teach, but with this you could potentially be changing a nation if you find yourself talking to a small country's virtual lone astronomy educator. In fact, go one better and give them any spare paper and/or CD/DVD resources you may have. Now that's job satisfaction.

¹ Just in case the American prime-time cartoon program *The Simpsons* hasn't permeated every corner of the globe, Steve is referring to Ned Flanders, the much-abused neighbor of Homer Simpson. -ed

² From "Astronomy Education in the United States," an invited talk given at the 189th Meeting of the American Astronomical Society in Toronto, Canada in January 1997. An earlier version was published in *Astronomy Education: Current Developments, Future Co-ordination*, edited by J. Percy (1996, Astronomical Society of the Pacific Conference Series).

On Distance Learning

Over the last 30 years or so, distance learning has gradually built up a significant head of steam to the point where today it has revolutionized general education for millions of people in hundreds of subjects. An educated (pardon the pun) estimate would put the number of institutions around the world offering distance education in a variety of subjects at about 1,000. Of those, 300 or more specifically mention astronomy in their college- or degree-level distance learning courses. The figures can be argued over, but a conservative estimate by Barrie Jones, an astronomer at the UK's world-famous Open University distance learning institution, puts the approximate number of students studying some form of astronomy, either at a distance or in person at a college or university, at 100,000 or more. He adds the caveat, however, that the accuracy of this figure lies somewhere between the uncertainty of the Hubble constant and the amount of missing mass in the Universe!

The Open University has performed internal studies that show a comfortable majority of its 1,500 or so annual astronomy students have most interest in cosmology and the origins of the Universe. Somewhat mysteriously, only about one-third say they have a particular interest in learning more about how to observe the night sky. And more students intend to go on to pursue a career in astronomy and physics than there are annual new jobs in the UK. Therefore, many of them move sideways into related scientific disciplines. I imagine it's the same in many other countries, too.

Jones has devised this whimsical distance learning version, below, of the classic stellar sequence list of star temperatures, indicated by letters:

Features Of Distance Education. It:
Must be **Open**
Is best on a **Big** scale
Is **Affordable**
Must build on the students' **Foundations**
Is **Growing**
Must have courses of high **Kwality** (!)
Must make use of the various **Media**
Is part of a growing world wide **Revolution** in education
Is relatively **New**
Must provide **Supported** self-learning

Educating the Public

In today's media-drenched society, professional scientists in many disciplines, including astronomy, have discovered the benefits of educating the public about their research. But not all of them are natural communicators, and therefore many of them shy away from the public duties that others grab with open arms. From a strictly selfish perspective, the main benefit for scientists of taking their message to the public is that the higher profile

both they and their research programs garner comes to the attention of their funding organization. The theory is that the funding body will therefore look kindly upon that particular program of research during the next budget round. Perhaps the budget axe will fall somewhere else.

But from a more general perspective, public education, especially when it involves scientists who are using public money, is a way of showing us where our money is going. These days it's almost demanded in some areas. Up to a point, NASA has been criticized over the years in some quarters for its overall educational efforts and the degree to which they are truly committed to it, but my experience has largely been positive and their material is usually high quality.

The education task is more attractive to professional astronomers than to other scientists, because they know that astronomy is the public's favorite area of scientific research, so they face far less of an uphill struggle than their colleagues from other disciplines.

But the downside is there is still a fair degree of skepticism among scientists of all disciplines (including professional astronomers) about those who get involved in public education. "They're doing it to pump up their ego," or, "They're doing it just for the publicity" are common refrains. Either way, it is seen as working against the principle of true scientific investigation done the old-fashioned way far from the public gaze and scrutiny. Many would still argue that it shouldn't need justifying, jazzing up or dumbing down for the public. Also, many scientists are loathe to deal with non-technical journalists for fear of having their work misrepresented.

It's not uncommon to find professional astronomers viewing the mass media as a necessary evil. Print, tv, and radio provide a stage for public education, although the ground is peppered with holes to be avoided for fear of embarrassment or ridicule from your peers. Astronomers need to be media-savvy, which require skills very different from those that you and I have developed over the years for the planetarium and classroom and the ones they, themselves, have nurtured for their research. But it reflects how education is changing in today's electronic world of fast news.

School science teachers aren't faced with such concerns, especially as a growing number in Europe are focusing their own education initiatives through the excellent European Association for Astronomy Education (EAAE). (Their web site can be found at www.eaae-astro.org).

This organization has its roots in a 1994 meeting of 100 physics teachers from across Europe, brought together in Garching, Germany, under the auspices of the European Southern Observatory. At the conclusion of the one-week workshop on astronomy education initiatives, the participants decided to form the EAAE with the long term intention of unifying, as much as possible, the teaching of astronomy across Europe.

The association is now registered as a non-profit organization in Germany, and local branches, with local representatives, have been set up in many European countries. EAAE activities include in-service training for teachers, exchange of science students across borders, summer schools at observatories, etc. The ESO still play a large part in organizing events, planning education initiatives, and stimulating

the flow of information between members.

Lastly, in my potted and brief study of the range of astronomy education initiatives out there, we come to a world-famous research institution offering its students the chance to learn what it takes to bridge the gap between the classroom and the land inhabited by professional astronomers. The Smithsonian-Harvard Summer Intern Program is a 9- to 10-week long program that gives select undergraduates from US colleges and universities a golden chance to spend the summer actively involved in solid research projects, with post-doctoral fellows and senior scientists acting as mentors. They engage in observational and theoretical astronomy and laboratory astrophysics and study supernovae, star formation, the interstellar medium, and so on through large, professional telescopes. There are field trips, too, and an opportunity to present their research results at a professional meeting. Many former Summer Intern Program students have gone on to be professional astronomers contributing to important projects involving gravitational waves, solar motions, galaxy merging, general cosmology, and so on. It's education at the sharp end of things, and they get to do stuff you and I only dream about.

So I hope this all places the planetarium world in better perspective for you all. We are a highly visible sector in the astronomy education field, but we provide just one of a variety of ways in which the public can get excited about the universe.

Well, the moon of time has just eclipsed the sun of fate, which means it's the end of this column once more, so I'll put you out of your misery by stopping here. ☆

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Forum



**Gary Lazich, Manager
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In one of his earlier recordings, Comedian Bill Cosby commented that philosophy majors in college wandered around asking questions like, "Why is there air?" Everybody knows why there's air, he retorted: to blow up basketballs with! We could, I suppose, apply similar "reasoning" to this issue's Forum question. Why are there planetariums? To give planetarians somewhere to work and vendors something to sell!

Fortunately, respondents took the question more seriously. As stated, the question took the following form:

Some years ago, George Reed asked impertinently, "Who in hell needs a planetarium?" In a time of dwindling budgets and layoffs, who indeed? With Sky Scout* by our telescopes and Starry Night* on our computer screens, who needs a planetarium and for what purpose?

*The SkyScout™ personal planetarium is from Celestron; Starry Night™ software is a product of Imaginea - ed.

Beleaguered planetarian Gail Chaid provides our first and most eloquent response, containing as it does the testimonials of several educators in her school district, a community member, and a high school student.

★ ★ ★

The positions of planetarium director (a teacher) and a .75 clerk-typist have been eliminated at Independence High School (San Jose, California). The Independence Planetarium is on the chopping block. Teachers, students and parents have written compassionate letters about their experience in the planetarium and how they feel about the cuts. Below you see some of the reasons for having a planetarium:

Why Have A Planetarium?

Independence Planetarium offers educational programs on astronomy to adults and children alike. We see students ages 2 to 102. The planetarium simulates the night sky. With its technology, there are many creative ways to study astronomy, math, science, and other subjects that cannot be done in a regular classroom. As Robert Havlen, past director of the Astronomical Society of the Pacific, says, "Astronomy, more than any other science, is a natural magnet to a child's imagination and curiosity about the unknown universe. Astronomy is the crossroads of history, mathematics, geology, physics, chemistry and biology that is alive and removed from the dry laboratory. Astronomy opens natural pathways to all of the sciences and history of our species. Most of all, astronomy is fun. The planetarium is one of the best motivational tools

ever invented. It is a resource that can positively inspire children of all levels into a lifelong appreciation of science."

The geometry of the celestial dome in a planetarium allows for a more effective understanding of astronomical concepts. It is different than a classroom and students remark about it immediately. "Wow, this is so neat!" they exclaim as they enter the dome. As the program continues students are immersed in darkness. The stars come out, there is a voice and magnificent astronomical images surround them. They begin to experience the awe and curiosity about nature, Earth, and the universe.

A planetarium provides a place where abstract concepts make more sense and the wonder about them provides students with inspiration. The world seems to make more sense after their visit to the planetarium. The

rhythms of the seasons and the daily motion of the sun, moon, planets, and stars become comprehensible. Students become more observant about the celestial objects and about nature. They ask more questions. They become more curious about nature and the world. Curiosity is a first requirement for leadership for many CEO's.

The planetarium is also a place where students can increase skills in listening, which also increase skills in reading and writing. The same part of the brain is engaged for both skills. Planetariums, as extensions of the classroom, also provide a place where people have a community experience in learning. There is a sort of "bonding" with the community of the audience when the lights go out and everyone exclaims, "Oh!" and "Ahhhhh!" That moment is magical. It is that moment and the night sky and all that it teaches us that keeps us connected with history, with humanity and with our own humanity.

Gail Chaid, Director
Independence Planetarium
East Side Union High School District
1776 Educational Park Drive
San Jose, California 95125 USA

★ ★ ★

As a science teacher, I have found that one of the most intangible concepts for students to grasp is astronomy. I cannot imagine trying to explain nebula clouds, constellations, light

A planetarium provides a place where abstract concepts make more sense and the wonder about them provides students with inspiration.

years, and phases of the moon without the interactive and visual approach provided by the planetarium. As educators, we know that very few students can pick up a text book, read about a rather difficult concept, and truly understand. Most students need to experience the content. The planetarium provides that experience.

Jennifer Williams
Independence High School
Science Teacher

★ ★ ★

Having a planetarium accessible for all the students in the district is important to keep our students learning in an active manner. Most of our brightest students have little knowledge of any of the earth sciences. I see this at the many competitions my top science students attend. The planetarium provides a way to add earth science to the curriculum in a meaningful way to the students. Reading about the stars is not the same as see-

ing them. I have developed physics curriculum just to utilize the wonderful resource and have used the planetarium every year I have been a teacher in the ESUHSD. Please help save this vital resource.

Debra Dimas
Physics/Chemistry Teacher
Santa Teresa High School

☆☆☆

The planetarium at this school is a reason the science students here have been able to make progress in science test scores. It is a premier institution open to visits from all schools and is one of the most heavily used facilities in our district. Among my students it not only provides a unique approach to teaching through the dedicated work of our excellent director, Gail Chaid, it creates a sense of optimism and excitement that lets them know there is a future in learning science. Given the original commitment of the public funding for the planetarium and the relatively small expense of maintaining it, I for one do not want to be any part of allowing it to be diminished. I am sure time will bear out its continued value.

Stuart Briber
Science/Physics Teacher

☆☆☆

The Planetarium has been a valuable resource since the opening of Independence in 1976. I can testify to this as I have been a grateful and enthusiastic user of its programs in my 23 years of teaching science here at Independence. It provides curricular support in high-interest areas that support our science standards. It integrates the visual and kinetic learning modes to accommodate our students' different learning styles. And not just for Independence students, but for students in the other East Side schools, including middle schools and elementary schools. It even reaches out to the community and to educators... It is...an irreplaceable educational asset which is motivational and enriching for our children's education.

Ellean H. Vickrey
Science Department Chair
Independence High School

☆☆☆

Keep our planetarium open! Without it, my students would never know how the moon was formed, or why the moon is shaped like a crescent! We need the planetarium to keep our students literate in science!

Matt Trask
Science Teacher
Piedmont Hills High School

The programs that are offered at this facility provide students with a unique and interactive learning opportunity—one that is very different from anything that could be presented in a traditional classroom setting. Students visiting the IHS Planetarium learn about the science behind seasons, eclipses, star/planet/moon formation; to name just a few. In preparation for the upcoming STAR tests, a recent visit to the facility provided my biology students with a review of the California State Standards on cellular biology. There is no doubt that this experience will improve their performance on this all-important test.

Alison Brunsdon
Science Department
Independence High School

☆☆☆

For integrated science, 9th grade, a good part of the first semester and part of the second semester, the planetarium programs are specially designed to reinforce and clarify the concepts taught in classrooms. Again many sections are handled at a time. We do not see "planetarium" as a place for learning celestial objects only.

Molla Huq
Science Teacher
Independence High School

☆☆☆

I am a lifelong resident of Santa Clara County, a retired chemist, environmental manager and science teacher who grew up going to the planetarium. Planetariums are a great way to make science a part of children's lives; and an opportunity for parents to become involved with their students, stargazing and discussing astronomy at home. The US is woefully behind other countries in the science education of its children, which limits our ability to compete in the world. These days, when so few parents get involved with their children's education and so few students get enough exposure to science to choose it as a career, we cannot afford to further limit student access to planetariums.

Susan E. Johnson

☆☆☆

I have been to the Independence High School Planetarium twice: once as a third-grader in elementary school, and once just recently as a tenth-grade student at Independence. Over the years, it has really improved in quality with new programs. The planetarium is a

great educational facility that can be enjoyed by everyone, young and old. Young children can learn about the stars and the solar system. High school students can learn about cells or further expand their knowledge of the universe. Taking away the planetarium would be like removing a member of an already endangered species. There are already so few planetariums left. Very soon, if this continues, there will be none left! Why let future generations miss out on the experience? Please keep the planetarium open.

Patrick, student
Independence High School

★ ★ ★

A planetarium represents a unique opportunity for engaging the public in learning science. Research on how people learn has shown that new knowledge is built from existing knowledge, and that people naturally organize their personal experiences into mental models. Unfortunately, such models are often incomplete, self-contradictory or poorly defined.

The planetarium is an ideal forum for providing the experiences needed to develop scientifically accurate mental models regarding the appearance of the night sky and its connection to the positions and motions of the Earth and celestial objects.

The sky as experienced from the Earth forms the surface of a hemisphere. This basic fact is central to understanding the apparent motions of the Sun, moon, planets and stars. However, flat-panel depictions of the curved night sky on a two-dimensional computer or

Planetariums are a great way to make science a part of children's lives; and an opportunity for parents to become involved with their students, stargazing and discussing astronomy at home.

television screen necessarily introduce distortions due to projection. Moreover, the flat depiction of the sky on a screen introduces an unnecessary layer of abstraction between the would-be observer and the real sky available just outside.

A planetarium provides a realistic and reliable representation of the two-dimensional projection of the sky experienced in three-dimensional space. Visitors directly and personally experience the meaning of the horizon, zenith, ecliptic, etc., and the simulated passage of time, thereby establishing the reality of the sky and its motions and providing the basis for new, more scientifically accurate mental models.

A planetarium provides the opportunity

to teach essential science skills to non-scientists: the role of observations, formulating hypotheses, making predictions, and reasoning from evidence. The novel environment of the hemispherical theater is inherently engaging, and the combination of experiential education and inspiration makes the planetarium a powerful tool for teaching basic observational astronomy and creating a scientifically capable public.

(Based in part on "The Interactive Planetarium: Student-led Investigations of Naked-Eye Astronomy," an article submitted to *Astronomy Education Review*)

Emily Rice and Dr. Nate McCrady
UCLA Astronomy Department
405 Hilgard Avenue
Los Angeles, California 90095 USA

★ ★ ★

Who in hell needs a planetarium? A lot more folks than you think.

Yes, there are "computer planetariums" and other things such as SkyScout, but those devices, although they show the sky, cannot answer questions about the night sky and the objects in it.

In any city, it is not the local schools or educators who give the public information about the sky. It is the local planetarium that does that. Who do the media go to when there is an eclipse, transit, or anything else happening in the sky? The local planetarium. Who is it that the public calls when they want information about how to purchase a telescope? The local planetarium.

In many cases, people come to the planetarium when they don't really have to. Here in Schenectady, we do a lot of Scout programs. When you read the requirements, most of the badge work can be done at home. But the parents tell us that they come to the planetarium because they can find the "experts" there who can answer the questions, and the kids feel it is better because the lesson is taught by a "real scientist."

The schools attend the planetarium because the teachers, unless they are high school teach-

ers, have no training in any of the sciences. So not only are the kids learning, but the teachers are too. And the public comes to the planetarium to learn a lot about the sky and spaceflight. Remember that we in the planetarium field are the "middle man" between NASA and the general public. Yes, they can go on the Web, but again, who is going to actually answer any questions that they have? They can get NASA-TV in their living rooms, yet they choose to watch a shuttle launch with the planetarium staff so, if they have any questions, there is someone to talk to.

Planetariums provide a real and important service to the schools and public. Despite the rising cost of gas, the attendance here in Schenectady is up 29%—yes, twenty-nine percent—over last year, and last year we had the highest attendance in the history of the facility. So someone other than the staff thinks that the planetarium is important!

