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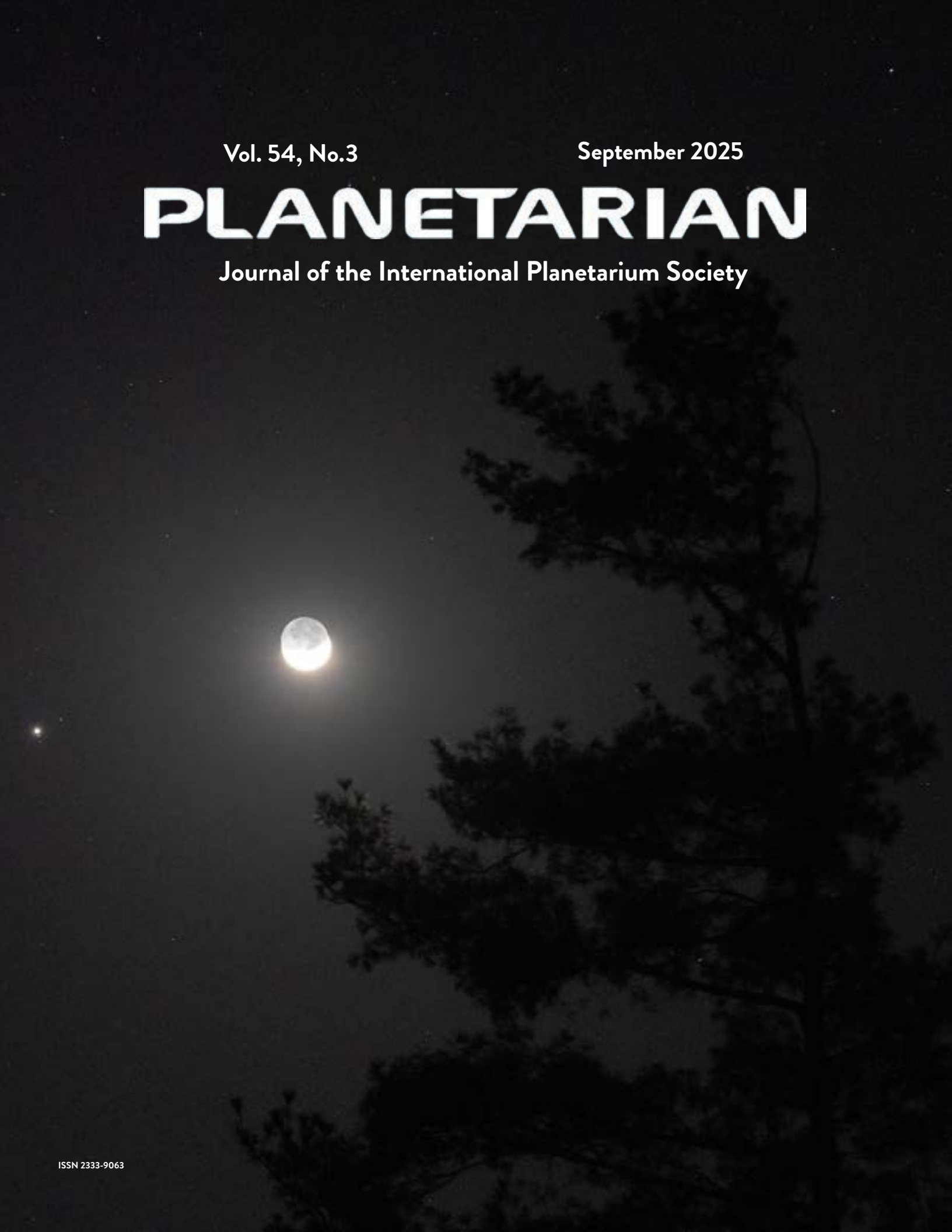

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The crescent Moon and Jupiter in conjunction on March 13th, 2024 by Ashleigh Dickenson.

Pictured is Ashleigh on her last weekend before maternity leave. She is one of our student interns and one of the many reasons our guests love visiting us. Take a moment and think about who makes your theater special. It really does take a Universe. Portrailt by Adam Thanz.

Have an image you would like to see on the cover of the Planetarium? Submit your photos to *editor@ips-planetarium.org* with the subject line “Cover Submission”. We love to showcase the work that our fellow planetarians are doing!

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IPS President Dave Weinrich
Welcome to the 2012
IPS Conference
Baton Rouge, Louisiana

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HELLO FELLOW PLANETARIANS!
A MESSAGE FROM THE PRESIDENT

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Our board met in June in Santiago, Chile at Planetario Chile at the Universidad de Santiago de Chile. We would like to thank our wonderful hosts Jacqueline Morey, Constanza Yovaniniz Letelier, and Rodrigo Miranda and their amazing team who were incredibly gracious to help us with planning and showing us their amazing facility. It was particularly special for me as this was my fourth trip to Chile but my first trip this planetarium. I have never been able to stay in Santiago long enough to visit, so I was happy to finally see it and to meet new friends. In addition, we had an opportunity to visit the newest planetarium, Planetario Huechuraba. It was a wonderful new facility dedicated to supporting its local neighborhood.

One of the major goals for the board, as mentioned in previous letters, was to establish strategic goals for IPS so we have a roadmap forward as we come out of some difficult years. Our organization has weathered the storms of the past several years well. To help keep us resilient it is important to set priorities and projects that take into consideration the current state of the world. The board did an excellent job distilling down our goals and coming up with some possible priority projects.

Overall, the board came to the conclusion that we do need to review the overall operational plan of the organization including looking at assessing and recommending changes for sustainability of the organization as it related to the organization's structure and financial health. To that end the major focus areas will include more professional development opportunities including investigating how to establish a certification program and how to get research published in the *Planetarian* to a broader research audience. We will explore other options for member benefits with a particular focus on establishing more language options for our work. And finally we will find ways of building community for planetarians through smaller, virtual meetings and other chances to share our work outside of conferences. Board members are taking the lead on these projects and will be building teams to make progress over the next 2 years. But these projects will not be done solely by the board, but we will be reaching out to membership for feedback and support.