Steven LJ Russo, Planetarium Manager
Suits-Bueche Planetarium
Schenectady Museum
Schenectady, New York 12308 USA

★ ★ ★

This is a question that a lot of administrators are asking. Of course, to us planetarians, the answer seems obvious. No device can simulate the night sky as effectively as a planetarium and it doesn't even have to be clear, or even dark to do so. The sky is always clear in the planetarium.

The human species is naturally curious about the world around us and that includes the sky above. I have travelled to countries where the opportunities to learn about astronomy are very limited and I find that many people, especially young people, have a real hunger to learn about the universe in which we live. Students who live in these countries have many questions about our solar system, the possibility of life outside the earth, black holes, and cosmology.

A planetarium, combined with an effective presenter, is one of the best ways to answer many of these questions. We can show

them where to look for stars, planets, or the site of a suspected black hole, so that they can go outside and observe some of these things with their own eyes. They can find a star with a newly detected planet around it and wonder if someone is looking back at them. They can look at the light from a galaxy that has travelled millions of years to reach their eyes and marvel at the far flung reaches of space. The planetarium is the most effective tool for showing the location of these objects and inspiring a sense of awe in our visitors.

Even in the era of wonderful multimedia planetarium productions, some of my planetarium's most popular shows remain the simple constellation talk. To sit under a starry sky is magical, whether under a planetarium dome or the real thing. Listening to a skilled interpreter take an audience on a tour of the night sky is totally different than a tour by a computer. It's the human impact that makes a difference. And show me a computer that can skilfully silence a restless fourth grade class!

Dave Weinrich, Planetarium Coordinator
Minnesota State University-Moorhead
1104 7th Avenue S
Moorhead, Minnesota 56563 USA

★ ★ ★

Eloquent responses all—and great ammunition against arguments in favor of closing a planetarium! I daresay that everyone needs a planetarium, whether he/she knows it or not. Beyond what we actually teach or present, our jobs involve—and may depend on—effectively showing people why they do need one.

Of course, we can't "sell" other people the planetarium experience unless we have first "sold" ourselves. Especially during spring field trip season, we can all too easily get caught up in the grind of cranking out shows and maintaining equipment, forgetting perhaps why we entered the planetarium field in the first place. Fortunately, we sometimes experience "epiphanies" that recapture our "beginner's minds" and remind us why we continue to do what we do. To explore those epiphanies, let us consider the following question:

What do you recall as one of your most moving or poignant encounters under or outside of the dome—one that rekindled your initial enthusiasm for planetarium work? How did you feel then and how do you feel now recalling it?

For your response to receive consideration for inclusion, I must receive it no later than July 15. I would also appreciate your including your full address in case anyone wishes to comment on your response "off list."

Happy solstice—whichever one you celebrate!

★

Planetarium Directors

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Copyright Infringement

I began last quarter's column with a brief discussion about the recording industry's lawsuit against an Arizona man for "ripping" legally purchased CDs to his hard drive and subsequently making the digital files available via a "shared folder." The suit is just one in a long series of litigation recently brought by the industry in an effort to curb the widespread copyright infringement that has plagued the commercial recording industry for a number of years.

Although the recent spate of record industry litigation has garnered much attention, the industry's standard enforcement practices are far more ubiquitous and decidedly low-key: threats and warnings promising financial and criminal penalties for unlawful duplication or performance. While this sort of warning was once limited to the familiar "FBI Warning" that appears at the beginning of most commercial videos, it seems like today anyone who claims a copyright interest in something accompanies their copyright

claim with threats of significant monetary penalties and decades in prison for infringement.

Just the other day I ran across a professional photographer's web site that threatened a \$2,500 "fine" for any "unauthorized use" of his images. Of course, there are several ways one might use copyrighted work that are not expressly authorized by the copyright owner, but are, nevertheless, lawful. Indeed, the fair use provisions of the Copyright Act allow certain, limited use of copyrighted material without prior permission of the owner. Similarly, the TEACH Act allows public performance or display of copyrighted material under certain circumstances. (Both are discussed in earlier columns). Moreover, private parties, copyright owners or otherwise, lack the necessary legal authority to unilaterally assess "fines" against alleged wrongdoers; the assessment of such monetary damages must be made by a court of competent jurisdiction.

So, what are the consequences of infringing upon someone's copyright? Or, from a copyright owner's perspective: what are the remedies available from an infringer? As usual, the answer lies in the Copyright Act.

A quick word of caution: this column, as with most of my writing, relies wholly on U.S. law. International laws vary widely with respect to infringement remedies, so be aware that your home country's laws may differ significantly. No matter what country you live in, it's important to talk to a qualified attorney for guidance on copyright issues, or any other legal matters.

Criminal versus Civil Liability

As an initial matter, it is important to note that the Copyright Act provides for both civil and criminal penalties for copyright infringement. Criminal infringement occurs, generally, when one willfully infringes a copyright "for purposes of commercial advantage or private financial gain" or when one makes or distributes unlawful copies of copyrighted works with a retail value of more than \$1,000.

General Counsel is intended to serve as a source of general information on legal issues of interest to the planetarium community. Planetarians 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.

Sentences can include prison terms of up to 10 years and fines of \$1 million, but the Federal Sentencing Guidelines give judges some leeway in crafting an appropriate sentence, particularly if an offender does not have a prior criminal record. For example, a man was recently sentenced by a judge in the Eastern District of Virginia to six months of home confinement (commonly referred to colloquially as "house arrest") for ripping unreleased CDs (made available only to radio stations and DJs) and uploading the content to various Internet servers for global distribution.

In addition to incarceration and fines, criminal copyright convictions also typically re-



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sult in the forfeiture of the infringing items, which are destroyed, and any revenues generated as a result of the infringement.

Like all federal criminal charges, criminal infringement actions are brought by the U.S. Attorney of a particular jurisdiction; they cannot be brought by individuals, though such charges generally start with a complaint or tip from a copyright owner. Criminal infringement charges are typically directed at widespread, commercial conduct, like the selling of bootlegged recordings or videos.

Civil Remedies

Far more common than criminal charges are civil lawsuits brought by one private party against another, seeking money damages and injunctive relief against the alleged infringer. As a general rule, a copyright owner who prevails on an infringement claim is entitled to receive the actual losses attributable to the infringement along with any profits generated by the infringer that aren't included in the "actual losses" calculation.

In cases where a copyright has been registered with the Copyright Office prior to the

alleged infringement or within three months of publication, a copyright owner may elect to receive "statutory damages" which are defined by the Copyright Act and have no relation to the actual damages or lost profits attributable to the infringement.

A statutory damage award can range from \$750 to \$30,000, or, if the copyright owner is able to show that the infringement was willful, up to \$150,000. The commercial recording and movie industries quote this latter number frequently as an absolute penalty for copyright infringement. Conspicuously omitted from their threats, however, is the statutory language that immediately follows the willful infringement provision, providing for a reduction in statutory damages (to no less than \$200) if the defendant can demonstrate that it was unaware that its acts constituted infringement.

So, to sum up the relatively complex copyright damages landscape: as a general rule a copyright owner can recover the actual losses attributable to an infringement of his or her work. If the work is properly registered, a copyright owner can recover between \$200 and \$150,000, depending on the relevant circumstances of the infringement.

In addition to money damages, the court can award the winner with litigation costs and attorney's fees, to be paid by the oppo-

nent. The court can also enjoin (stop) the infringer from continuing to engage in the infringing acts, and order the destruction of any infringing articles that may still exist.

Liquidated Damages

Recall that earlier I mentioned that private parties do not have the right or lawful ability to unilaterally assess "fines" against others. There is one small caveat that is worth mentioning, as it has the potential to appear in the context of content license agreements.

Parties to an agreement may, in some circumstances, stipulate the consequences of breach ahead of time. These provisions, typically called "liquidated damages clauses," are common in contracts where the actual damages incurred by a breach may be difficult or costly to calculate. A typical cell phone contract, for example, often provides for an "early termination" fee, a set fee that the service provider charges in the event a subscriber cancels the contract before the end of its defined term (usually one or two years).

One could conceive of a copyright license, such as a performance license for a planetarium show, that might include a liquidated damages clause in the event that the licensee exceeds the scope of license (consider a licensor includes a liquidated damages clause in its show license that provides for a \$50 charge ev-

ery time an image from the show is used outside the context of the full show presentation).

The point of this protracted explanation is to illustrate that although a copyright owner cannot unilaterally "fine" an alleged infringer, two contracting parties, through their agreement, can provide for liquidated damages that has the ultimate effect of a fine. But the catch is that the parties have agreed to the arrangement in a contract. Absent such an agreement, a copyright owner making an infringement claim must seek redress through the courts.

A Brief Digression: Cell Phone Jamming

On an unrelated, but very relevant note, there has been a fair amount of Dome-L traffic lately regarding the use of cell phone "jammers" that prevent the reception of cell phone signals in certain areas. While the technology is not particularly new, it had, until recently, been limited to government and military use, typically as a method to prevent remote detonation of explosive devices. Apparently a number of governments have legalized jamming equipment for use by private parties, such as movie theaters, restaurants, libraries, and other places where patrons may value an environment free from interruption.

Although the jamming devices are available through a variety of online sources, in the United States, their use remains illegal. A 2005 public notice issued by the Federal Communications Commission explains that intentional interference with licensed radio communications, such as cell phone transmissions, is a violation of the Commissions' regulations and applicable federal statutes.

Passive jamming - that is, constructing a facility in such a way that prevents or hinders cellular transmissions - may be a lawful alternative to using affirmative jamming technology. Indeed, many commercial buildings already enjoy (or, depending on your perspective, are plagued by) this "feature," as the concrete and steel construction often inhibits cellular reception. ☆

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From left, Row 1: Agnès Acker, Bart Benjamin, Martin Bush, Ignacio Castro
 Row 2: Gail Chaid, Alexander Cherman, Kevin Conod, Alex Delivorias
 Row 3: Jack Dunn, John Hare, Erik Koelemeyer, Nataliya Kovalenko, Tom Mason
 Row 4: Andre Milis, Dan Neafus, Donna Pierce
 Row 5: Loris Ramponi, Gerd Thiel

International News Celebrates a Jubilee

My first column was in the Planetarian was March, 1996, when I took over the Regional Roundup column from Steven Mitch. My very first column included contributions from 9 out the then 18 affiliate associations, covering 3.3 pages of that issue.

During the remainder of the Viking age (the second millennium), the number of affiliate reports varied between 4 and 13, and the number of pages between 1.6 and 5.4 - quite a variation. In the beginning, contributions came as letters, faxes, and email, but rather soon came only by email, which simplified my editing a lot.

Since I felt that the IPS affiliate associations were international rather than regional, I suggested to Planetarian chief editor John Mosley that the column should be re-named International News. He agreed, so this became the name of the column starting with June 1998. That was then the only change; the columns still were just text, three columns per page.

In the new millennium, the number of contributions steadily grew, from around 10 contributions per issue in the beginning to over 12 this past year. This reflects the growth of IPS to 23 affiliate associations; the average number of contributions has been quite stable at 50%.

The very first illustration, a drawing of the Hansen Planetarium Gateway project, appeared in International News in September 2001. The next column had two illustrations, both in black-and-white: a map showing the planetariums in France and a photo of Bradenton's Bishop Planetarium after the fire. The amount of illustrations has steadily grown since then, and the first color photos appeared in number September 2002. Then, from March 2003, the Planetarian is all-color, and so are the photos in International News.

For most of the time, Mosley was my executive editor, and he had firm rules: never a manuscript after his deadline date and never additions after I had submitted my manuscript. I never complain about this at all: It is after all easier to perform a task if the rules are clear.

Thus, when Sharon Shanks took over as editor, I was well trained and

have continued sending my material in time (but rarely before deadline date). Shanks is also freer in where to put the illustrations in the column—not always at the same page as where the corresponding text appears, which makes them more evenly spread over the column.

Over the years, I have had as many as 60 contributors, some contributing near to or more than 40 times. The list contains many well-known planetarians, so it almost looks like a Planetarium Who's Who:

Agnès Acker (15), Karl von Ahnen (1), Steve Balog (2), Vadim Belov (3), Bart Benjamin (42), Martin Bush (2), Tony Butterfield (8), Ignacio Castro (36), Gail Chaid (20), Pierre Chastenay (2), Alexandre Cherman (3), Tom Clarke (5), Undine Concannon (7), Kevin Conod (14), Laura Deines (1), Alex Delivorias (14), John Dickenson (17), Jack Dunn (9), Alan Dyer (3), and Jon Elvert (19).

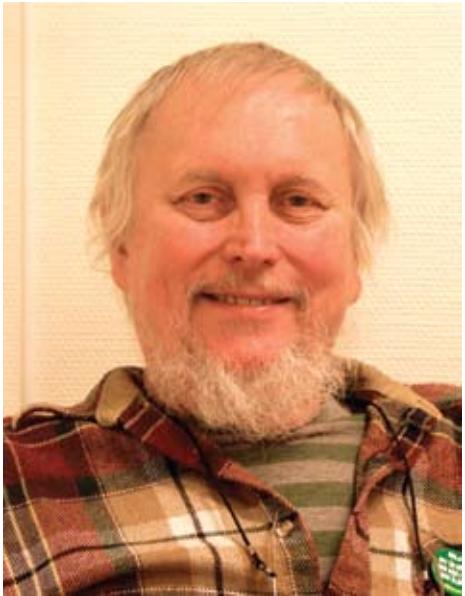
Paul England (2), Jean-Michel Faidit (23), Martin George (1), Subramanian Gopinath (3), Teresa Grafton (11), Nicolás Gulino (1), Andreas Hänel (8), John Hare (39), Dieter Herrmann (1), Michel Hommel (4), Shoichi Ito (14), Chris Janssen (3), Don Knapp (1), Erik Koelemeyer (3), Nataliya Kovalenko (2), Thomas Kraupe (1), Uwe Lemmer (1), Tom Mason (8), Jim Manning (1), and Aaron McEuen (5).

André Milis (9), Glenn Moore (1), Marc Moutin (3), Mike Murray (1), Dan Neafus (1), Donna Pierce (19), Loris Ramponi (45), James Rusk (1), Alexander Serber (1), Mark Sonntag (2), Fred Stutz (2), Mickey Schmidt (2), Christine Shupla (10), Zinaida Sitkova (14), Gerd Thiele (2), Eduard Thomas (5), Erich Uebelacher (1), Wolfgang Wacker (1), Scott Young (2), and Jennie Zeiher (5).

I am much obliged to all of you, since without your work year after year, there wouldn't have been any International News. You have also helped me to make this 50th jubilee column larger than ever with reports from 20 affiliate associations. Encouraged, I will continue editing the column in coming issues, but I won't try to reach 100. Anyway, I plan to meet new readers already in Planetarian September 2008!

Lars Broman

International News



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This is the 50th column that I have edited, and I am happy to announce that a record 20 affiliations are presenting planetarium news from their part of the world. It is a great favor to read and edit the news from dedicated planetarians from all over the globe—it really keeps me updated on what is going on. I just hope that something of this is conveyed to the readers of the *Planetarian*. I won't promise to do another 50 columns, but I'll hang on for a while!

Presently such large changes are going on in the planetarium field so it almost could be called a paradigm shift. During the last two weeks I have had the opportunity to first visit the Mediendome in Kiel for the German Planetarium Conference and then the planetarium at Heureka outside Helsinki, Finland. The German experience started with an evening trip to Hamburg Planetarium, which I have visited once before in 1977, watching a very nice and very classical planetarium program narrated live by Erich Uebelacher, using a Zeiss-6 opto-mechanical projector. I was treated to a digital sky featuring *Cosmic Collisions* in German with its amazing animations. At Heureka, which I have visited close to a dozen times since 1987 (when it was under construction), the old system (opto-mechanical Zeiss Univer-

sarium + hemispheric movie) has just recently been replaced by a digital sky, and I enjoyed *Cosmic Collisions* in Finnish.

While fulldome video certainly gives a planetarian the possibility to run exciting live shows, it instead seems like a repetition of history. Back in the early nineties, I saw *The Dream is Alive* so many times in planetariums with fulldome cinema. What my brother Per, Snævarr Guðmundsson and others do live with a fisheye lens video, appropriate computer program, and knowledge and enthusiasm under a 5-m dome is a really good show, and I would certainly love to see something like that under a 20-m dome.

The International News column continues to be dependent on contributions from IPS Affiliate Associations all over the world. This time, my thanks go to Agnès Acker, Bart Benjamin, Martin Bush, Ignacio Castro, Gail Chaid, Alexandre Cherman, Kevin Conod, Alex Delivorias, Jack Dunn, John Hare, Erik Koelemeyer, Nataliya Kovalenko, Tom Mason, André Milis, Dan Neafus, Donna Pierce, Loris Rampponi, Alexander Serber, and Gerd Thiele for your contributions, and I wish both you and others back for more international news. Upcoming deadlines for contributions are 1 July for *Planetarian* September 2008 and 1 October for December 2008.

Association of Brazilian Planetariums

New shows abound in Brazil! The Rio de Janeiro Planetarium opened two new planetarium shows. Authored by Fernando Viei-

ra, astronomer at the RJ Planetarium and former ABP president. *Unveiling the Solar System* is a documentary aimed to the 5th grade and up. Its main topic is the "new" solar system, with its eight planets and the new dwarf planets. The second show to open, written by Fernando as well, is a kid's show called *The Magic Window*, and tells the story of the Hubble Space Telescope.

The Campinas Planetarium, which opened in 1987 and has a 60-seat dome with a Zeiss ZKP2 projector, is now showing its own production, authored by the astronomer Romildo Faria, titled *Journey to the Giant Planets*. The Campinas Planetarium, in its 21 years of existence, has been visited by over half a million people, approximately half of the population of Campinas itself!

The Indigenous Planetarium, a mobile planetarium managed by the archaeoastronomer Germano Afonso, is offering a special presentation, *The Sky of Japan*. The year 2008 is the celebration of the 100th anniversary of Japanese immigration to Brazil.

Association of Dutch-Speaking Planetariums

As a planetarium you are always searching how to reach the schools and, more especially, the teachers with your educational offerings. For years the Planetarium of Brussels did this by organising workshops on a Wednesday afternoon (a time when schools are out in Belgium) so the teachers could come. This went well till last year, when they had to cancel the workshop because only five reservations were received (instead of the 50 of earlier years)!

So it was time to invent a new concept: the open door day for teachers and their families.

Here in Belgium the teachers have a full



Open door day for teachers and families at Brussels Planetarium. Courtesy of Brussels Planetarium.



The RSA planetarium and Albert Planetarium's dome in the chapel of the Ecole et collège privés catholiques in La Brède, near Bordeaux. Photo by Michel Favret.

agenda with their job. In addition to preparing and giving lessons, they also need to refresh their knowledge by following workshops, visiting exhibitions and so on. There's not much free time left to spend with their families. Keeping this in mind, the planetarium staff elaborated the concept to present the workshop on a Saturday and to make a double program: one for the teachers and one for their children.

While the parents are following the explanation on our educational offerings for schools, the children can amuse themselves with different workshops. The workshops are—of course—all in the theme of science. Some examples: making windmills with plastic bottles and making sure that they turn in the wind. The telescope: how does it work? How do magnets work and who can make the longest row of paperclips?

On 26 January, this open day was organized for the French-speaking schools of Belgium and we welcomed 154 persons, 88 adults and 66 children. This is certainly a good concept for following years. The event was organized in collaboration with ESERO, a project from ESA and the planetarium to establish a direct link between ESA and the educational community of Belgium. More info on ESERO, see www.esa.int/esero and www.planetarium.be/esero, or contact André Milis at andre.milis@planetarium.be.

Association of French-Speaking Planetariums

The 24th APLF Conference was hosted from 8 to 11 May 2008 in Epinal (located inside the beautiful Vosges mountains), thanks Didier Mathieu, planetarium.epinal@wanadoo.fr.

The International Year of Astronomy 2009 has been in active preparation in France since March 2007. Agnès Acker is a member of the national committee of the "Année Mondiale de l'Astronomie" (AMA09, see www.astronomy2009.fr) and represents planetariums in particular. About 150 projects were submitted, coming from associations, planetariums, observatories, and universities, and more than 100 received the label AMA09 for their rich content: installation of new planetariums in empty regions, exhibitions, books, theatrical presentations around Galilee, Copernicus, Newton, or symphonic concert on the cosmos.

The French Planetariums (via APLF) will produce, in strong collaboration with the European Organisation for Astronomical Research in the Southern Hemisphere (ESO), a special show titled *The Quest of our Cosmic Origins*, devoted to the international project ALMA (the Atacama Large Millimeter Array). It will be produced for fulldome video and classic theaters in six languages.

Increasing educational activities are being developed using portable planetariums. Since fall 2007, Michel Favret presents animations in the large region around Bordeaux, for schools and family public, inside schools or municipal rooms, or in other more exotic ones, such as a chapel! He alternates planetarium demonstrations and lectures on the fundamental questions - earth motions, night/day and seasons, scales in the solar system - with illustrations using a mini-video projector and the software Celestia. For more, see www.constellationsetgalaxies.org/planet2.html.

An important question that APLF members are discussing came as a result of the improved APLF website with an updated list of planetariums. The webmasters were confronted with the question "what is a planetarium?" The instrument itself can be opto-mechanic, digital, or a dome with LEDs making a starry night, which also is OK. But the shows proposed by planetariums cover a very large range, from creationists telling untruths to some casinos showing entertainment via a planetarium, a bar in Japan, and the "futuroscope" in Poitiers, France. What is the good definition of a planetarium? What kind of sites can be included in a serious list of planetariums? The APLF Council proposed to exclude all planetariums without any astronomical content in their presentations (e.g. the casino planetarium shown on the image).

Association of Italian Planetaria

The revisited list of Italian planetariums (more than 130 facilities) is ready on the web

site www.planetaritaliani.it. The updated list is one of the first goals of the new national organization called Planit, the Association of Italian Planetaria. In fact, after the long service of the Italian Planetaria's Friends Association (1986-2007), the new organization has been officially presented during its first meeting on 6 April 2008 in the planetarium of Modena.

The new list of Italian planetariums confirms that many facilities are in schools and therefore are open mainly for students. Thirteen school planetariums are installed under a dome of 6 m in diameter or more. The occasion of the Day of Planetaria offers the opportunity also for the school planetariums to open to the public at least one day in the year.

Three of the medium-sized Italian planetariums are situated inside a building managed by a church: Amelia (Terni), Bedonia (Parma) and Crespano del Grappa (Treviso). The list that follows on the web site contains the main Italian planetariums in alphabetic order.

The first Spitz planetarium will be open in the small city of Brembate di Sopra, close to Bergamo. In the city of Ferrara (near the Adriatic Sea) there is the main mobile planetarium, but another in the north of Italy will start activities soon. In Florence, the city of Galileo Galilei, the Astronomical Observatory of Arcetri and the Science-Technique Foundation manages an 8-m Zeiss planetarium.

In Lecco, the planetarium is installed inside the local museum of Belgioioso palace, an historical place. Also, the Livorno Planetarium is inside a museum devoted to natural sciences. Milan, the biggest dome in Italy, is also close to a natural science museum (gardens of Viale Venezia). Last October the Hoepli Planetarium hosted the last meeting of Italian Planetarium Friends' Association. Near Venice, in the small city of Mira, a private organization runs a planetarium in collaboration with the municipality. The planetarium of Modena is close to a high school and the building includes also a solar tower. The main Italian science center, the City of Science in Naples, has also one of the most active planetariums in the country.

Ravenna, near the Adriatic Sea, is one of the first planetariums managed by a municipality. Reggio Calabria, Planetarium Pythagoras, is the main facility in the south. Also in a small village, Roccapalumba, near Palermo, there is a planetarium managed by the municipality that includes also a small observatory. The same model is in activity also in the geological museum of Rocca di Cave, near Rome. In the Museum of Roman Civilization, the public can follow the activities of the Rome Planetarium that includes also an astronomical exhibition with an old Zeiss II model from 1928. The Rovigo Planetarium is managed by the local group of amateur astronomers. In the city

is also an astronomical observatory open to the general public.

Other planetariums connected with museums are the Museum of Balì, a science center in the area of Pesaro and Urbino; the San Giovanni Persiceto Planetarium, that includes an important collection of meteorites; and the new Apriccielo (open the sky) Planetarium in Turin (Digistar 3 Model), managed by the Observatory of Pino Torinese. The public can reach the planetarium using a cableway. Also on Venice Lido there is a planetarium, built and managed by the local group of amateur astronomers.

Association of Mexican Planetariums

Ignacio Castro remembers when he first started collaborating in the International News Column in December 1988 as AMPAC representative, thanks to the encouragement of Gabriel Muñoz, AMPAC-IPS Fellow, now deceased. At that time there were only 12 IPS Affiliated Associations and Steven Mitch edited International News. Nowadays there are 23 Affiliated Associations, quite an improvement, and through International News we are able to let other planetarians know about the events taking place at our respective associations.

Regarding AMPAC news, the 20 February total lunar eclipse was profusely announced amongst AMPAC participating planetariums, thanks to the collaboration of their respective local astronomy associations who provided telescopes at the planetarium facilities for attending public use.

The José Martínez Rocha Planetarium in Magdalena de Kino, Sonora, will soon re-establish operational activities with the help of local municipal and educational authorities. This planetarium is part of the Constellation program originally fostered by the University of Sonora and by Antonio Sanchez, former AMPAC president.

Australasian Planetarium Society

Overall, 2008 has been a good year for Australasian planetariums. A new planetarium has opened in New Zealand. Set in the national park at Mt Cook, New Zealand's tallest mountain, the Sir Edmund Hillary Alpine Centre Planetarium presents astronomy in a truly stunning natural setting. On New Zealand's north island, the Stardome Observatory has upgraded its planetarium to a fulldome facility. The new theatre has reopened and Stardome are now undertaking a renovation to their other buildings.

Unfortunately, these openings have been offset by the closure of the Canberra Space Dome, based in the Australia's national capital. This planetarium had been under a cloud for some time due to its tenancy situation,

and was finally forced to close its doors in January. It is hoped that a new planetarium may be able to be established in a more permanent facility.

Both in New Zealand and Australia, planetariums are looking forward to the regional APS meeting in May, hosted by the Horizon Planetarium in Perth. This annual meeting is of special significance to a community dispersed across an area the size of the continental USA.

enthusiasts of today are the researchers of tomorrow. INTECH's planetarium is a great development for the area and for the UK. There is evidence that at least some decision makers are aware of the power of the planetarium to fire youngsters' imaginations.

Armagh Planetarium is celebrating its 40th anniversary this year and the season of events was started by a weekend function on 7-8 March. The Mayor of Armagh formally opened the event, which was attended by



INTECH showing *Black Holes: The Other Side of Infinity*, courtesy Denver Museum of Nature & Science

British Association of Planetariums

Planetariums in the UK continue to expand. The famous fantasy/science fiction author Terry Pratchett attended the opening of the newest UK facility on 21 March in the historic town of Winchester in Hampshire, 100 km (70 miles) southwest of the center of London. The project was funded by a £650,000 grant from the southeast England Development Agency in 2007. This latest UK planetarium comprises a 176-seat theatre at Winchester's INETECH Science Centre and is powered by a six-projector system installed by the UK company Global Immersion, previously part of SEOS.

INETECH's Planetarium Director Phil Winfield commented that Winchester offered something really special—enabling visitors to see fully rendered planets and galaxies. He also mentioned that Terry Pratchett had said that he had been inspired by planetarium visits when he had been a boy and that was exactly what INETECH wanted to do: to inspire young people to take up careers in science. Astronomical personality Sir Patrick Moore endorsed this view, saying that the young

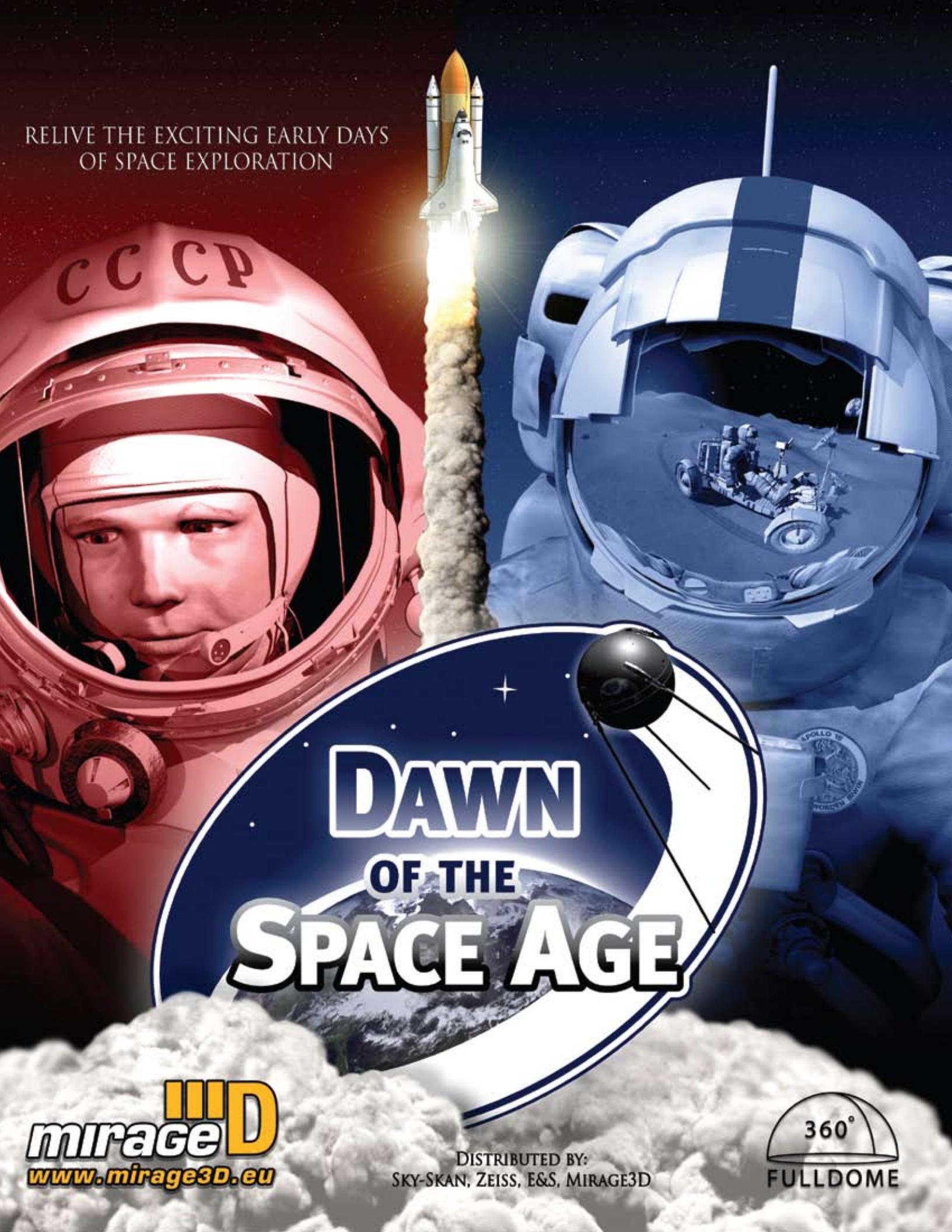
numerous people from the local government agencies that had helped fund and maintain the planetarium.

Saturday was devoted to a more formal astronomical occasion, with the local amateur astronomy community and the Friends of the Armagh Planetarium invited to participate. Official guests included Professor Carl Murray of Queen Mary College, University College London, who has worked on the Cassini-Huygens probe since its inception. He showed some fabulous images of the Saturnian ring system and its many moons, and the dynamic perturbations of the rings.

Former Armagh Planetarium Director Terence Murtagh, now at Evans & Sutherland of Salt Lake City, showed historic images of his past career at Armagh, including TV footage of a younger, brasher Murtagh drumming up support for more visitors to come and see for themselves the glory of the heavens.

Lastly, Dr. Mike McKay provided a humorous synopsis of his personal part in the great Irish space race, which was narrowly pipped to the post by the United States! McKay is flight controller at the European Space Agency.

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cy's ESOC facility at Darmstadt in Germany. Armagh's Theatre Manager Julie Thompson used their D3 to present the first cut of a new collaborative show jointly produced by Armagh Planetarium, the ESA, GOTO and E&S, called *Invaders of Mars*. The final version of the show will be available from mid-year 2008, at the Chicago IPS Conference.

They also took the opportunity to open a new display which built on the history of Armagh. This honored several people who had been stalwarts in their support for the planetarium and the development of astronomy education in Ireland and further afield. Terence Murtagh and Mike McKay, already mentioned, were added to the display. They shared the wall space with long-serving Management Committee personality and well-known local university teacher and astrophysicist Fred Byrne. All were added to Armagh Planetarium's stars exhibit.

The next meeting of the British Association of Planetaria was held at the Centre for Life at Newcastle in northeast England over the weekend of 9-10 May.

Canadian Association of Science Centres

At the H.R. MacMillan Space Centre in Vancouver, production work is gearing up for a new planetarium show on Chinese astronomy. Research will begin this summer on the long history of Chinese astronomy that dates back to the 6th century BC.

With its focus on constellations and observations of "guest stars," such as the 1054 supernova, as well as Chinese observatories and observational techniques, Chinese astronomy remains relevant today due to its long record of observations that predate the observations of western astronomy. The research and script writing for the program, as well as the music and art work for the show, will be conducted by local artisans with cultural ties to China.

Working with panorama and all-sky location photography that has been accumulated from two previous trips to China, the aim is to include as many local artisans as possible, creating a project on both the history of Chinese astronomy as well as providing relevant content that reflects the contemporary views of local cultural interests. More information is available from Erik Koelemeyer at ekoelemeyer@hrmacmillanspacecentre.ca.