At the meeting we also voted on the site for our 2028 conference. I am pleased to announce that IPS 2028 will be held in Buenos Aires, Argentina at Planetario Galileo Galilei. This will be our first conference in South America and our host, Dra. Estefanía Coluccio Leskow, is already planning on ways of making her city shine. We have been promised Tango lessons! So make sure to bring your dancing shoes.

♥

Shannon

P.S. UNSOLICITED BIRD FACT:

The national bird of Argentina is the *rufous hornero*. It is also known as the red ovenbird. In Brazil it is called João de Barro.


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EMOTIONS IN THE SKY
IN FRONT OF THE CONSOLE

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Sometimes you get lucky and one of the astronomers at your university shares a message on their Instagram asking if anyone wants to let him play in their dome. The answer being obvious, I immediately sent an email, subject line "Do you want to do a planetarium show?"

Dr. Kevin Hainline is an astronomer at the University of Arizona and a member of the James Webb NIRCam Science Team. He's also one of the most amazing science communicators I've had the pleasure of meeting and working with; he has presented several times in our theater to sold-out crowds. His ability to bring the love of space to people of all ages and backgrounds is an example that I aspire to. He is also insanely creative; At his presentation at Tucson Fringe Fest, armed with nothing more than an old-school overhead projector and his wit, he spoke to the audience about infinity and our place in the universe. Utterly impressed, I walked out knowing that there was someone to remember, someone I hoped to find the right time and project to collaborate on.

Those who know me know that I work fast - I tend to talk too fast, I juggle multiple things at once, I am always go, go, go. Kevin is that, but he is so much better at it than I am. Our first meeting was fast and productive - what if we could dovetail off of his presentation on infinity? Not just another presentation on Webb or a typical planetarium show, but something more, something that made you think and feel - and something with music. Kevin mentions he needs to speak with his wife -

Lara Ruggles is a Tucson songwriter who performs in various genres including folk and electro-pop (the latter under the moniker Sharkk Heartt - which as a shark-lover, I love). She plays the guitar, the keys, she sings, she tours - and she just so happens to be Kevin's wife. Talk about a power couple.

I sent that email May 7th. 2 meetings and 3 rehearsals later, we would debut "You Were Light" during our Science at Sunset programming to a sold out crowd. We were even offering our front two rows of seats that are too close to be an ideal view. 50ish minutes of planet-hopping, time-jumping, solar-system leaving piloting in Uniview, beautiful nebulaes from James Webb, Vera C. Rubin, and ESA's extensive catalog of nebulae perfectly timed to four hauntingly beautiful pieces created by Lara (accompanied by her bassist Jaxon Ovation and violinist Ryvyr Nyx) all laced together by Kevin's poetic oration about life, humanity, and space.

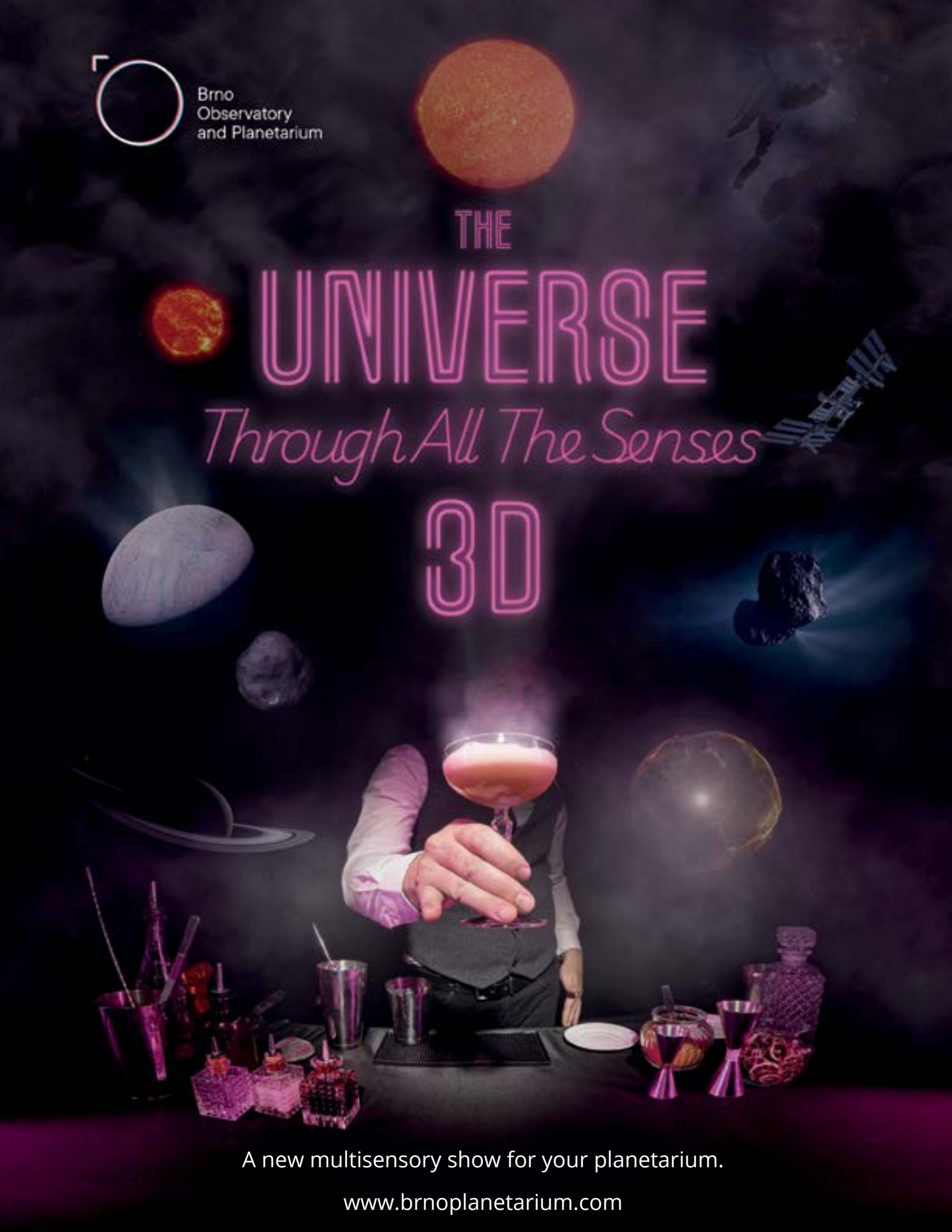
As I sit here writing this, remembering the final movement, I can feel the goosebumps forming. A monologue on how love is integral in us understanding the universe, and how we are made of the universe, from those initial creations of elements repackaged to create us. It was such a powerful piece on how we are part of a bigger picture, a picture that has no borders, no races, no gender. Listening back to the awe-inspiring