Since the announcement made last December that the Montreal Planetarium will be re-located in a new building with state-of-the-



Four Canadian planetarians having a good time in Edmonton last summer. Standing from left to right: Pierre Chastenay (Montreal), Alan Dyer (Calgary), Erik Koelemeyer (Vancouver) and Scott Young (Winnipeg). Musician and composer Donovan Reimer is sitting at the piano. Photo by Pierre Lacombe.

art fulldome digital equipment, staff has been busy planning the numerous and important stages that the project will have to go through to ensure a grand opening late in 2010 or early in 2011. There are still a few things that need to be decided that will impact on the exact opening date.

Right now, the staff is discussing fulldome technology and will contact several other planetariums in North America and Europe to inquire about their experience working with the latest equipment. Is it stable and robust as everyone wished it was? How easy and intuitive is the software used to produce shows? What is the cost of maintenance in terms of human and financial resources? At the same time, a complete functional plan for the new building is being developed to allow architects and engineers to work their stuff. The year 2008 will indeed be a busy one for the Montreal Planetarium staff! Contact and information: Pierre Chastenay at chastenay@astro.umontreal.ca.

Council of German Planetariums

The study group of German-speaking planetariums met in Kiel 5-7 April. More than 100 representatives from the planetariums in which programs are performed in German gathered. Such a meeting takes place every year. Kiel, with its media cathedral in the advanced technical college, is a forerunner in the area of the digital fulldome projection. Students experiment here under instructions of lecturers with the new medium. Interesting art projects have already originated.

However, employees in conventional planetariums also have the opportunity to exchange and to find out new information. To-

gether with the European Space Agency, many planetariums are integrated into a project that features the Herschel/Planck mission for the International Year of Astronomy in 2009. A study group will be working for one year with the project. Next year, many citizens should be able to enjoy astronomy from Galileo's simple lens telescope up to the modern space telescope Herschel in a planetarium program.

The IYA also brings together in Germany many people who have a passion for astronomy. In the meantime, beside a central coordination node, there are many regional approach points in which scientific institutes, observatories, planetariums, and amateur astronomers are coordinating their activities.

European/Mediterranean Planetarium Association

The Eugenides Planetarium in Athens, in its continuing efforts to remain in the ivy league of planetariums worldwide in terms of projection, software and hardware capabilities, is currently thoroughly investigating different fulldome 3D projection systems and technologies for a projection system upgrade that has been scheduled for the summer of 2009. This follows on an earlier upgrade that took place last summer, which included an upgrade of its Sky-Skan digital equipment and the installation of new computers in order to run the latest versions of DigitalSky 2 and Digital Universe software.

The Eugenides Planetarium is currently working on the production of a shorter version of its latest show, *The Christmas Star*, which will be available this summer for leasing by other planetariums, and is also preparing its brand new show and guide-book, scheduled to premiere next autumn, *Wonders of the World*.

Great Lakes Planetarium Association

Illinois. Brock Schroeder has stepped down as planetarium director at the Strickler Planetarium in Bourbonnais, Illinois. His replacement is Steve Case, formerly of Flint, Michigan. The Lakeview Museum of Arts and Sciences in Peoria premiered its Zeiss Powerdome Planetarium System on 26 January. The museum has founded a new Museum Education Ambassadors group comprised of representatives (ambassadors) from 60 area schools.

The William M. Staerkel Planetarium at Parkland College in Champaign hosted its

"First (and Last) 35mm Film Festival" this spring, showing all of its C-360 films one last time to the general public. Staerkel also hosted three Girl Scout Sky Search workshops, two Boy Scout astronomy workshops, and a "Rock-It Into Space!" children's event.

The Cernan Earth and Space Center of Triton College in River Grove enjoyed clear skies for its public observing of the total lunar eclipse. At its March monthly Skywatch program, the Cernan Center debuted a new permanent display dedicated to John Jones, who served the Cernan Center for many years as a lecturer, telescope operator, and mythology expert before his death in 2006.

Indiana. The Notre Dame Digital Video Theater has a new director, Keith Davis. The Challenger Learning Center of Northwest Indiana in Hammond has a new executive director, Amanda Maynard. Last year, the Challenger Learning Center lost its founder and director, Lisa Austgen, to leukemia. The Kennedy Planetarium in South Bend has become involved in a collaboration with YMCA Camp Eberhart to initiate a contest for scholarships to Astro Camp. The Kennedy also recently co-hosted Celebration of the Moon for the recent lunar eclipse.

P-H-M Planetarium Air & Space Museum is actively involved in dark sky issues, specifically a planetarium DVD and teacher packet titled *Let There Be Night*. This program will be divided into several chapters that cover all aspects of light pollution. The Ball State University Planetarium and Observatory, which recently marked its 40th anniversary, has joined the Southeastern Association for Research in Astronomy, a 10-university consortium that operates a 36-inch telescope at Kitt Peak National Observatory.

B.J. Harper, retired director of the Northrop Planetarium, Fort Wayne Public Schools, recently taught five weeks of archeoastronomy, combining her travels to astronomy places in the US, Egypt, Iceland, and Great Britain. The E.C. Schouweiler Memorial Planetarium recently celebrated the installation of a 12-projector automated dissolve pan system.

Michigan. The Cranbrook Planetarium continues co-production on the fulldome/classical planetarium program *Bad Astronomy: Myths and Misconceptions* and welcomed Dr. Phil Plait of *Bad Astronomy* fame for a lecture in May. On 10 May, the Dassault Systèmes Planetarium also premiered *Bad Astronomy*, as well as opened its new Rocket Garden exhibit next to the planetarium.

The Shiras Planetarium is working on a fulldome digital conversion of the *Icy Worlds* show produced by the Science Museum of Virginia. The staff has also been doing some outreach programs through the local astronomy club utilizing the NASA Night Sky Network toolkits. The Kingman Museum Plane-

tarium was struck by lightning on January 7, damaging the UPS for their Digistar 1. In January, the Roger B. Chaffee Planetarium premiered *Everybody's Sky: Star Stories Around the World*, which covers the theme of immigration to America and our ethnic heritage.

Ohio. Midpark High School Planetarium was recently upgraded, which included a refurbished East Coast Controls control panel, two projectors, a DVD player, and a computer controller.

The University of Toledo's Ritter Planetarium recently installed a new high-end LCD video projector to their theater and a 42-inch LCD monitor connected to NASA's *ViewSpace* to their lobby. This summer, a new program titled *Arctic Adventures* will debut.

Marietta College is building a new planetarium, the first in far southeast Ohio. The new Anderson-Hancock Planetarium will feature an opto-mechanical star projector and full-dome video in its 88-seat, 12.2-m dome. Dr. Ann Bragg, currently an instructor at Bowling Green State University, will be its first director.

Roy Kaelin reports that the Shafran Planetarium at the Cleveland Museum of Natural History is considering a major upgrade to its current video projection system. On Astronomy Day, Shafran offered special sky shows for identifying night-sky wonders, hosted mirror-making demonstrations, and gave away telescopes as prizes. Dayton's Boonshoft Museum of Discovery also hosted events on Astronomy Day, including solar observing and interactive demonstrations. In the early evening hours they offered a live planetarium show set to music provided by local musicians.

At the Shaker Heights High School Planetarium, Gene Zajac has been going to elementary classes to design moon habitats as part of the moon design challenge from the STS-118 flight. The Bowling Green State University Planetarium celebrated leap year with a special showing of its classic production *It's About Time*. Dozens of BGSU students and public visitors turned out under clear skies to see the February 20 lunar eclipse.

Wisconsin/Minnesota. The Paulucci Space Theater in Hibbing, Minnesota has installed a new digital speaker system. Extensive renovations are being planned for Minnesota State University Moorhead Planetarium this summer, including new seats, a light-trap door, a new East Coast Control Systems' slide and video control system, and a new video projector. At Rochester's Mayo High School Planetarium, Larry Mascotti reports the installation of an Eluminati large format projector and the acquisition of a three-foot diameter Magic Planet video globe.

At the UW-LaCrosse Planetarium, Gordon Stewart is trying to get funding to purchase a fulldome video system and to upgrade their

A3P. The planetarium is introducing Saturday matinees.

The L.E. Phillips Planetarium at UW-Eau Claire has established a collaborative effort with the UW-Eau Claire Physics and Astronomy Department, the Hobbs Observatory and the Chippewa Valley Astronomical Society. These four entities sponsor Astronomy Day and support a monthly newspaper column on astronomy.

The Allen F. Blocher Planetarium in Stevens Point is presenting another local production, titled *Gods of the Solar System*, which was written by Amy Wilder. In greater Milwaukee, the February 20 lunar eclipse was a well-coordinated event between all four of that metro area's planetariums. The Daniel M. Soref Planetarium recently added new seats, a new two-projector SONY SRX system from E&S, and new cove lights from Bowen Technovation.

Great Plains Planetarium Association

After a cold and nasty winter, most of us are thawing out and eagerly appreciating the coming of spring on the plains. With spring comes the school groups. No matter what we do, they only seem to want to travel in spring, just in time for spring storms. Mueller Planetarium continues to run *Dawn of the Space Age* with its excellent depiction of spaceflight history. It seems there is another anniversary almost every day now. At the same time, since that show ends with a trip to Mars, it seems appropriate to observe the landing of Mars Phoenix. There should be another good group gathered at the planetarium to watch the coverage.

Jack Dunn has had success creating short fulldome movies at Mueller featuring the photography taken on orbit by Nebraska astronaut Clay Anderson and also a group of astrophotos taken by an old friend Richard Johnson (from his home observatory).

Jack Northrup at King Science Middle School now has a fulldome mirror system in operation. He is working with students to create some of their own content. Since there currently isn't a WAC conference scheduled in 2008, plans are to have another GPPA informal meeting of Nebrakans, Iowans and Kansans (if anyone is willing to travel). Hopefully, more of the small planetariums will want to participate. This is vital for their survival as communications and exchanging of ideas and techniques for operation on no budget - something that is a benefit to all.

Middle Atlantic Planetarium Society

The Schenectady Museum and Suits-Bueche Planetarium in Schenectady, New York was the host of the annual MAPS conference May 14-17. Located in the Capital District of New



Steven LJ Russo, planetarium manager, and Megan EN Dominguez, assistant planetarium manager, at the Suits-Bueche Planetarium, host of 2008 MAPS Conference. Photo provided by Steve Russo.

York State, just 20 minutes from Albany, the Suits-Bueche Planetarium contains a 9-m (30-ft) dome and a new GOTO Chronos star machine installed in October of 2006. An East Coast Control Systems automation system was installed in 2003 as part of an extensive renovation project, which included 21 new Kodak slide projectors, two new video projectors, automation of all of the existing projectors, a new sound system, new cove lighting, and two 42-inch plasma screens above the planetarium entrance.

The planetarium can now project all forms of media on the dome, including live NASA-TV, which can also be shown on the plasmas. The planetarium seats 60 people. The Schenectady Museum is devoted to science and technology and the development of technology. This past year, over 41,000 people visited the museum.



James Kaler

Two MAPS members have been in the news. James Kaler, professor emeritus of astronomy at the University of Illinois and frequent speaker at planetarium conferences, has been awarded the American Astronomical Society's 2008 Education Prize. The prize was given for significant contributions

to many aspects of astronomy education throughout his entire career; for his inspired teaching and mentorship of graduate and undergraduate students, many of whom have gone on to noteworthy careers in the field; for

books and articles for amateur astronomers as well as the general public.

Meanwhile, Noreen Grice, operations coordinator at the Boston Museum of Science's Hayden Planetarium, has published her latest book, *Touch the Invisible Sky*. The book was written with authors Simon Steel, an astronomer with the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts, and Doris Daou, an astronomer at NASA Headquarters, Washington. It brings majestic images taken by NASA's great observatories to the fingertips of the blind.

Touch the Invisible Sky is a 60-page book with color images of nebulae, stars, galaxies and some of the telescopes that captured the original pictures. Each image is embossed with lines, bumps, and other textures. The raised patterns translate colors, shapes, and other intricate details of the cosmic objects, allowing visually impaired people to experience them. For more information on the book and NASA's great observatories, visit hubblesite.org/newscenter/archive/releases/2008/05.

Nordic Planetarium Association

In the beginning of 2008, the Orion Planetarium (Jels, Denmark) acquired a new telescope for its observatory. The 9.75-inch Celestron schmidt-cassegrain telescope is placed in the observing tower next to the planetarium building and is open to the public all Wednesday nights throughout year and at special astronomical events. Given the relatively low level of light pollution in the rural setting, this is now one of best telescopes in Denmark open to the public on a regular basis. More information is available from Lars Pettersen, orion@au.dk.

Hannu Salmi, professor and research leader at Heureka, the Finnish Science Centre, reports

his wider contributions to introductory astronomy education through his textbooks and many engaging astronomy books; for maintaining a popular website with a wealth of useful material regularly consulted by astronomy teachers and students; and for his contributions to the public understanding of astronomy through his prodigious number of public lectures, his work with planetariums, television, and radio programs, and for his numerous

about COSMOS. This is a partly EU-funded project in seven European countries aiming to create a virtual experimental laboratory for students and teachers to improve science instruction at schools and universities. The idea is to offer real science results from researchers like those at the University of Liverpool's Observatory in Canary Island to on-line use for the students and teachers.

In Finland, the new planetarium at Heureka is used as the major tool for astronomy-related science education. The project is administered in close cooperation with the schools and the University of Helsinki, from which the teacher students are attending the integrative science learning pedagogical course taking place at Heureka's exhibitions and planetarium. More information can be found at www.ea.gr/ep/cosmos/ and from hannu.salmi@heureka.fi.

Vattenfall Planetarium is the new name of Verne Planetarium at Heureka Science Center outside Helsinki, named after its major new sponsor, Swedish Waterfall, Inc. On 26 December 2007, the planetarium re-opened after major technical changes.

The 19-year-old Zeiss Universarium projector has been retired and all previous auxiliary projectors (including the famous Prodome all-sky slide projector) have been thrown out. Instead, the digital 2-projector Sky-Skan DS2 has been installed together with an LED all-color cove light system. The premiere show was Hayden Planetarium's *Cosmic Collisions*, and late in April, *Infinity Express* was added to the repertoire. The system allows live shows with impressive animations, and plans are to start presenting also such programs before the end of the year.

Anne Bruvold, anne.bruvold@nordnorsk.vitensenter.no, reports that the Northern Lights Planetarium is coming back to life—and growing! Since 2003 the Northern Lights Planetarium in Tromsø, Norway, has been the home of Nordnorsk Vitensenter, the science centre of northern Norway. The science centre has been planning to "go digital" and buy an all-dome digital projector. A bit sooner than expected, they received funding for this and are in the process of evaluating tenders. The plans are to reopen as a planetarium for tourists by the summer of 2009, unless something causes problems.

What can cause such problems? Expanding the building! The planetarium is too small for a science centre, and on 11 April the science centre received funding for a new building in connection to the planetarium. Hopefully 2009 will be a year of expanding!

Finally, Ivar Reed Nakken of Jærmuseet, Vitenfabrikken, Sandnes, Norway, will host the next Nordic Planetarium Association Conference in September 2009. More information is available from ivar.nakken@mail.nu.



Top: Mika Paavola demonstrates the DS2 system in Heureka's 3-m dome, used for program development, for Lars Broman. Bottom: Paavola and Broman under the Vattenfall Planetarium dome, which is the original 19-year-old dark grey. Almost everything else is new, including carpeting and comfortable chairs. The south of the two DS2 projectors is seen near the horizon. Photos by Saily Puranen/Heureka.

Pacific Planetarium Association

The budget crisis in California has reached Independence Planetarium, San Jose, and the planetarium is being threatened with closure. In the East Side Union High School District, "teachers on special assignment," which are counselors, librarians and the planetarium director, are all on the list for lay offs. If that happens to Planetarium Director Gail Chaid, the planetarium will be shut down. Susan Button, IPS president, wrote a letter to express strong support of IPS members for keeping the planetarium open. Her letter and those of others can be seen on the Independence Planetarium website at ihplanet.org. (See also this issue's Forum on Page 44 - ed.) Check it often for updates about the progress of events as they unfold. Letters of support are always welcome. They can be sent to Gail Chaid, 1776 Educational Park Drive, San Jose, California 95133, USA or you can email directly to gchaid@gmail.com.

PPA members from the San Francisco Bay Area felt a need to meet more often than once a year at affiliate meetings, so the Bay Area

Domes (BAD) group was formed. It is an informal group of Bay Area astronomers, planetarium directors, and educators. The first gathering was at the College of San Mateo in 2007. In early March 2008, a smaller group of PPA members, Benjamin Mendelsohn, president, Alan Gould, Gail Chaid, and Karl Von Ahnen, gathered to begin planning the next gathering on 29 March at College of San Mateo. Dr. Darryl Stanford was host. Participants came from Santa Rosa, NASA-Ames in Mountain View, San Mateo, and Cupertino, California. They were able to see the new Digistar 3HD system. Bing Quock reports it looked terrific. To get on the e-list for invitations and reminders for the Bay Area Domes events, please contact Bing Quock at (1) 415-321 8186 or email him at bquock@calacademy.org.

The affiliate meeting for PPA will be at the IPS Conference in Chicago. There will be no other PPA meetings for 2008. The next PPA meeting will be in 2009 at the Western Alliance Conference of Planetariums. No official written invitation has been made for 2009 yet.

The 2010 IPS Conference in Alexandria, Egypt will be another opportunity for PPA to meet again. Presidents of SWAP, RMPA, GPPA, and PPA talked to vendors during the 2007 Alaska Western Alliance Conference and came to the conclusion that affiliate meetings should be held only on off-IPS Conference years. This concept will be discussed further in Chicago.

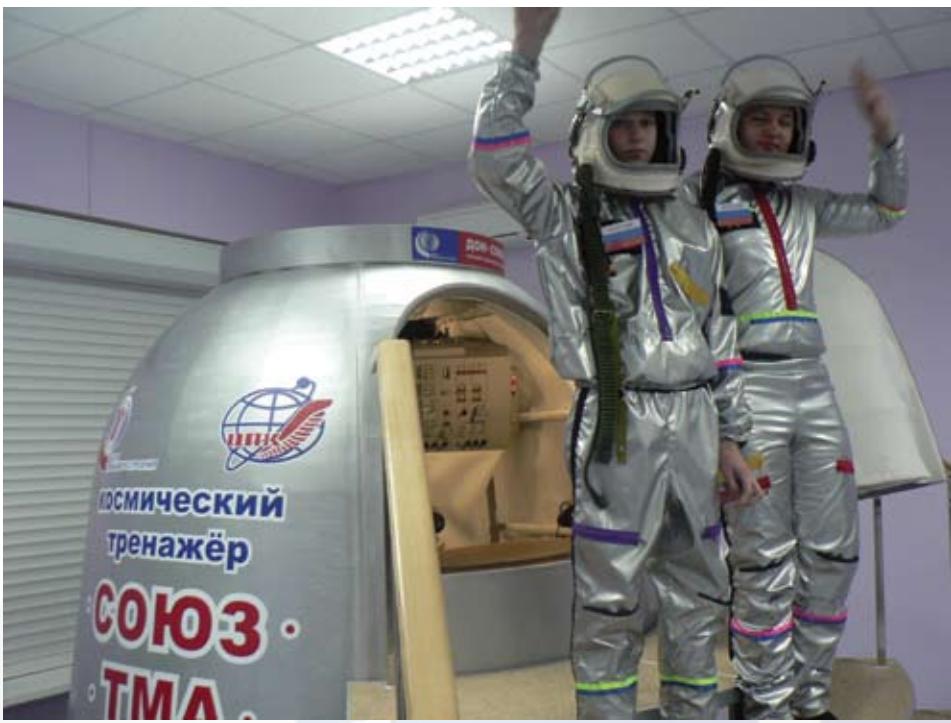
Gail Chaid, IPS representative for PPA, recently visited Griffith Observatory in Los Angeles, www.griffithobs.org, www.griffithobservatory.org/obshist.html and reports on a delightful experience. As the lights of the Samuel Oschin Planetarium dimmed, a young actress walked slowly down the aisle with an illuminated globe in her hand. As she approached the new and improved star projector, she spoke about the mythology and magic of the sky. Her introduction led seamlessly into the program about the history of astronomy. She appeared again throughout the program to bring us back to focus on the storytelling and enchantment of the night sky. To close the program, she appeared again with the illuminated globe and her voice and the drama of her storytelling left the audience with a wonder, imagination, and magic of the night sky.

Chaid said she felt this was one of the most beautiful presentations ever done in a planetarium. Only one other presentation has been close to this one, and it was also in the Griffith Planetarium with their old projector with the marshmallow stars. In both cases, it was the presenter that made the difference. As the audience filed out, Chaid approached the back console where the presenters were seated, thanked them and they told her about their presentations. The Griffith hires actors and actresses to present their programs. Not only do they work in the planetarium, but they also present short presentations outside in the museum and science center. It is with enthusiasm and friendliness they present the science of the exhibits. Everyone on the Griffith staff went out of their way to be helpful and friendly.

Chaid also visited the exhibits on all levels and saw the historical film about the recent rebuilding of the Griffith. Rebuilding was a monumental process; see www.griffithobservatory.org/obsrenovation.html. Most of the expanded space is now under the front lawn of the Griffith. The result keeps the original look to the Griffith with its crisp lines. The



Griffith Observatory after restoration. Photo by Gail Chaid.



Schoolboy crew before docking using the SOYUZ-TMA spacecraft simulator. Photo by V. V. Belov.

Leonard Nimoy Event Horizon Theatre represents the size of the sun and the planets and their relative sizes are represented in the hall outside the theatre; see www.griffithobservatory.org/bnimoy.html.

Griffith's director since 1974 is Dr. E.C. Krupp. He has guided the observatory through its long transformation and construction to the present beautiful state of being. The attendants were happy about this unique experience in science education. Everyone in the group came away smiling and feeling good about the visit and about the Griffith. It was a memorable day. Can't visit today? Go to a virtual tour at www.griffithobservatory.org/obs-virtualtours.html.

Rocky Mountain Planetarium Association

The Rocky Mountain Planetarium Association has a diverse and geographically isolated membership, spread throughout the western United States. Association members are looking forward to gathering in Chicago for IPS, to meet and share stories.

President Dan Neafus has been traveling quite a bit recently. The Western Alliance of Planetariums meeting took him to Fairbanks, Alaska to see glacier melting and Aurora Borealis. He was on the east coast for the Triple Conjunction, held last fall at Benedum Planetarium in Wheeling, West Virginia, with a stop in Pittsburgh to see the fulldome shows at the Buhl Planetarium. He was back on an airplane again, traveling with his adult daughter Kate, to attend the Immersive Vision Conference at Plymouth University in Great Britain. He also

took the opportunity to visit Stonehenge, the Royal Observatory at Greenwich and the new planetarium at INTECH.

The ability of digital planetarium to share content globally is an exciting trend and a great thrill to those of producing shows. Denver's *Black Holes: The Other Side of Infinity* was playing at Plymouth University, the Peter Harrison Planetarium at Greenwich and at INTECH Science Center simultaneously! The INTECH was also showing Denver's most recent release, *CJ3: A Solar System Adventure*.

Speaking of international show distribution, Mike Murray of the Clark Planetarium in Salt Lake City also had one of his shows running at Greenwich. *The Secret of the Cardboard Rocket* is shown daily to hundreds of children in Great Britain. Mike also reports that his team is hard at work on his next fulldome show, certain to be announced at IPS.

Russian Planetarium Association

Needless to say, all planetariums in Russia are working constantly to promote knowledge of the universe and space exploration among the general public. Apart from ordinary shows and lectures, they organize quizzes and contests for schoolchildren on the occasions of great events or planetarium anniversaries (for example, this was done on 23 November 2007 in Briansk Planetarium on the occasion of its 30-year anniversary) or various exhibitions, among which the Tunguska Meteorite in Tomsk Planetarium is worthy to mention.

The main topic for the Russian planetariums in 2007 was the 50-year anniversary of

the Sputnik launch. Several meetings directly or implicitly dedicated to this date were held simultaneously on 1-4 October 2007 at the Nizhny Novgorod Planetarium and the planetariums of the World Workshop.

The agenda included a detailed two-part talk by IPS Past President Martin George; a report and presentation of the book *Planetariums of the World* by Alexander V. Anisimov, chief architect of the project of reconstruction of the big Moscow Planetarium; and information on the development of a new full-dome digital star projection and show system for the Nizhny Novgorod Planetarium and on the opportunities for other Russian planetariums to get this brand new equipment by Sergey A. Molinov, director of Argus Company, Nizhny Novgorod.

The Advances in Astronomy and News of Cosmonautics Round Tables were headed respectively by astronomers and astrophysicists from Nizhny Novgorod and Moscow, and by the 37th Russian cosmonaut, Vyacheslav D. Zudov, who was born near Nizhny Novgorod.

The XI Report and Election Conference of the Russian Planetarium Association was attended by about 50 people from 26 planetariums, including two Ukrainian planetariums from Kiev and Kharkov.

The Nizhny Novgorod People to Cosmonautics series of ceremonial events dedicated to the 50th anniversary of the cosmic era included public talks delivered by veterans of the space industry; video shows on the regional plants and facilities participated in the Soviet Soyuz-Cosmos space program; the awarding of winners of a special children's contest that honored engineers and children who won diplomas, prizes, and medals of the Russian Cosmonautics Federation; vocal, performance, and ballet concerts; and, of course, delivery of the first Russian fulldome digital planetarium show in the big dome of the Nizhny Novgorod Planetarium.

However, this time the Russian planetarians leaving Nizhny Novgorod have been inspired by hopes for the better future. Construction of planetariums in Russia was halted due to various reasons for about half a century. At present, the situation has changed radically: construction of new planetarium buildings became a topical issue for planetariums in Barnaul, Yoshkar-Ola, Novosibirsk, Vladimir, Yaroslavl, and the youth camp Olenok near Tuapse on the Black Sea.

The third Russian SOYUZ-TMA spacecraft simulator has been mounted in the fourth hall of the Nizhny Novgorod Planetarium and put into operation in December 2007. The simulator prototype is operated at the Don Branch of the Simulator Construction Center, Novocherkassk, Rostov-on-Don region. The second such simulator is used in the Cosmonaut

Training Center in Star City, Moscow region.

The official ceremony of the simulator opening was headed by the entire top management of the Cosmonaut Training Center, including the Chief of the Center, the 76th Russian cosmonaut, the Hero of Russia, General-Lieutenant Vasily V. Tsybilev, and his deputies Boris A. Naumov and Valery G. Sinelnikov, as well as by the 84th Russian cosmonaut, the Hero of Russia Yury I. Onufrienko, the Deputy Head of International Space Station Flights of the Flight Control Center Viktor D. Blagov, and the Chief Executive Officer of the Simulator Construction Center Valentin E. Shukshunov.

The pre-trained crew comprised of two schoolboys and two backup crew members managed to complete successful approach and the first docking of the spacecraft with the orbital station and reported on the mission completion to the high commission. At present, special training sessions are routinely carried out for public and pupils in the Nizhny Novgorod Planetarium so that everyone can try and practice docking SOYUZ-TMA to the International Space Station.

On 28-31 May 2008, Nizhny Novgorod planetarium hosted the RPA Conference dedicated to the 60th Anniversary of Nizhny Novgorod Planetarium. It is the second planetarium opened in the USSR; the first one opened in Moscow in 1929 was the 13th in the world.

The Municipal Cultural Institution Perm Planetarium celebrated its 40-year anniversary on 12 April 2008. Since its foundation, the planetarium constantly issues new shows aimed at improving the level of basic astronomical education.

Educational issues remain the core of planetarium activity, but other activities have become increasingly popular among the general public, in particular, game and performance shows, contests, astro rings, children parties, art exhibitions, concerts, meetings with famous and interesting people, pavement-drawing contests, launches of rocket models, etc.

Perm Planetarium was the first in Russia to welcome official wedding ceremonies under the stellar dome. An optical theater was organized on the basis of the planetarium in 2005. Multimedia technologies are extensively used in performances played by both live and video characters.

Five new shows were presented to public during the Day of Planetariums. The most symbolic première was the show *From Icarus to the Proton Launcher*. This is the first step in the development of cooperation between the



Meeting at Nizhny Novgorod Planetarium are left to right Zinaida Sitkova, Yury Onufrienko, Victor Blagov, Valery Shukshunov, Boris Naumov, and Oleg Shepelev (engineer). Photo by V. V. Belov.

Perm Planetarium and the Proton JSC, one of the leading enterprises of the Russian space industry celebrating its 50-year anniversary. The Proton launchers put into orbit the majority of satellites servicing our civilization. The RD-275 rocket engine produced by the Proton JSC was the only Russian product honored by The Pride of the Motherland Prize during the final of the 100 best Russian Products contest held in Moscow in December 2007.

Southeastern Planetarium Association

The 2008 SEPA conference is scheduled for Lafayette, Louisiana, 22-26 July. Conference host for the second time around is Dave Hostetter. The last conference in Lafayette was held in 1989. Since then the planetarium has seen lots of improvements and has been relocated to a new and larger site downtown. Among the conference highlights is a Messier shootout at the St. George Observatory in Schriever, Louisiana. Contestants will be given three minutes to locate a particular Messier object. Successful contestants will advance to the next round until only one contestant remains.

Another treat for delegates is a trip to Mulates Original Cajun restaurant. Mulates is renowned throughout the southeast as one of the finest examples of authentic Cajun cooking and live Cajun music. Conference speakers include Dr. Paulette Hebert of Oklahoma State University. Dr. Hebert is chair of the International Dark Sky Association Education workshop and will speak on light pollution.

The banquet speaker is John Caldwell of the Physics and Astronomy Department, York University, Toronto, Canada. Caldwell will speak on NASA's Kepler mission designed to locate Earth-sized planets. The conference ho-

tel is the Holiday Inn and Conference Center of Lafayette.

Detailed conference information is available at the SEPA website sepadomes.org and from Dave Hostetter, dhostetter@lafayette.gov.

Southwestern Association of Planetariums

Donna Pierce found reading the minutes from the first SWAP business meeting on 11 November 1966 to be most interesting. It was held at the Ft. Worth Children Museum and the following officers were elected: president, Don Starkey, Ft. Worth Children Museum; vice president, Frank McConnell, San Antonio College; secretary/treasurer, William A. Dexter, St. Marks School of Texas; editor, Jack Fondren, King High School, Corpus Christi; and board members Paul Engle, Pan American College, Edinburg, and James Thomas, La Porte High School.

Don Lunetta, Denver Museum of Natural Science, suggested the association include planetariums in the states of Colorado, Louisiana, New Mexico, Oklahoma, and of course, Texas. It was Jack Fondren who submitted our name: Southwestern Association of Planetariums. Evidently much discussion was held on whether to use the term planetariums or planetaria as the plural of planetarium. The majority voted to use the term planetariums as a memorial to Armand Spitz.

Frank McConnell moved that each member of SWAP volunteer one article per year to the newsletter, but Jack Fondren amended the motion to read "All members of SWAP are committed, or morally obligated, to contribute an article to the newsletter, at the request of the editor." Other attendees included John Cotton, Dallas Health & Science Museum; DeWayne Harmon, Ft. Worth Children Museum; I. L. Friedman, Tyler Junior College; and George Seidel, Spitz Laboratories, Ft. Worth. Oh, by the way: dues were \$1. So here's to SWAP's 42 years and here's to Lars' 50th anniversary as IPS Regional Roundup/International News editor.

Ukrainian Planetariums Association

An audience survey was performed at Kyiv Planetarium during fall-winter 2007-2008. Kyiv Planetarium is the largest in Ukraine. It holds a "Big Zeiss 4" projector, has a 24-m (80 ft) dome, 300 seats, and about 100,000 visitors a year.

Having presented a program to up to 300 visitors at once, it is not always easy to examine the general public's understanding of ba-

sic astronomy, to get feedback on the program, and to estimate the educational impact on public. That's why they used strategically-designed questionnaires, to find out what are visitors' personal experiences and previous knowledge. Each questionnaire included 23 questions that can be conditionally divided into such groups:

- personal data (age, education);
- astronomical knowledge and observational experience (attendance of astronomy lessons at school, observation of interesting astronomical events such as eclipses, comets, meteors, experience of watching the sky through a telescope, age of Earth and the universe, reasons for seasonal changes and Moon phases, the brightest star, constellations that the visitor knows, number of planets in the solar system, the biggest planet in the solar system, how often do visitors read about space related topics); and
- visitors' personal beliefs, like their attitude towards horoscopes and extra-terrestrial life.

The survey was aimed primarily at the public that attends planetarium programs on week-ends and during vacations (mostly family groups and middle school pupils). The survey revealed that many people were visiting the planetarium for the first time (58%), while

more than a quarter (26%) had attended three or more times. Even if they were first-time visitors, people had some basic astronomical knowledge (they marked that they read or listen from time to time to space news in the media). Visitors' ages ranged from 6 to 62, with a median age of 17. Some 61% of the respondents were school pupils. About 10% had higher education; and 23% had astronomy lessons at school. The same percentage had the experience of observing through a telescope.

The easiest question for the audience was "What is bigger: the Earth, the moon, or the sun," with 98% giving the right answer, while the most difficult question was about the age of the universe (6% chose the correct answer). Surprisingly, only 12% of respondents chose the wrong answer on the question about change of seasons (88% correct), and 73% chose the correct answer about the reason for moon phases.

The most popular constellations are Ursa Major and Minor, Canis Major and Minor, and zodiacal constellations (not surprisingly). Some visitors listed quite a lot of constellations, not only the most common, while other visitors invented their own, such as polar cross, coliseum, pleiades, and snakes.