swells of music as Lara performed Who Could Have Known - it is the same feeling I had that night, that many had. Those final words were spoken and lights brought up to a standing ovation. There were tears, there was applause.

There was a feeling of unity.

I think, in the end, that is what I want people to leave our domes feeling. A sense that we are one, under one sky, and that we can be part of something so much bigger than the individual when we put aside the things that don't matter. Portable dome, star projector, digital projectors,LEDs -— we can spend all the money in the world but if we can't create programming that teaches and inspires, they don't mean anything. It is in that, that we should feel lucky. It is a privilege for us to get to help inspire others and work with others who share that passion. It was a privilege to work with Kevin and Lara - and it is a privilege to do what I do.

It's something I like to remind myself as I prepare to help celebrate Flandrau's 50th anniversary.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So, what exactly is a "sensory sensitive" facility anyway? It sounds like something from *Mission: Impossible* where priceless artifacts are kept under laser-detection protection. But a "sensory sensitive" facility is just a place that has been designed or adapted to accommodate those with sensory processing differences. This is also known, or referred to, as being neurodivergent.

When this is brought up, it's often assumed to be a program for those with autism. Although those with autism are a key demographic, people with sensory processing differences also include people with ADHD, PTSD, or anxiety.

Augmenting your planetarium and/or facility to accommodate the neurodivergent doesn't require any fancy installations or drastic upgrades. It's actually low-cost and rather unobtrusive. Making some slight changes and a few additions to your daily list of readily available materials to aid the neurodivergent isn't just a compassionate maneuver but a strategic, inclusive, and community-building one.

After all, the general assessment is that one in twenty people live with some form of sensory sensitivity due to autism, PTSD, ADHD, and anxiety. So, creating a welcoming environment which allows individuals and families to fully participate in cultural and educational spaces, not only aligns with many mission-based goals, but it also helps remove barriers and embraces universal design principles.

There are many families who are always looking for activities and facilities that cater to sensory sensitive people.

By making a few tweaks and additions to your facility's list of materials, you can help build trust and community relationships as well as expand your audience.

The Louisiana Art & Science Museum and Irene W. Pennington Planetarium used two main resources to implement a sensory sensitive initiative: KultureCity and the McMains Children's Development Center.

KultureCity is a website and app where you can get certified for being sensory sensitive inclusive. They offer staff training, promo materials, sensory bags, signage, and more. This is a group that can work with anyone across the country.

The McMains Children's Development Center is a local childhood development network that works with children with disabilities, providing physical, developmental, academic, and communication services.

LASM used KultureCity for their staff training, signage, and materials.

The KultureCity signage is a facility-wide series of signs letting people know where the quiet zones are located, if a certain area is meant for headphones, notifications that the facility is a sensory inclusive location, and that sensory sensitive bags are available to them at the front desk.

Within these sensory sensitive bags are a set of items helpful to those with sensory sensitive needs. There are noise suppressing headphones, strobe reducing glasses, fidget spinners, and visual cue cards to assist with communication and navigation.

These communication cards are used for people who have trouble communicating with others. They can use the cards to point out certain things they want, e.g. the restroom.

We were fortunate enough to also have McMains Children's Development Center on board. They walked with us through our building to help figure out where the best place to put designated quiet areas. McMains was also able to help us with how we should augment our planetarium programs for our special Sensory Sensitive Second Sunday program.

These special planetarium shows are a bit brighter, have subtitles, and quieter audio.

So, we used KultureCity to get things started. They provided the staff training, the signage we would use across the facility, the sensory sensitive bags we could hand out to those who wanted it, and helped cross promote us via their website and social media platforms. And we used McMains Children's Development Center to help us figure out where our quiet areas would be, the light level adjustments across the facility, and how to adjust the planetarium environment and programming.

Here are the first steps if you would also like to go down this path.

The first thing we did was contact KultureCity to setup an invoice and contract. The initial cost for setting up was $750. This cost gets you online staff training and they do require at least 50% of your staff to be trained before moving to the next level. LASM was able to achieve 93% staff training.

Once at least 50% of your staff are trained, they'll send you the signage, sensory bags, fidget spinners, headphones, soft mats, etc.

It's also good to provide KultureCity with pictures of your progress as you move through these steps so they can add it to their social stories. In doing this, they will also provide you with press release materials. In turn, they will update their app and website to reflect that your facility is now listed with them. So, anyone using their app to find areas in their town that cater to their needs will be able to find your facility with your programs.

But what about the planetarium? How do you adjust your planetarium shows and theater to suit these special needs?

Thanks to McMains, we were able to determine some things we could do to easily accommodate the neurodivergent. Keep in mind, this is for when we do our specific Sensory Sensitive Second Sunday programming schedule. We make a point

to advertise it this way and announce that our shows will be specifically catered to those with sensory sensitive needs.

For this special day of programming, we keep the doors open. McMains stressed that we should leave the doors to the planetarium open during the shows because some may feel they're less boxed in.

We also offer a set of closed-captioned shows: *Into America's Wild, Cosmic Colors, Audio Universe*, and *From Earth to the Universe*.

These shows also run at a modified sound level. The planetarium usually runs shows that peak at 70 to 75dB. For the sake of context, normal speaking level is around 60dB. McMains suggested we drop our normal audio level by 30%. This meant our shows for our Sensory Sensitive Second Sunday would cap out at around 50dB.

Having a night-time, low-light environment in the planetarium is, of course, an ideal situation. However, for these specific shows, we turn our blue LED cove lights up to about 50%. Now, I know this sounds like a lot, but 50% blue light is still fairly dim, doesn't affect the show quality too much, and is just enough light to make everyone feel comfortable and at ease.

If you've worked in a planetarium, you've probably come across someone who was just too afraid to walk inside the planetarium. On top of that, when the lights go out, they get even more scared. So, having the blue lights up to about 50% definitely helps. Also, there's one more thing you can do to help people, especially scared children, enter the theater.

There are these yellow "star stress relief toys for all ages" you can find on most online shopping platforms. They are these little squishy stars that typically are sold in bulk. When I have a child that's too afraid to go into the theater, I typically give them a little foam star and tell them the little star fell from the sky and misses his friends. I ask the child if they could be brave and keep the star company so he can go into the planetarium and see his star friends up above again. You'll be surprised to see that the story, coupled with the foam star, works quite well.

But prepping the planetarium is just one aspect of our facility. We're housed inside an Art & Science Museum, so we have to also adjust lights and sound across the facility.

For the size of our facility, it was recommended we have two designated quiet zones. These would be filled with sensory pea pod chairs, soft mats, fidget toys, headphones, and weighted pads.

In our art areas, we offer over-sized crayons, large paint brush adapters, pencil grips, easy grip paint, and more. These are, of course, always available and not just on our Sensory Sensitive Second Sundays.

These items and materials are available to all via our front desk and planetarium entrance.

Some of these changes are easier to implement than others. I know that all planetariums and facilities have their own thing going for them. All planetariums do things a bit differently. Everyone has a different budget. Everyone has different needs.

So, I want to briefly touch on how I make subtitles for some of my planetarium content.

This won't be a comprehensive how-to, but more of an overview on how I go about doing it. Because some planetariums can natively play .srt files (which is a standard subtitle file format) and some can't.

One thing I would do before starting this process is check with the film distributor to make sure you can add the subtitles to their original frame sequence. In fact, many film distributors may even have a subtitle file for you already.

However, sometimes you'll have to make your own. I, for one, had an older show about dinosaurs and the Baton Rouge School For the Deaf wanted to watch it but didn't know how to go about efficiently signing for each dinosaur name. They were going to make flashcards for the long dino-names but I was able to make subtitles for the entire show for them being that I had ample notice beforehand to make it all and render it.

What I do is take the original frame sequence and audio file and import them into Adobe Premiere Pro so I can use Premiere's new AI captioning feature. This feature will look

at your show audio and extract the voice-over and create a subtitle file for you. Now, you'll have to go through this to correct the grammar and spelling for certain things, but overall the heavy lifting has been done for you already.

Once it creates this subtitle sequence, you can add drop shadow and change the text color if you'd like. However, one thing you'll want to do is make sure the closed captions it creates are right in the center of the frame sequence. So, you might have to just reset the position and anchor point.

From here, I turn off the original frame sequence, leaving just the closed captions in the center of the frame with a transparent background. I will then export that closed caption frame sequence as a new frame sequence and into a new folder. Keep in mind to retain the same "frames per second" setting as the original show frame sequence.

From here, I open up After Effects and import the original show frame sequence and import the new closed caption frame sequence and put the subtitled one on top of the original frame sequence on the After Effects timeline. Now all you have to do is use the Navigar Fulldome plugin for After Effects to move the closed captions down to the bottom of the frame where you want it and it'll do the warping for you to make it appear correct on the dome screen.

Just export this new frame sequence with the subtitles overlaid and there you have it. It should sync perfectly with the original show audio. I just make two different buttons for each show: one with subtitles and one without.

Again, this isn't supposed to be an in-depth tutorial on how to make subtitles for your shows but to give an option to what's available and to get you thinking on how you can use certain tools like Adobe Premiere Pro's AI closed captioning ability.

So, with all the changes in place that could be made to our facility, and the options we have on the table for what we can do in the planetarium to suit the needs of the neurodivergent, how did we roll this out to the public?

We started off quiet at first. We wanted to work out the kinks and be able to make changes to how we did things. But once we were comfortable with what we had to offer, we began to advertise on our website and social media.

Of course, that's what most people would do. It's the standard go-to with marketing your brand and programs on social media. But we also began to do some other t
hings which really turned
the tide for us with this particular program.

We began to see a real change and uptick in attendance when we started to visit functions such as Rare Disease Day. We'd go to events like this, introduce ourselves to people

here, told them what we had to offer, and figured out how to cross-promote each other on our social media platforms.

We also would go out to site visits featuring Therapy Dogs of Baton Rouge and Bayou Buddy Therapy Dogs. Again, we'd introduce ourselves and cross promote across our channels.

We contacted "Be Like Buddy" and the Autism Society to coordinate our social media posts with each other. We ended up getting on their platforms and becoming listed as a facility that offered programs for neurodivergent people.

There are also "event of the week" announcements you can seek out on social media and local news outlets. They're always looking for content to promote and be part of their "event of the week."

So, as you can see there are more opportunities available to promotion than just making a social media post. There's reaching out to specialized groups in the community that can list you on their site and cross promote you on their own

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WOMEN WHO LOOKED UP

Linda Kucan

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Figure 1: Stained glass window of Urania, Allegheny Observatory, Pittsburgh, PA

The School of Athens by Raphael (1509-1511)

This article is based upon a presentation shared by the author at the Allegheny Observatory, Pittsburgh, PA, on May 28, 2025.

There is a growing interest in documenting the women who engaged in astronomical endeavors in the mid-1800s to the mid-1900s. This article describes the contributions of some of those women.

To begin, consider that the muse of astronomy is a woman—Urania. She is often represented with her arm upraised as if to invite or exhort her viewers to look up. At the Allegheny Observatory in Pittsburgh, PA, there is a stained-glass window depicting Urania with that gesture.