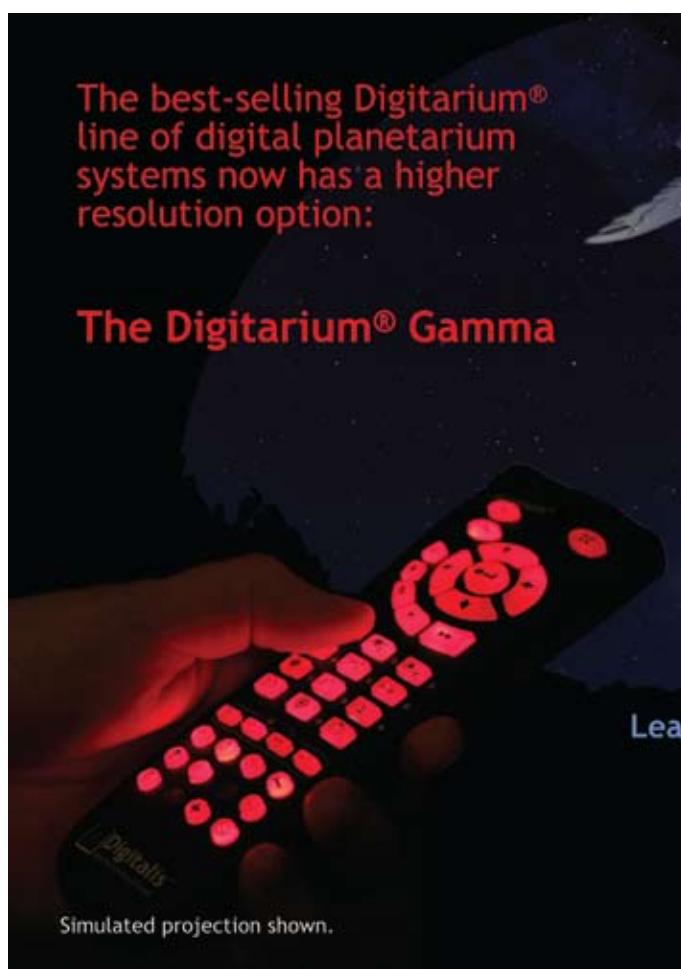
The personal beliefs survey showed that 56% believe in extraterrestrial life, and 68%

believe in horoscopes. People would like to know from lectures in the planetarium about UFO, extraterrestrials, black holes, the future of the Universe, space missions, origin of planets, constellations, and lunar cycles and their impact on agriculture.

To eliminate the audience's misconceptions, we should emphasize humanity's place in space and time. For that purpose in Kyiv Planetarium several exhibits are being developed as Power Point presentations to be shown in the Stellar Hall before the lecture starts.

Even though such questions as how old and big is our universe inevitably arise for everyone, for many people it's difficult to bear in mind abstract, "astronomical" numbers. In developing exhibits we should tie these numbers to our day to day life realities. For example, the "cosmic year" approach, proposed by Carl Sagan, makes the idea of the age of the universe visual, clear, surprising, and therefore attention catching. More information on the survey is available from natalia_kovalenko@hotmail.com.

At the Kharkov Planetarium, Ukraine, the Day of Planetaria was celebrated by shows, lectures, a youth-club concert, and, last, but not the least, the opening of the first Ukrainian "museum of ufology." For details, see planetarium.kharkov.ua. ★



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Reach Out to Other Organizations

I recently attended a Science Teachers Association of New York State (STANYS) mini conference here in Syracuse. It is interesting to attend conferences that are not specific to one's own profession; it allows you to network with people who share your mission in many ways and may have a slightly different perspective that can be quite valuable.

The two workshops I chose to attend were quite relevant and reinforced many of my own intuitions.

The first was called "Science-Please Take it Personally" and was presented by Dr. Michael Sponsler, associate professor in the Department of Chemistry at Syracuse University. Dr. Sponsler remarked, "Science has a reputation for being impersonal, but nothing could be further from the truth. Allowing, or better yet, forcing students to see and experience the personal side of science can bring the subject alive for them."

He went on to say that exposing students to the human side of science makes the information more interesting and relevant. This can be accomplished through many complimentary strategies, such as:

1. Demonstrations: Showing that "if you do this, then this happens" is valuable and can generate questions and further experiments.
2. Research Experiments or Guided Inquiry: Gives the experiment a real-world purpose and places the student in a role as problem solver...the scenario can be contrived. (For example, to solve some problem that you pose, the student needs to observe and record the position of the sun at various latitudes or seasons.)
3. Animations and Simulations: Illustrate concepts much better than words and demos and allow for exploration of a concept.
4. A Strategic Question and Answer Approach to Lectures: Promotes active thinking and allows for a different perspective...that of the researcher.
5. Historical Perspectives: Gives a more personal perspective through events and the lives of actual scientists and researchers and brings the science closer to reality.
6. Science Jokes: Shows the human side and promotes interest and attachment to the subject. "Inside jokes" can give students a sense of inclusion; those outside of the class (without the background knowledge gained in class) won't understand the jokes.

The examples given during Dr. Sponsler's workshop were geared for chemistry classes. However, I was able to relate much of what he described as totally applicable to education in a planetarium. Many of us already use many of these strategies with great success but may have recently neglected one or more. I hope that my listing them will remind you to use more of these strategies to compliment the awesome capabilities of the planetarium!

Paul Preczewski, a graduate assistant from the Department of Education at Syracuse University, presented the second workshop I attended, called "Ways to Enhance Student's Scientific Literacy." After helping us understand some definitions of scientific literacy, we agreed on a generally accepted, although not extremely demanding, two definitions of scientific literacy (www.csa.com/discoveryguides/sciliter/review.pdf):

Miller's (2006) "A level of understanding sufficient to read science and technology stories written at the level of the New York Times Science Times Section or an article in *Science et Vie* (a French science magazine)," and Hazen (2002) "scientific literacy, quite simply, is a mix of concepts, history and philosophy that helps you understand the science issues of our times."

Paul then shared some shocking results of current formal assessments of scientific literacy. Of 33 industrialized nations assessed, only six had results that showed above 20% but below 35% of adults were scientifically liter-

ate; the rest of the nations had only 2-18% of adults who were scientifically literate. (Miller 2006) Anecdotally, we all know that our students and the general public need to have a better basic level of scientific literacy in order to be enlightened citizens who truly understand articles published in the news and issues that come up for vote during elections.

Briefly, what Paul suggests is that we use strategies much like those listed above from Dr. Sponsler's workshop. Paul also suggests connecting material to current events and to recent citizen votes and the consequences of those votes. Getting students to understand the level of scientific knowledge needed to vote responsibly can really make it personal.

During this workshop we also practiced looking at the newspaper and finding articles and/or ads related to what we teach in class. It was surprising how many items we found that required a substantial understanding of science to even comprehend claims made by advertisers in the newspaper. That was an enlightening experience. Perhaps our pre- or post-planetarium activities could include current events issues for students, teachers and even the general public to ponder.

Finally, of greatest interest to me was the guest speaker, Dr. Robin Kimmerer. Dr. Kimmerer is a biologist at the State University of



Dr. Robin Kimmerer

New York College of Environmental Science and Forestry (SUNY-ESF) and is the director of the newly-established Center for Native Peoples and the Environment at ESF (www.esf.edu/success/kimmerer.htm). Dr. Kimmerer explained, "What makes this center

unique is the bridge between western, scientific knowledge and traditional ecological knowledge," she said. "This is a way to increase our ability to learn from each other and work together to solve environmental problems."

Dr. Kimmerer's talk, "Traditional Ecological Knowledge," was extremely inspiring. She explained that just as there is great value in preserving genetic diversity, we must also preserve intellectual diversity. Examining traditional knowledge alongside scientific knowledge provides us with many more ways of understanding our universe and a greater diversity of approaches to problems that we face in the environment.

Dr. Kimmerer discussed the similarities between Traditional Ecological Knowledge (TEK) and Scientific Ecological Knowledge (SEK). Both are derived from observation of nature, yield detailed empirical information

and both have predictive power.

Then she explained the differences between these two kinds of knowledge. TEK involves resource users themselves and is qualitative, holistic, diachromic data, embedded in social/ethical/and spiritual context, moral based and intuitive. SEK involves scientific professionals and is quantitative, reductionist, synchronic data, mechanistic and rational ("values free").

Some people say don't let both kinds of knowledge touch! Dr. Kimmerer says that using both ways of knowing can provide a type of symbiosis. Just as native peoples plant corn, beans and squash together which increases productivity, her approach of combining these two kinds of knowledge has captured the interest of her students and has made them more productive. She encourages her students to understand that an educated person is one who first knows their own gift and second knows how to use it for the good of the world. She encourages them to understand what they learn with their whole being: mind, body, spirit and emotion.

Dr. Kimmerer's talk reinforced my dedication to continuous learning and promotion of the use of knowledge from indigenous cultures. I feel it is important to examine how we can learn from this knowledge and respect different "ways of knowing."

I enjoy including native understandings, viewpoints, music, and art as a way of enriching lessons and as a way to integrate affective learning with cognitive learning. A successful integration of these two ways of knowing inspires discussion, engages critical thinking and acts as a powerful tool for memory retrieval after the planetarium lesson concludes.

For those interested in learning more, Dr. Kimmerer recommended the following books: *Look to the Mountain: An Ecology of Indigenous Education and Native Science: Natural Laws of Interdependence*, both by Gregory Cajete, and *Sacred Ecology: Traditional Ecological Knowledge and Resource Managements* by Fikret Berkes

African Skies-Cultural Astronomy

Speaking of cultural resources, on Dome-L there was a question posed and discussion followed about where to find African sky stories and several people contributed ideas about where to find this information and other suggestions worth sharing here.

Steve Berr (sber@bee.net) told us: "Many years ago I got interested in African Star mythology. I did some research and eventually created a small planetarium program for my 24-ft Spitz installation. I still have that script somewhere (I retired in '93).

"Several years later I was recruited by Russell Blake, who was doing a more serious compilation of African sky mythology. I sent him what I found, and suspect that he has some-

thing as well.

"After retirement I worked as a sales rep for LTI, and they have an African Skies cylinder complete with curriculum guide. If you go to www.starlab.com you should be able to get a copy of the curriculum guide, or if you contact any local STARLAB owner, the African Skies is part of their big curriculum guide, along with Egyptian Skies."

Alan Gould (agould@berkeley.edu) shared: "Here at Lawrence Hall of Science, we developed key activities that are in the Learning Technologies Curricula for the STARLAB African Mythology Cylinder. It includes the basis for our African Skies planetarium program, which we have done some years for Black History month. We got permission from LTI long ago to put it up on our PASS website." Go to lhs.berkeley.edu/pass/passv05/PASSv05updates.html, the second item under news and articles.

"On the LTI website, it's a little hard to find the details for the African Cylinder, but here's the direct link: www.starlab.com/slcylymth.html#Anchor-35326"

Chuck Bueter wrote to say that there is a newly-published book available called *African Cultural Astronomy: Current Archaeoastronomy and Ethnoastronomy* (Astrophysics and Space Science Proceedings). This book was published in December of 2007 and the editors are Jarita Holbrook, Thebe Medupe, and Johnson O. Urama. The contents of the book include a paper on the Ghana 2006 Eclipse Conference and research on the development of lessons involving cultural astronomy.

Andy Dolph (acdo@gmail.com) wrote: "It seems like there's interest in this from a variety of corners (including me). Would it make sense/would there be interest in starting a wiki for mythology of the sky from all over the world that people could add either their own work or references to others works so there'd be one place to go as a starting point?"

Karrie Berglund contributed these thoughts, "I'd like to suggest adding sky cultures directly to Stellarium software. Since Stellarium is open source, anyone can download, use, and modify it for free. See Stellarium.org. In addition to its being open source, there are other strong arguments for adding sky cultures directly to Stellarium:

"Stellarium allows users to display labels and text menus in more than 40 languages, so it is truly international. Translations into even more languages are underway."

"There are already about 10 different cultures in the software (though no African constellations yet).

"Stellarium is multiplatform: it runs on Linux/Unix, Windows, and Mac OSX.

"If you do add sky cultures to Stellarium, please be as accurate as possible. We here at Digitalis have contributed seven different sky cultures (and we are working on others). Our rule of thumb is to find two or more sources that provide the same data before adding a constellation to Stellarium. I encourage you to use the same guidelines in order to achieve a reasonable level of accuracy. If you have constellation data but don't know how or don't have time to add it to Stellarium, we can do that for you. Contact me at karrie @DigitalisEducation.com."

I think a Wiki would be a good idea for background resources. However, in my opinion, having the data added to an application like Stellarium would make it much more useful.

New Moon Cylinder for STARLAB

Learning Technologies reminds the mobile community about their new moon cylinder, which features photos detailed enough that students can identify and compare the Apollo landing sites, look at the far side surface, and distinguish features such as highlands, maria, craters, mountains, ejecta rays, and rilles.

What's New Columnist John Schroer featured this new cylinder in his column in the March *Planetarian*; check it out on page 61 in that issue.

Elementary Planetarium Shows

Mike Smith wrote to Dome-L, "I'm trying to come up with a planetarium program schedule, I'm finding it hard to find slide-based planetarium programs that are for 1st graders through 3rd graders, approximately. So far I have been finding a lot that are for 4th graders and up and a few for PK through 2nd. I've looked at places like Calgary Science Centre, Loch Ness Productions, and Sudekum Planetarium, but are there any others that I'm missing? If you have any suggestions I would love to hear from you."

Mike received many helpful hints and I copy the list of resources here for the benefit of other who may have the same need.

First, take a look at the new planetarium shows WIKI at planetariumshows.wikispaces.com. According to the site, "As many planetariums are moving towards fulldome video, it's becoming more and more difficult to find interesting educational planetarium shows for 'conventional' theaters. This wiki is a place where planetarians and educators can list currently available, new and upcoming shows."

Three shows were specifically applauded for this age group:

Don't Duck, Look Up! from the Davis Planetarium; contact Jim O'Leary (joleary@mary-landsciencecenter.org) and

Mystery of the Missing Seasons and Moon Witch from Bowen Technovation. Contact Mike Grznar (mikeg@bowentechnovation.com).

It was also mentioned that Stasiuk Enterprises (uofgts.com) would work with you to customize their shows on currently available systems. Contact Garry Stasiuk at garrystasiuk@mac.com.

After listing these resources, I feel that Matt Linke's (mlinke@umich.edu) comment deserves to be aired. Matt commented, "I suppose one question to ask is whether or not you should be doing slide programs at that age - especially the very young. I used to have some special topic slide-based programs for that age, but generally found that they responded much better to live programs—maybe supported by slides."

5th European Meeting of Small and Portable Planetaria...

Anthony Pedrosa wrote to tell me, "Navegar Foundation and the Center for Astrophysics of Oporto University are pleased to invite all interested in participating in the 5th European Meeting of Small and Portable Planetariums to Portugal.

The conference will be held 9-11 October 2008 at Centro Multimeios Espinho, a modern building that includes, among other equipments, a planetarium. We are ready to start sending the information to the participants for the 2008 meeting. The website is ready; please have a look at ecspp2008.multimeios.pt."

Anthony Pedrosa

... and Looking Ahead to the 6th

Tomasz Kisiel is in the process of organizing the next meeting, which will be held in Poland in 2009. We will probably meet in early September at the Silesian Planetarium (en.wikipedia.org/wiki/Silesian_Planetarium). Tom writes, "Apart from it being the oldest planetarium in Poland,

it's also a very nice conference center and also is located in a very good spot." Look for further information soon.

First Report (GLPA Region)

Dayle L. Brown reports about a newly-established group for portable planetarium di-

rectors: "The GLPA Portable Group is small, but growing. We have a highly-diverse and talented group of people. At present the group consists of ten people, but I have expectations of increasing the size. Six of the ten are GLPA members. Communication to this point has been by way of email."

Dayle assures me that more news will follow as the group gets underway. Thank you Dayle!

Summer Courses for Teachers

Remember, each summer the College of the Atlantic in Bar Harbor, Maine, offers accredited two- and four-credit graduate summer res-

idential courses for teachers in a variety of subjects, including astronomy. This year the "Introduction to Astronomy" course will be given 13-26 July and the "Teaching With a Portable Planetarium" course will be held 27 July-2 August.

For more information go to coa.edu/html/coursesk12teachers.htm or contact Jean Sylvia, associate director of Summer Programs, at jsylvia@coa.edu or 800-597-9500. If you cannot attend this year, think ahead to next summer!

Signing Off!

I hope to see you in Chicago. If not, keep in touch via email. ★

Planetarians' Calendar of Events

2008

12-14 June, Canadian Association of Science Centres Annual Conference, London Regional Children's Museum, Ontario, Canada, www.canadiansciencecentres.ca/main.htm.

15-19 June. 5th Science Centre World Congress, Toronto, Ontario, Canada.

27 June - 2 July. 19th International Planetarium Society Conference, Adler Planetarium, Chicago (USA). www.ips2008.org.

22-26 July. Southeastern Planetarium Association (SEPA) annual conference, The Lafayette Natural History Museum & Planetarium, Lafayette, Louisiana, USA. Contact: dhostetter@lafayettegov.net.

28-1 August. Spitz Digital Institute, Chadds Ford, Pennsylvania, USA, Starry Night/digital planetarium learning event with two sessions. Call +1 610-459-5200 x126 for details, or see www.spitzinc.com/institute.