Urania's invitation to look up has been accepted by many women. Some of them are described in this article. The first is Hypatia of Alexandria (370-415 CE). Hypatia was a philosopher, mathematician, and astronomer. Her teacher was her father Theon, himself a well-known mathematician and astronomer. It is said that Hypatia surpassed her father's knowledge at an early age. She became a renowned teacher herself. According to her student Synesius, Hypatia considered astronomy to be "a divine form of knowledge" (Dzielska, 1995, p. 54).

Figure 2 shows Hypatia in Raphael's painting entitled "The School of Athens," which he created for the Vatican's Apostolic Palace in 1509-1511.

You can see Hypatia on the left in the painting. She is the only figure looking directly at us viewers. In the center are Plato in a red robe, pointing up, and Aristotle in a blue robe, with his hand seeming to press down. According to some sources (Kenney, 2023), a bishop asked Raphael who the beautiful lady in the painting was, Raphael answered: "She is Hypatia of Alexandria ... certainly one of the greatest thinkers ever." The bishop demanded that she be removed. As you can see, she's still there.

It's a big jump from the fifth century to 1750, but that's what we need to do to talk about Caroline Herschel, the first woman to hold a position as a professional astronomer. Catherine Herschel was born in Germany, one of six surviving children in the family. William was her older brother. Caroline's father judged her to be unfit for marriage because typhus and scarlet fever left her with a scarred face, a loss of vision in her left eye, and a small stature. She was

probably only 1.22 m tall (4 ft). So she was destined to keep house for her family until William, who had emigrated to England, sent for her.

William knew that Caroline was curious and intelligent—and that she could sing. That's why William sent for her—at first. He earned his living as a music teacher, musician, and director of his own chorus. He trained Caroline so that she was able to perform as a featured soprano. In that role, she also earned a living.

But both William and Caroline were intrigued by the stars, and eventually William abandoned his music lessons and performances to build telescopes. William learned everything about constructing those instruments from reading books and astronomical tables.

William later sent for his younger brother Alexander, who was skilled at making mechanical things, including very precise clocks. The three Herschels worked together to build reflecting telescopes: 1.52 m (5 ft), 2.133 m (7 ft), and the most powerful and useful—6.09 m (20 ft). Their house in Bath had no yard to set up their largest telescope, so William dragged it into the street each night.

One evening, Dr. William Watson, a member of the Royal Society, was walking by and saw it. Watson encouraged William to join the local version of the Royal Society and to submit papers describing his findings. William wrote about many things—the mountains on the moon, the method of making telescopes, speculations about nebulae.

On March 13, 1781, William reported the siting of what he thought might be a comet or star. The object turned out to be a planet, later named Uranus. William's friends advised him to name it after King George III who would be obliged to repay him with a position. However, the position of Royal Astronomer was already filled, so the King offered 200 pounds per year for William to move closer to Windsor Castle and to provide astronomical presentations for the entertainment of the royal family and their guests. The King also gave his permission for William to make and sell telescopes, mirrors, and lenses. And he agreed to pay for the construction of a 12.19 m (40 ft) telescope.

As shown in Figure 3, Caroline assisted William by writing down his observations, which he called out to her. Because she could take the notes, William could keep his eye on the telescope eyepiece and preserve his night vision.

Caroline and William were able to do their work because of the King's stipend, but the King was quite demanding, requiring Herschel to bring his telescope to Windsor Castle for parties. However, that proved impractical and detrimental to the apparatus, and the King soon lost interest in making the journey to the Herschel household in nearby Slough. However, the King demanded that Herschel travel to the University of Gottingen to present a telescope as a gift. While he was away with Alexander, Caroline was in charge. She took on the work of observation and record-keeping as well as overseeing the construction of the 40-foot telescope. On December 21, 1786, Caroline discovered her first comet. People referred to it as the Lady's Comet, and Caroline was famous. She kept meticulous notes and diagrams and went on to discover seven more comets and three nebulae.

When the King came to review progress on the 12.19 m (40 ft) telescope, William explained that more money was needed. In a letter to the King, William wrote:

You know, Sir, that observations with this great instrument cannot be made without four persons: the astronomer, the assistant, and two workmen for the motions. Now, my good, industrious sister has hitherto supplied the place of assistant, and intends to continue that work. She does it indeed so much better... than any other person I could have, that I should be sorry to lose her from that office. Perhaps our gracious Queen, by way of encouraging a female astronomer, might be induced to allow her a small bounty...which would make her easy for life.... Lemonick, 2009, p.117)

And that's what happened, Caroline received a pension of 50 pounds per year and became the first woman to receive payment for her scientific endeavors. In 1828, six years after William's death, Caroline was awarded the Gold Medal of England's Astronomical Society. She

Figure 3 (left): William and Caroline Herschel; Figure 4 (below): Caroline Herschel at the age of 78, one year after being awarded the Gold Medal of the Royal Astronomical Society in 1828.

earned that honor not for just noticing a comet. In 1797, she completed the "arduous task" of organizing, updating, and correcting the catalogue of fixed stars originally published by John Flamsteed in 1725 and used by astronomers throughout the world. She completed a second catalogue of all the objects William had observed (8,760) along with their celestial coordinates, which she calculated individually.

Caroline Herschel was an inspiration but also a provocation to other women, including Maria Mitchell, another notable woman who looked up. Maria grew up in a Quaker family of ten on the island of Nantucket, which is about 30 miles south of Cape Cod, Massachusetts. Nantucket was a unique place. Its citizens were nourished by libraries and book clubs and lecture series. It was a vibrant intellectual community, and the Mitchell family contributed to that community in tangible ways. Maria's mother Lydia had been a librarian and her father William was a popular lecturer and teacher.

William Mitchell was also a well-respected expert at maintaining chronometers, very accurate portable clocks that showed the exact moment when it was noon at the Nantucket longitude. Sailors could consult a chronometer and compare their position at noon to the known position of Nantucket at the same moment and determine their location.

In 1831, using a smoked lens, William Mitchell observed an annular eclipse during which the moon seems to be centered on the face of the sun, leaving an annulus, or ring of fire, around it. Maria counted the seconds as the moon moved across the sun.Mitchell coordinated his readings with astronomers in two nearby sites which allowed him to calculate the exact longitude of the Mitchell house. That measurement allowed him to set chronometers with even more precision than before.

Like William Herschel who depended on his sister Caroline for mathematical calculations, William Mitchell depended on his daughter Maria for her mathematical expertise. She gained that expertise through self-study. In 1835, she was appointed the librarian of the Nantucket Atheneum. The Atheneum was a library and a museum, open to the public for a limited time each day. Maria used the other hours to study, focusing on advanced mathematics.

The next year, Maria's father was appointed the director of the Pacific Bank, which included an apartment for the family on the top floor of the bank. It was on the roof of that building that he installed a telescope, and it was with that telescope that Maria discovered her comet.

How do you discover a comet? Of course, there is some luck involved in being at the right place at the right time. But of more importance is what the observer knows about the sky she's looking at. She knows what she has seen night after night, season by season. Only that knowledge allows her to notice what has not been there before.

From 1836 to 1847, Maria Mitchell climbed to the roof of the Pacific Bank and looked up. On October 1, 1847, Maria slipped away from a dinner party at the Mitchells' home to look through the telescope and saw the comet. Maria not only observed the comet, she also calculated its complex trajectory. For her discovery, Maria was awarded a medal from the King of Denmark. His image is engraved on the front of the medal, and Urania is on the back.

Maria's life was never the same after that. Her quiet days in the Atheneum were disrupted as visitors came from all over the United States to see her. However, a more positive outcome was her election as an honorary member of the American Academy of Arts and Sciences, the first woman to secure this honor.

And she was hired as a computer for the United States Navy's *Nautical Almanac*. Maria's job was to calculate the positions of Venus throughout the year so that navigators could use those positions to determine their location. Navigators can use the measurements to determine their location using a sextant. To this day, every large ship is required to carry a sextant.

Maria was paid well for this work, and she could do her calculations wherever she happened to be. Using her savings and salary, she decided to travel to Europe to visit astronomers and observatories across the continent and England. On her journey, Maria was treated with respect and enjoyed access to the homes and observatories of the most revered astronomers, including John Herschel, Caroline's nephew. After a visit with the Herschel family, John gave Maria one of the notes that Caroline had written as she recorded her brother William's observations. Maria noticed that "each sentence began with the letters *W.H* (for William Herschel): 'W. H. says ..., ' 'W. H. thinks ...,' 'W. H. has put it in both zones...,' and so on. The initial *C,* for Caroline, is nowhere." (Bergland, 2008, p. 111).

Caroline's persistent subjugation to her brother was something that Maria found repugnant. Thoughts of Caroline's self-subordination might have been on Maria's mind when she applied for permission to visit the Vatican Observatory. That application was summarily rejected—only because Maria was a woman. Permission was finally granted when Maria petitioned American diplomats and church officials. Even so, Maria was only permitted to see the telescope, not to use it. She was only allowed to remain in the observatory until dusk- right before the best time for observing the night sky.

Renee Bergland, one of Mitchell's biographers, asserted that Maria's experiences in Europe had radicalized her, and that she left Rome" with a strong commitment to the fight for women's education...." (Bergland, 2008, p. 135). The opportunity to honor that commitment was provided when she was offered a position at the newly established Vassar College for women. It was here as the first woman professor of astronomy that Maria established her legacy.

Ironically, the appointment of women as professors at Vassar was a controversial issue. Women were eventually

Maria Mitchell (seated) with her student Mary Watson inside the dome of the Vassar College Observatory, possibly from the 1880s. (Vassar College)

appointed, but their salaries were consistently lower than those for men.

Maria's compensation at Vassar included her salary but also lodging, and those lodgings were in the Vassar Observatory. She had a cot there in the same room where she was to teach her classes.

Maria engaged her small group of students in astronomical observation and calculation. She traveled with them to Iowa in 1869 to observe the solar eclipse. She and her students also wrote the monthly astronomy column for Scientific American, which included calculations of the positions of planets.

Maria taught at Vassar for 22 years. She retired to Nantucket in 1888 and died a year later. Antonia Maury, one of her students, secured a position as a computer at the Harvard Observatory.

At the Harvard Observatory, a group of women called the Harvard Computers not only catalogued the stars but also organized critical information about them leading to important discoveries and theories. These women formed a unique group who looked up by looking down. That is, they studied the heavens not by looking through telescopes but by looking down at photographs.

The Harvard Observatory was constructed on Summerhouse Hill in Cambridge in 1844 where its 5.90 cm (15 in) Great Refractor telescope was installed in 1847. The fourth director of the Observatory was Edward Pickering, who was appointed in 1876.

Pickering wanted to do more than document the positions and movement of stars which was the focus of then-current observational astronomy. He wanted to study the features of stars—their brightness, their chemical composition. He also wanted to understand variable stars—those stars whose brightness seemed to wax and wane across different spans of time.

Meanwhile, Henry Draper and his wife Anna Palmer Draper worked together using their own telescopes to photograph stars such as those in the constellation Orion and planets such as Jupiter. They also photographed stars including the sun through prisms that allowed them to capture spectra: patterns of lines that spoke to the chemical composition of the stars.

Upon Henry's untimely death in 1882, Anna Palmer Draper gave the photographic plates and notes that she and Henry had collected to Pickering for analysis and publication. She provided ample funds and donated one of Henry's telescopes to support what came to be known as the Henry Draper Catalogue.

The photographic plates and notations from the Draper collection were the initial data set studied by the Harvard computers Nettie Farrar and then by Williamina Paton Fleming. With thousands of spectra available in the Draper collection, Fleming's task was to describe the criteria for assigning stars to specific categories.

Fleming created 16 categories with a focus on the overall pattern of the spectral lines. Pickering published The Draper Catalog of Stellar Spectra in 1890, citing the work of both Nettie Farrar and Williamina Fleming.