1 August, total solar eclipse

9-11 October. 5th European Meeting of Small and Portable Planetaria, Centro Multimeios Espinho, Navegar Foundation and the Center for Astrophysics of Oporto, Portugal. ecspp2008.multimeios.pt.

18-21 October. Association of Science-Technology Centers (ASTC) Annual Conference, The Franklin Institute, Philadelphia, Pennsylvania, USA. www.astc.org.

29 October-1 November. Great Lakes Planetarium Association (GLPA) Conference, Milwaukee Public Museum Planetarium, the Gary Sampson Planetarium, and the Charles Horwitz Planetarium. Contact: Gary Sampson, 11400 West Center Street, Wauwatosa, Wisconsin, 53222-4213 at +1 (262) 844-6940 or David DeRemer, +1 (262) 896-8423, dderemer@waukesha.k12.wi.us.

2009

International Year of Astronomy

22 March. International Day of Planetaria. www.dayofplanetaria.org.

18-19 April. Italian Association of Planetaria (PLANIT), XXIV National Conference, Naples, City of Science, Italy. www.planetarialiani.it. Contact: osservatorio@serafinozani.it.

22 July, total solar eclipse

September. Nordic Planetarium Association Conference, Jærmuseet, Vitenfabrikken, Sandnes, Norway. Chair and contact: Ivar Reed Nakken, ivar.nakken@mail.nu.

2010

June 26-30: 20th International Planetarium Society Conference, Alexandria, Egypt.

11 July, total solar eclipse

Deadlines for "A Week in Italy"

31 August 2008, planetarians from France

30 September, planetarians from Spain

15 April 2009, planetarians from United States

For more information on the "Week in Italy," go to: 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. More details about several of these upcoming events is included in the International News column.

The most up-to-date information also is available online at the International Planetarian's Calendar of Events at www.astrofilibresciani.it/Planetari/International_Calendar.htm

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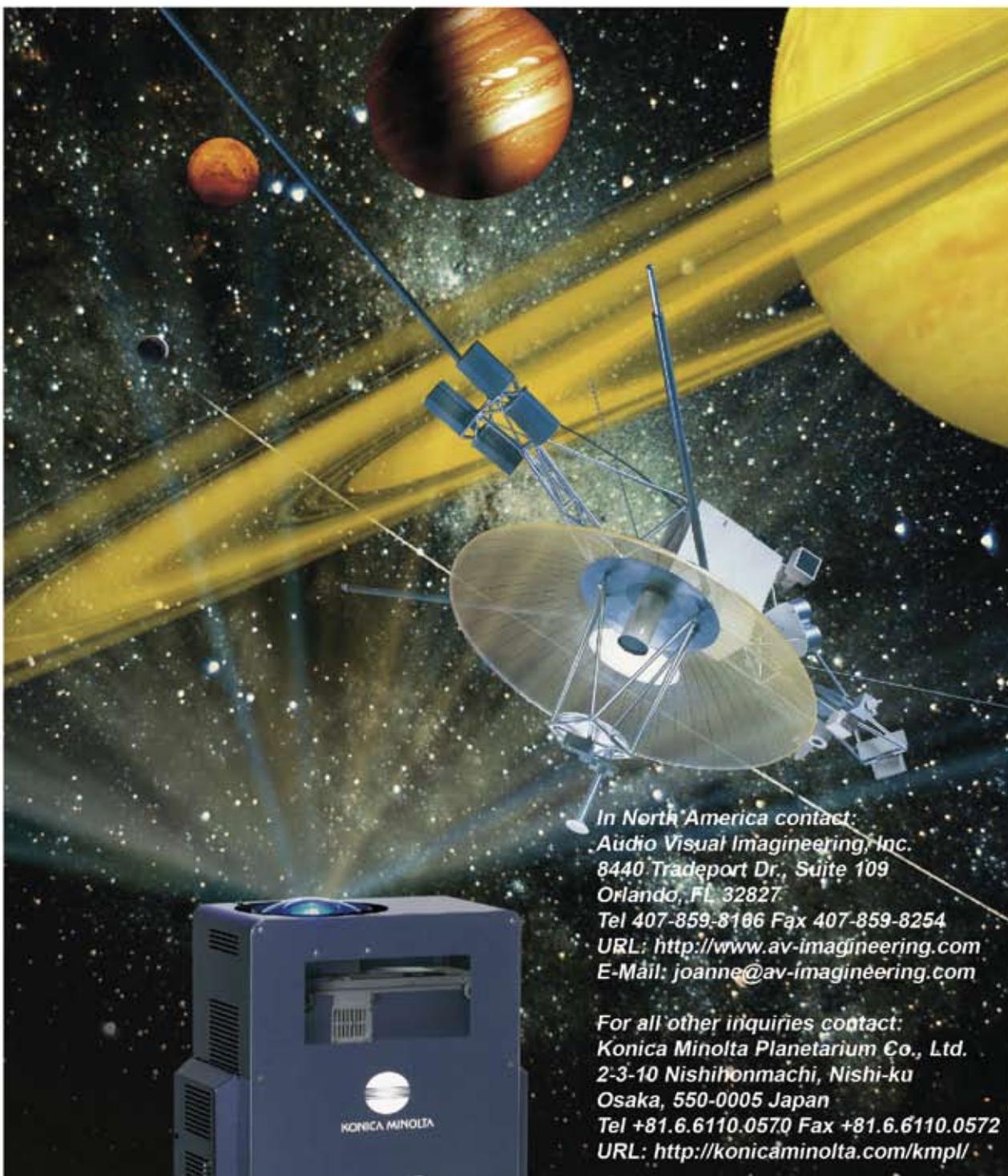
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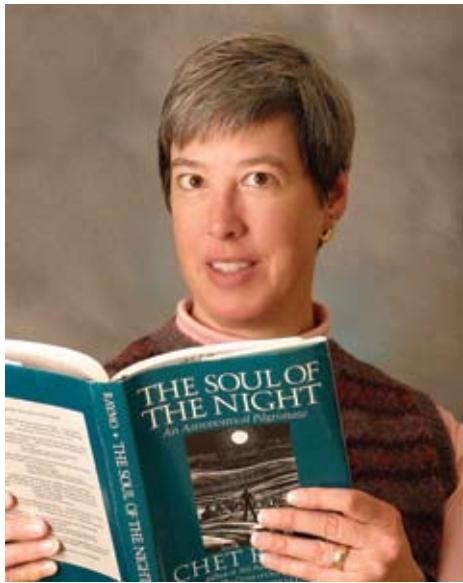


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Reviews



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There are books about everything in this column, dear readers. From the cosmos to backyard observing, there is something for children and something for teachers, along with stories from the Space Shuttle and details of the lunar lander.

Many thanks, and welcome, to our reviewers: Steve Case, Francine Jackson, Paul J. Krupinski, Fran Ratka, John C. Scala, and Richard Walker. And we're always looking for more reviewers! Drop me an e-line if you're interested in free books. I'll send you the list of what's available, and you get to choose. Such a deal!

Deep Sky Objects: The Best and Brightest from Four Decades of Comet Chasing

David H. Levy, 2005, Prometheus Books, Amherst, New York, ISBN 1-59102-361-0, soft-bound, US \$25.00

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

The attendees of the recent Triple Conjunction (MAPS, GLPA and SEPA) conference in the fall of '07 were fortunate to have David Levy as one of the main speakers. As astrono-

mers go, Levy is kind of an anomaly: although he is possibly one of the best-known astronomy popularizers in the world, he has (his own confession) never taken a formal astronomy course. His love of the sky comes from a deep curiosity of the night as a boy in a camp for asthmatic children, and has been forged by virtue of his discoveries of many comets, including one which the world watched temporarily change the face of the planet Jupiter in 1994.

Through the decades, in his search for comets, Levy, like Charles Messier centuries before him, was continually discovering, not comets, but deep sky objects, many of which had comet-like structure at first glance. And, like Messier, Levy catalogued what he found looking through his many telescopes. At the time this book was published, he had 378 objects on his Levy list, with the promise of more to be added on his web site.

The book chapters not only divide the objects into their type (stars, nebulae, clusters, galaxies), but also their distance. As you continue into the book, you are traveling farther and farther from home. Also, to make life very easy, Levy not only gives his catalogue number, but the common Messier designation (if appropriate) and common name, the NGC number, 2000 coordinates, magnitude, distance, and the first time Levy viewed it. Then, he speaks about his observing the object, his description of it, very often how he first found it through his telescopes through the years, and the season(s) it is best located in the sky. Some of his observing recounts are pure young boy, as when he first found M101 (Levy 2) on July 4, 1966 after setting up in camp. He had to explain to the counselor why he'd rather hunt for comets than join the Independence Day fireworks (remember, Levy is Canadian).

Reading *Deep Sky Objects* is like snatching someone's diary from under the bed. As you read, you will find yourself not only learning about a whole new set of relatively easy—for the most part—telescope finds, but also you will get a feel for the boy and man who, for most of his life, has enjoyed the beauty of the night sky and used it to become one of the very elite club of comet discoverers.

Conceptions of Cosmos—From Myths to the Accelerating Universe: A History of Cosmology

Helge S. Kragh, 2007, Oxford University Press, Great Clarendon Street, Oxford OX2 6DP, ISBN 978-0-19-920916-3, US \$70

Reviewed by Steve Case, Strickler Planetarium, Bourbonnais, Illinois, USA.

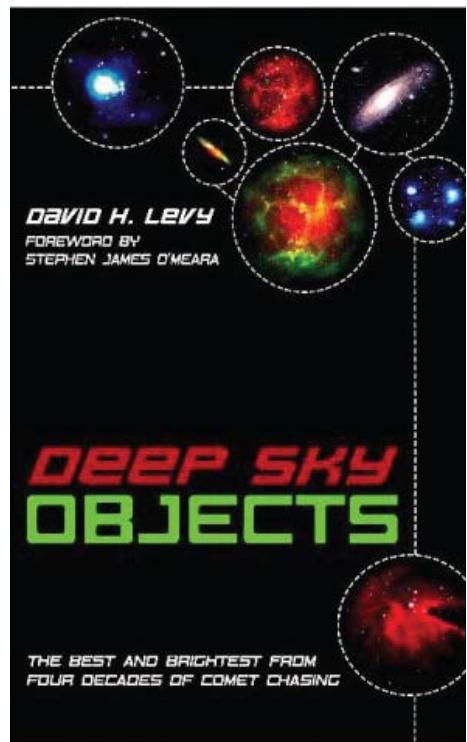
One of the most powerful aspects of astronomy education is the way it illustrates humanity's changing perception of the universe

throughout history. Planetarians have the responsibility and privilege of highlighting this great story: the development of our view of the universe from the geocentric to the heliocentric universe, from the Newtonian to the relativistic universe, and on to contemporary conceptions and the search for dark matter and dark energy. An aid to this formidable task is available in Kragh's book *Conceptions of Cosmos*.

What sets this book apart from previous works, such as Dreyer's *A History of Astronomy from Thales to Kepler* or Kuhn's *The Copernican Revolution*, is that in Kragh's work the author sets out to cover the entire history of Western cosmology, from mythology and ancient astronomy up to present day models of the inflationary Big Bang and the accelerating universe. In fact, the entire second half of the book is devoted to modern cosmology, a disproportion when viewed in terms of time periods but certainly fitting for the amount of material to be covered.

The only parts of the book that I found difficult were portions that discussed general relativistic field equations and the different cosmological models they entailed. Though they're not essential to a general comprehension of the book, the discussions seem rigorous enough to satisfy a reader much better versed in general relativity than I.

One of the strengths of this book is the way that Kragh dispels common misperceptions regarding the history of cosmology. In the section on Copernicus, he disagrees with the likes of Kuhn by maintaining that Copernicus did not develop his heliocentric model in response to a crisis in astronomy, but in-



stead due in large part to his conviction that heavenly motions must be uniformly circular and that the deferents and equants in Ptolemaic astronomy had violated this. In the section on Hubble's law, he put to rest my presupposition that Hubble's observations led directly to the assumption that the Universe was expanding. In fact, Kragh reports, these observations did no such thing. An expanding universe was not even proposed until two years after Hubble's observations and not commonly accepted until long after that.

Another strength of the book is the way in which Kragh approaches the debate as to whether or not cosmology should even be considered a science. He provides opinions and quotes throughout the book from the works of scientists on both sides of the question, some arguing that pushing the laws of physics to the very limits of space and time results in philosophy, meta-physics, or mathematical games; others insisting that cosmology is a rigorous science that has resulted in observationally and experimentally verified facts. Whichever side of the debate you may fall on, it's an illustration of the power of these ideas.

Kragh's work presents the story of cosmology (albeit, in the early chapters, an exclusively Western cosmology) in a compelling manner that should be of interest to anyone wishing to tell the story of our evolving conceptions of the universe.

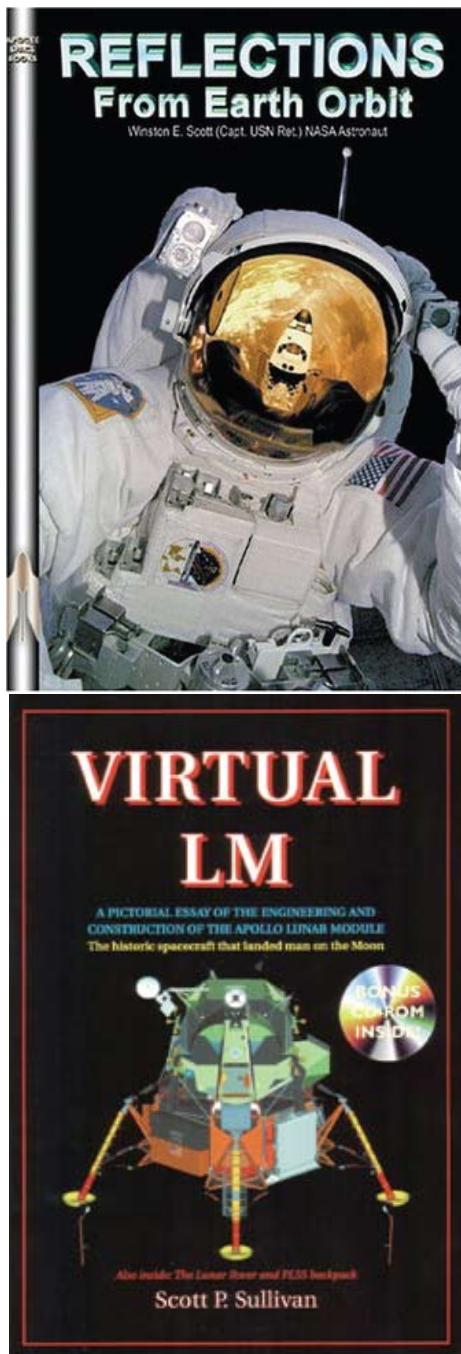
Reflections From Earth Orbit

Winston E. Scott (Capt. USN Ret.), retired NASA astronaut, 2005, Collector's Guide Publishing Inc., Box 62034, Burlington, Ontario, Canada, L74 4K2, ISBN 1-894959-22-1, US \$23.95, Canada \$30.95.

Reviewed by Paul J. Krupinski, Mobile Dome Planetarium/Strasenburgh Planetarium, Buffalo/Rochester, New York, USA.

This book is a truly outstanding ride into orbit, plus a look back at the Earth below in all its beauty and diversity! Retired US Navy Captain and former NASA Space Shuttle Astronaut Winston E. Scott takes the reader to low Earth orbit, approximately 210 miles up, for personal reflection of his early life as a boy who loved music (he earned an arts degree in Music from Florida State University in 1972) and wanted to fly (he also earned a master of science degree in aeronautical engineering from the US Naval Postgraduate School in 1980); fly he did! As a research and development project pilot, he flew the F-14 Tomcat, F/A-18 Hornet and A-7 Corsair aircraft. Later, he flew two Shuttle missions to Earth orbit—STS-72 in 1996 and STS-87 in 1997—spending a total of 24 1/2 days in space, including 19 1/2 hours spacewalking outside the shuttle.

While orbiting at 17,500 miles per hour,



Scott recognizes that his lifelong dreams of flying, joining the Navy, becoming an aviator and engineer and ultimately an astronaut, hinged on someone who took the time to make one phone call while in high school. This personal story is about him growing up in Coconut Grove, Florida, yet aspiring to make it big one day. Dreamers dream big and Scott reflects back on the people—especially the one who took interest, who never lost confidence, never gave up trying to help, and always pushed him to do the best he could...which ultimately affected his destiny.

But wait, there's more. Take a ride with Scott aboard Space Shuttle Endeavour. He describes vividly suiting up in his bulky orange launch and entry suit, crawling into the orbiter and then waiting patiently for nearly two

hours in a heads down, feet up position as the countdown clock continued to T-minus zero. "The beast is stirring now. He'll awaken soon and we had all better be ready!" Feel the shuttle sway prior to liftoff, then blast off with him for the rough eight-minute ride to orbit. How does it look in space? One of the most frequent questions he's asked! Scott explains the view as if you were there. Learn about astronaut's daily duties onboard the shuttle: working 16-hour days, then eating, grooming, and sleeping for eight hours whether the sun is shining or not!