When Pickering found a way to enlarge the spectra, he asked Antonia Maury (former student of Maria Mitchell), to work on organizing the characteristics. With the enlarged spectra, she could see that the spectral lines were not only thick or thin but also hazy or fluted. She included such detail in her descriptions. Pickering cited Maury's work in the report of 1891.

In that same year, Harvard established an observatory in the mountains of Peru. Funded to a large degree by a gift of $50,000 from 73-year-old Catherine Wolfe Bruce, eldest

Figure 6 (above): Harvard computers examining photographic plates. Williamina Fleming standing. **Figure 7 (right):** Annie Jump Cannon and Henrietta Swan Leavitt in 1913 *(Harvard University archives)*

surviving child of her father George Bruce, a successful leader in printing processes. Conditions in Cambridge compromised the night sky—too much light from streets and homes and the rattle of streetcars was affecting the stability of the telescopes in the Harvard Observatory. So the Peru observatory was invaluable.

When Annie Jump Cannon came to the observatory in 1896, Pickering asked her to examine the photographic plates from Peru that captured the stars of the southern hemisphere. Cannon built on the work of Farrar and Fleming and Maury and examined thousands of photographic plates. Her categorization scheme was the basis for further schemes which included color and temperature as well as luminosity and presence of hydrogen lines in the spectra.

Pickering's research agenda included developing a principled stellar taxonomy but he was also interested in variable stars. He assigned that work to Henrietta Swan Leavitt. Variable stars are stars whose brightness seemed to increase and decrease over different spans of time. Leavitt used the data she collected from comparing thousands of photographic plates to describe a relationship: the brighter the star, the longer the time or period of variability. It was an insight that was only possible by organizing the data and noticing what no one else had noticed.

Who were these women who spent so many hours poring over black and white photographic plates in wooden frames, using magnifying glasses and mirrors to capture the light to illuminate them?

Williamina Fleming was born in Scotland and came to Boston with her husband in 1878. He abandoned her and their young son soon after. Needing to find a way to support herself and her young son, Fleming worked as a housekeeper for the Pickerings. Pickering's wife Elizabeth recommended Fleming to her husband, saying that she had exceptional talents well beyond household tasks.

Pickering hired her in 1881 to continue work on the categorizing of stars, but she also made important discoveries as a result of her scrutiny of all those photographic plates. She discovered 59 gaseous nebulae, including the Horsehead Nebulae, more than 310 variable stars, and 10 novae. She became the first woman to hold the position of Curator of Astronomical Photographs at Harvard.

Antonia Maury came from a family that encouraged scientific pursuits. She was the niece of Henry and Anna Draper. She attended Vassar College and studied with Maria Mitchell, graduating with honors in physics, astronomy, and philosophy. She became a Harvard computer in 1888. Although Pickering disagreed with Maury's classification system, she defended it and other astronomers used it because of its fine distinctions.

Maury left Harvard citing the unfairness of her findings being credited to Pickering with only a sentence about her contribution. "I worked out the theory at the cost of much thought and elaborate comparison, and I think that I should have full credit for my theory of the relations of star spectra," she wrote. Maury became a teacher of physics and chemistry at a girls' school, but in 1918 returned to Harvard as an adjunct professor.

Annie Jump Cannon was inspired by her mother, Mary Elizabeth Jump, to study science. She suffered hearing loss

from an early age, but that did not deter her curiosity. She and her mother built a little observatory on the roof of their house so they could view the stars. Her mother encouraged her to go to Wellesley College and to study science and math, which she did, graduating as the valedictorian of her class. Cannon studied astronomy at Radcliffe and was hired to work at the Harvard Observatory in1896. Like Fleming, she became the curator of astronomical photographs. She was the first woman to receive an honorary doctorate from Oxford.

Henrietta Swan Leavitt was the daughter of a minister, and she remained faithful to her religious beliefs throughout her life. She attended Oberlin and then transferred to Radcliffe. She became deaf later in life and had poor health, but she relished her work at the Harvard Observatory which began in 1895. Like Maury, however, Pickering took initial credit for her discoveries and published them under his own name with just a sentence about her involvement in preparing the information.

Another Harvard Computer was Cecilia Payne, later Payne-Gaposchkin. Payne was born in England and received a fellowship to the University of Cambridge, where she was enrolled in Newnham College, the college for women. At Cambridge, she began a course of study in botany, but a presentation by Arthur Eddington changed her life forever and raised her sights to the stars. A fellow student who had one of the 4 tickets for Eddington's presentation allotted to Newnham College became ill and gave her ticket to Payne.

Eddington spoke about his documentation of evidence to support Einstein's theory that the light of a star would bend when it came close to a massive star. That bending was caused by what Einstein described as the warping of spacetime. A solar eclipse in 1919 provided an opportunity to test that theory. Photographs that captured a shift in the position of stars would prove that bending. Eddington traveled to West Africa in May. With a break in the overcast skies, he was able to secure those photographs. In December, he was in Cambridge explaining what he discovered, and Payne was in the audience. She said that the talk was a "thunderclap' and she couldn't sleep for three days after it.

Later at an open house at the observatory, Payne approached Eddington and said that she wanted to become an astronomer. Eddington replied, I can see "no insuperable objection" (Moore, 2020, p. 100). With that rather limited encouragement, she was off: taking astronomy courses, studying professional journals, and opening the Newnham observatory which had not been used for many years so that she could explore the night sky. And working at the Cavendish Laboratory where she could learn from Eddington, Ernest Rutherford, and Neils Bohr—scientists engaged in cutting-edge research in quantum physics. Rutherford provided evidence of an atomic nucleus which contained the greatest part of the mass of an atom, and Bohr explained the orbits of electrons and how electrons could "jump" from one orbit to another in bursts of quantum energy.

In 1922, a classmate took Payne to hear Harlow Shapley, the new director of the Harvard Observatory. After the talk, Payne approached him and asked if she could work for him

Figure 8: Annie Jump Cannon and Henrietta Swan Leavitt in 1913 *(Harvard University archives)*

in America. He encouraged her and the next year, she was awarded a Pickering Fellowship along with other funds from grants and prizes which allowed her to make her move.