Appreciate what it's like to orbit around Earth. Scott explains the peculiar daily cycles of an astronaut as the shuttle whizzes around our home once every 90 minutes, traveling at 5 miles per second. Indeed, 15 sunrises and 16 sunsets are most unusual to us on the ground, but to an astronaut 200 plus miles above the surface, it becomes part of a scripted daily routine. Understand in a real way what it's like to look back at the awesome magnificence of our home planet against the cold blackness of space and behold its true beauty. "I could see the myriad beautiful colors of the Sahara Desert. I had always thought that all deserts were a single drab, light brown, much like typical beach sand. In reality, the Sahara sand exhibits an amazing array of colors ranging from orange-red to black!" This and much more await you and your imagination in *Reflections From Earth Orbit*.

VIRTUAL LM: A Pictorial Essay of the Engineering and Construction of the Apollo Lunar Module

Scott P. Sullivan, 2004, Apogee Books, Box 62034, Burlington, Ontario, L7R 4K2, Canada, ISBN 1-894959-14-0, US \$29.95

Reviewed by John C. Scala, Lenape Valley Regional High School, Stanhope, New Jersey, USA.

I have always wanted to be an astronaut. Born in the same year NASA came into existence, one of my earliest memories is my Colonel McCauley space helmet. My astronaut G.I. Joe with space capsule soon followed, evolving into a life long love of assembling plastic scale model kits of all things "space," and progressing to building, designing, and launching model rocket kits from Estes and Centuri. Alas, football injuries and a lack of grasping the advanced intricacies of calculus put my dreams to rest.

In *Virtual LM*, author Scott P. Sullivan professes his fascination with wanting to become an astronaut and with the Apollo program through 3D CAD virtual modeling. Working from NASA technical releases and web sites, he has masterfully and artistically created drawings that detail the construction and engineering of the lunar module (as he has previously done in his book *Virtual Apollo*, 2002,

Apogee Books, detailing the command and service modules). These drawings are not blueprints. However, they are full color and highly detailed such that one could conceivably construct a lunar module by following his layout.

The book opens with the famous Apollo mission patches that the crews wore on their space suits. Also included are the individual LM patches designed for each specific spacecraft (did you know that Apollo 11's eagle was LM-6?). An introduction to the text follows the history of the Apollo program, from President John F. Kennedy's speech to Congress challenging the nation to "landing a man on the moon and returning him safely to the Earth" by decade's end, through the possible methods of doing so. The contract to design and assemble the craft was awarded to Grumman Aircraft, of Bethpage, New York.

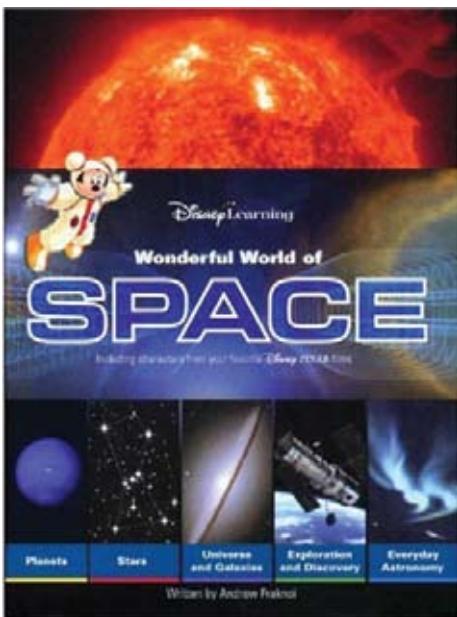
Famous for their military aircraft, this would be Grumman's first space vehicle. The introduction takes the reader through a timeline of their quest to design, engineer, and construct the LM. This section of the book is illustrated with fascinating black and white and color photographs tracing the development of the ship at various stages of its evolution.

Each of the next 230 pages is a treasure trove of information. The LM is color coded to match the materials used to construct that portion of the vehicle. Top, bottom, left, right, and exploded views detail the craft from every angle. Each part is clearly identified and labeled. Every system and sub-system is digitally mastered. You will come to appreciate the claim that these vessels were the most complicated ever designed to fly.

Photographs and chronologies are scattered through the text to aid in the visualization process. Once the craft as a whole is discussed, the separate ascent and descent stages are drawn, with special attention given to the fact that not all of the LM's were identical. The last few machines were designed for extended stays on the lunar surface. Where Apollo 11 was on the moon for a little over 21 hours, Apollo 17 housed its crew for over three days.

As if this tour-de-force through the LM and its variants were not enough, Mr. Sullivan next tackles the probe and drogue unit that allowed for the LM to dock/undock with the CSM, the lunar rover vehicle, including its folded and stowed positions, and the astronaut's PLSS life-supporting backpack unit. Each is detailed to the rivet, nut, and bolt. The volume is completed by a CD-ROM (by Frank O'Brien) that includes the manuals and checklists detailing the operation of the LM. Also included are detailed photos of the LM simulator cockpit and test vehicle ascent and descent stages.

Virtual LM is a gorgeous volume, packed with detailed drawings, lovingly rendered,



supplemented with text and photographs. In the author's own words, "I approached these projects from the viewpoint of an artist...so, if you would keep that in mind while you look at these renderings... my intent of trying to take you inside the spacecraft, if only for a moment, will have been achieved." In this reviewer's mind, Mr. Sullivan has more than met his goal.

Wonderful World of Space

Andrew Fraknoi, 2007, Disney Press, 114 Fifth Avenue, New York, New York, ISBN 10:0-7868-4969-X, US \$12.99.

Reviewed by Fran Ratka, Euclid City Schools Planetarium, Euclid, Ohio, USA.

Andrew Fraknoi has shown that he can write children's astronomy books as well as college texts. I use his text *Voyages Through the Universe* with my high school astronomy classes and I selected it because of its readability and clear explanations. *Wonderful World of Space* does a great job of explaining astronomy concepts so that children can understand them, even primary school aged children, especially if they experience the book with an adult. Beautiful images that illustrate the subject being studied appear on every page. There are also images of the kids' favorite Disney characters and cartoons sprinkled throughout the book that will enhance a child's interest.

The book starts with astronomical objects close to home (planets and moons), then moves to stars and galaxies. Star birth, life cycle and death are explained in very understandable and exciting terms. Students will even find out how many of the atoms in their bodies were made by stars.

The cosmological sections are probably a little too much for the average primary grade student, but Fraknoi does a great job explain-

ing these tough concepts to upper elementary and middle school students. There is a great chapter describing telescopes and space exploration, including the electromagnetic spectrum and its uses in astronomy as well as a little astronomy history.

The final chapter, "Everyday Astronomy," explains time, seasons, moon phases, eclipses, moon lore, meteor showers, and aurora and dispels some of our commonly held misconceptions. The book ends by giving helpful hints for sky watching and family astronomy activities. Also included are seasonal star maps, websites, and a kid-friendly glossary.

This book would be a great gift for any child, especially those interested in astronomy. Adults will also benefit from Fraknoi's clear explanations, especially when it is time to answer a curious child's tough questions. I have gleaned some ideas that I will use in my planetarium programs for elementary students and especially when I do cosmology shows with eighth graders.

Astronautics Book 2-To the Moon and Towards the Future

Ted Spitzmiller, 2007, Apogee Books, Box 62034, Burlington, Ontario, Canada, ISBN 9781-894959-66-7, US \$25.95

Reviewed by Richard Walker, Longway Planetarium, Flint, Michigan, USA.

Astronautics Book 2 is a concise history of the American and Soviet race to the moon and beyond. It is arranged in a roughly chronological manner, although there is much back tracking and overlap as different parts of the US and Soviet program developments are covered. This can get a bit confusing (I found myself turning back to previously read sections to check dates), but then it pretty accurately reflects the sometimes confused simultaneous programs that were underway as part of the mad dash to space.

I have never been a real student of the space race, so I found the book very interesting with a lot of information about the Soviet and American programs that I did not know. A lot of attention is given to the development of the launch vehicles. I guess I never really paid much attention to the fact that the space capsules were constrained by what the boosters were capable of getting into orbit. I always thought of it as, "Here's the Saturn V, now put something on top and shoot it to the moon."

The one problem is that there are not a lot of illustrations and the ones that are included are usually no where near to where they are referenced. One illustration was 50 pages further into the book from where it was first referenced! But if you are looking for a handy reference of the various missions, this fits the bill nicely. ★

25 Years Ago

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The June 1983 issue of the *Planetarian* is a good example both of how some things change and how some things never change. Both can be depressing.

Letters in the 1983 issue touched on the issue of creationism. Steve Russo, then at Bradenton, Florida, addressed the problem of creationism: "It's about time our profession takes a stand on the issue of creationism." Henry Mitchell of Chatham, Virginia disagreed: "Comparing conflicting interpretations of data is a more effective teaching device." This question is, of course, even more timely today with the opening of the Creation Museum and Planetarium in Hebron, Kentucky.

Tony Jenzano (Chapel Hill, North Carolina) addressed the issue of planetarium versus space theater. "Planetariums utilize theatics to provide entertaining education. Space theaters utilize theatics to provide educational entertainment." I always told my planetarium trainees that planetarium presentations rested on three legs of a tripod: science, education, and entertainment, and if any one of the three was out of whack the show would fail (not to mention their grade).

Arthur Johnson (Fleischman Planetarium, Reno, Nevada) wrote on advances in 35mm hemispheric cinematography. Cinema 360 was the cutting edge. Do I hear some youngsters asking why he didn't just have his laptop do the work?

In related work, Ray Villard and Dan Zirpoli (Davis Planetarium, Baltimore, Maryland) wrote about their facility's six-frame all sky system: "Over the past seven years, experiments with the All-Sky system have developed a number of visually exciting applications for our public shows." They go on to describe geometry, alignment, image distortion, blending, and set up.

Charles Hagar (San Francisco State University) presented part 3 of his study of the world's planetariums, this time covering just 9.1 m (30 ft) domes. In this installment he just listed manufacturers and how many seats were provided. I note I was number 73 on his list of 134 responders.



Surface photographs from the Soviet Venera 14 spacecraft. The Venera 14 lander became the second Venus surface probe to transmit color images. NASA

The script section gave the script of a show seen by attendees at the recent IPS conference in Vancouver, *The Mystery of SS433*.

President Jeanne Bishop discussed the re-established script bank, the 1986 conference site and how to apply to host future conferences, membership flyers, and asked for volunteers to work on IPS committees (plus ça change...).

John Wharton's Gibbous Gazette described the formation of the American Planetarium Association, jobs and internships, new installations, available slides of peculiar galaxies, and people changing jobs.

Jack Dunn did a rather restricted Regional Round Up, with only four regions, all in the USA, reporting.

Eric Melebrink ran the Creative Corner, with Joe Hopkins of the Bishop Planetarium (Bradenton, Florida) describing modifying the wiring on carousel projectors for enhanced effects.

Mark S. Sonntag ran the Focus on Education column, with Charles Hagar outlining the operations of the Planetarium Institute, a coop-

erative effort of planetariums in the San Francisco Bay area.

The late Gerry Mallon, for whom a planetarium in Pennsylvania is named, wrote an article, "Planetarium Usage for Secondary Students." He states: "The study of mythology can...offer the members of a non-science class" an entry into how scientific understanding can grow out of non-scientific attempts to explain nature.

Jack Dunn had a second column, Sky Notes. In this issue he addressed an eternal problem for our field by reprinting "A Producer's Guide to Music Clearance."

In "What's New," James Brown reported new catalogs from the Hansen Planetarium and from Sky-Skan. The Astronomical Society of the Pacific was offering a packet dealing with astrology. The NASA-JPL animated film dealing with the Voyager encounters with Saturn was available.

Finally, an unsigned section reviewed four recent short films, including the highly regarded *Powers of Ten*.

June 1983 was an active time in space exploration. Pioneer 10 was regarded as becoming the first man-made object to leave the solar system that month. Venera 14 on June 2 was followed five days later by the launch of Venera 15. Other Soviet launches that month included several in the Kosmos series, numbers 1469, 1470 and 1471. A Soyuz was launched on June 27, and Gorizont 7 on June 30.

The European Space Agency sent up an Ariane rocket to put Eutelsat 1 and OSCAR 10 in orbit on June 16.

The United States launched NOSS on June 10. A High Latitude Research Satellite (formerly Transit O-16) launched on June 23, same day as Kosmos 1470. Galaxy 1 went up June 28. But probably most memorable was the launch of the Challenger Shuttle with Sally Ride becoming the first American woman in space on June 18.



Sally Ride's official astronaut photo. NASA



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Last Light



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Triple Conjunction Fun Continues

Dr. Jim Kaler's much-anticipated "state of astronomy" talk was one of the conference highlights. Delegates filled the auditorium at Carnegie after supper to hear the latest information from the solar system to the edge of the universe. Host James Hughes introduced a major change in the format: "This is his first power-point presentation! Give it up for James Kaler!" The whoop from the audience pinned the needles on the sound system and blew out the microphone.

"Well, thank you!" Dr. Kaler responded, when the equipment was functional, "All three of you!" (MAPS, GLPA, SEPA)

An image of Yerkes Observatory appeared, with his comment that "you can tell it's an observatory because it's near bright lights." He went on to say that he could probably just end the talk here, because earlier speakers had already mentioned the best parts.

"Now where's my laser pointer?" he asked a minute later. Half a dozen dots of laser light immediately appeared on the image, to which he said, "That's the trouble with a hard liquor bar."

Shaking the podium's laser pointer, he muttered, "Aw, the batteries are dying. Kind of like me." A few points from his talk:

SOFIA is nearly ready to fly. Observing with that telescope is "akin to flying through a hurricane during an earthquake."

There's no water at the south pole of our moon this year. Dr. Kaler described an exam-

question he had given his students last year: "Is there water on the moon?" with answer choices of "yes," "no," or "maybe." Between the time the exam was given and the grading finished, the answer had changed with the discovery of water. The right answer was wrong and the wrong answer was right.

Describing an analogy he gives in one of his lectures, "If you want to experience vacation on Venus, coat yourself with oven cleaner, climb into a self cleaning oven, and turn it on." Then he said, "Of course you have to quickly tell the students don't really do that, it's just an analogy!"

Recounting the Mars rovers' activities, "It had a 90 day warranty, and has been working over 1300 days. Wouldn't you like to have a car like that? But it moves very slowly, about an inch every two hours."

"It's hard to keep up with the number of Jupiter's moons. It's at 63 now. When I was a boy there were 12. Heck, when I was a boy there were four."

David Levy gave a wonderful talk about his adventures in astronomy, beginning with an observation of Mars in 1963. He described being at a camp in Colorado, and reading an article in Sky & Telescope about Mars at opposition. A call to a friend in the Denver Astronomical Society revealed that opposition would occur at 8:00 p.m.

Mr. Levy said, "And you know what that means, right? Right at 8:00 Mars would suddenly get huge and bright!" And he had a little three-inch telescope that he set up on the southern-most part of the camp grounds, out behind the girls' dormitory.

The telescope was set up in plenty of time, and Mars was centered in the eyepiece. Five minutes to 8:00...three minutes to 8:00...8:00...Mars stayed the same. No sudden big, bright "size of the full moon" apparition.

Disappointed, he took the telescope down and headed back to his own dorm, where he was met by the house director with a question, "What was he doing, looking into the girls' dorm with his telescope?"

"But I wasn't! I was looking at Mars!"

To which the house director replied, "You know, coming from you, I believe it."

As a young person, Levy said, all he wanted to talk

about was astronomy. One night at dinner, his father said, "Last week we talked about the stars. Let's talk about something different."

"I should have said, 'I know I'm excited about it, Dad. Maybe I'll be over it. Maybe I'll be over it by the end of tonight. We'll see.'"

Comets were another topic. Mr. Levy described Earth's retribution against comets impacting the planet for thousands of years. With the Deep Impact space craft, Earth "got a bit of its own back," smacking into Comet Tempel 1.

"For me, looking for comets is easy. Finding them is hard."

He described the discovery of Comet SL9 as "it was cloudy and raining that night. Gene (Shoemaker) was reading Time magazine, I was working on a book draft, Carolyn (Shoemaker) was scanning with the telescope. All of a sudden she stopped, backed up, and said, 'Gene, David—look at this. It looks like a squashed comet.'

While viewing a series of images of SL9 taken in January 1994, he noticed that one image was blurred. How could that happen? They checked all the instrumentation, and discovered that the Northridge earthquake had rocked the telescope slightly, ruining the image.

Your seventies quote for the day

The sun never says to the Earth, "You owe me."

Look what happens with a love like that. It lights up the sky. ★

A BAYS MOUNTAIN PLANETARIUM PRODUCTION
THE CASE OF THE DISAPPEARING PLANET

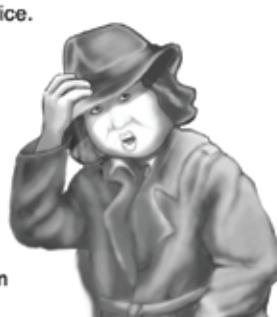


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