When Payne arrived at the Harvard Observatory in 1923, she was assigned the desk that had belonged to Henrietta Swan Leavitt. Shapley encouraged Payne to build on Leavitt's work on variable stars, but Payne wanted to pursue her own research agenda.

She had knowledge that would allow her to re-analyze the photographic plates in the Harvard Observatory collection. As Dava Sobel described it: "Cecilia Payne patiently sifted the same objective-prism plates that had passed through the hands of Nettie Farrar, Williamina Fleming, Antonia Maury, and Annie Cannon. In the ... line patterns, which had helped her predecessors sort the stars into categories, Miss Payne read a new subtext. It concerned the actions of individual atoms, absorbing and releasing tiny quantities of light" (Sobel, 2016, p. 206).

Like the other Harvard computers, Payne studied thousands of photographic plates. Unlike the other computers, however, she was working on a PhD, and she knew about photons and electron energy levels.

So what was she looking at, and what was she able to find out? She was looking at star spectra and measuring the width of spectral lines that revealed what elements were present. She used her measurements to determine which elements were the most abundant—what elements made up the composition of the stars.

What Payne discovered was that the stars she studied were mostly made of hydrogen and then helium. This finding was unexpected. Most theories about stellar composition suggested that the stars were made of the same elements as the Earth. And those theories were held by the people who needed to approve her dissertation, specifically the Princeton

astronomer Henry Norris Russell. Without Norris's approval, no one would sign off on the dissertation.

Shapley knew that Payne had to qualify her findings—and so she did. She wrote: "Although hydrogen and helium are manifestly very abundant in stellar atmospheres, the actual values derived … are spurious.… almost certainly not real" (Moore, 2020, p. 183). Payne's daughter said that: "She always regretted it…throughout her life, she lamented that decision" (Moore, 2020, p. 183).

In 1925, Payne published her dissertation. Four years later, Henry Norris Russell wrote a paper confirming the high percentage of hydrogen in stars. His method of analysis differed from Payne's, but it yielded the same result.

Payne-Gaposchkin (she married in 1934) went on to become the first woman appointed as a full professor at Harvard and chair of the astronomy department. Ironically, she was awarded the Henry Norris Russell Prize from the American Astronomical Society in 1976. In her acceptance speech, she said: "The reward of the young scientist is the emotional thrill of being the first person in the history of the world to see something or to understand something" (Moore, 2020, p. 250). So Payne-Gaposchkin had that personal thrill of realizing what she had discovered, but she also had the bitter experience of not having her discovery recognized.

While women astronomers were working at Harvard, there was another group of women at Yerkes Observatory in Williams Bay, Wisconsin. Their story is just beginning to be told.

Andrea Twiss-Brooks, director of humanities and area studies at the University of Chicago Library, was working with historical material related to the Yerkes observatory, when she came across a photograph taken in 1921 to commemorate a visit by Einstein. As Twiss-Brooks and her team studied the photo, they were amazed by the number of women in the group—8 out of 20. Luckily, someone had written the names of the people in the photo. Those names were the beginning of an investigation into the Yerkes Observatory archives that documented the important role of women astronomers and the welcoming culture that they found there (*https://news.uchicago.edu/story/records-reveal-hidden-history-female-astronomers-yerkes-observatory*).

Like Harvard, Yerkes had a vast collection of photographic plates. 175,000 at Yerkes; 550,000 at Harvard. Preparing to digitize the photographic plates from Yerkes, a team from the University of Chicago discovered the signatures of women on the plates and in the logbooks. Ultimately, they discovered that more than 100 women were involved in astronomical research at Yerkes. Several factors made this possible. For one, Edwin B. Frost, the director of the Yerkes Observatory, was a suffragist. He fostered an atmosphere in which women held the same jobs as men. In contrast, at Harvard where Pickering was the director, women were physically separated from men.

Another factor was that Yerkes was part of the University of Chicago, which was a coed institution. So women could work at Yerkes and pursue advanced degrees at the University. A nearby train line to Chicago made travel safe and easy. Again, this was not the case at Harvard until Cecilia Payne-Gaposchnik earned her PhD in 1925—but that degree was conferred not by Harvard but Radcliffe, the college for women. Of 9 PhDs awarded for research by Yerkes astronomers, 3 were earned by women.

There are difficulties in documenting the women who worked at observatories in the latter part of the nineteenth century and the early part of the twentieth century. As described by Zrull in an article about the Harvard computers (2012), archival records are not comprehensive, and the only traces of many of the women who analyzed the photographic plates at Harvard are simply their initials on the plate envelopes.

However, research into the lives and work of the women astronomers at Yerkes is ongoing. And there are similar efforts being undertaken at the Detroit Observatory. There is an online exhibition of the women at the Detroit Observatory, focusing on those who earned their PhDs in astronomy from the University of Michigan, which admitted women to degree programs in 1870 (*https://alumni.umich.edu/education-gateway/events-exhibits-lectures/aiming-for-the-stars-early-women-astronomers-and-the-detroit-observatory/*). Another site of documentation is an online resource documenting the women astronomers at Mt. Wilson (*https://www.mtwilson.edu/women-scientists-at-mount-wilson-observatory-during-the-early-years-part-one/*). All of these efforts speak to the desire to acknowledge and describe the women who looked up and whose work provided a foundation for advances in astronomy.

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KITZ THE CAT'S 2
SECRET OF THE SPACE STATION
BEIJING
International Film Festival
2025
AUDIENCE AWARD
BRNO
Fulldome Festival
2025
DIRECTOR'S AWARD
CREATIVE SUMM
Director/Writer KWON O CHUL CHO HEA SEUNG
Music KIM SU JIN Sound CHO KYE HWAN
KWON O CHUL
ASTROPHOTOGRAPHY

SEE YOU IN FUKUOKA — IPS 2026

Youhei Fujikake

INTRODUCTION

There are only Nine Months to go until IPS 2026 FUKUOKA. This will be the first IPS conference held in Japan in 30 years. Some of you reading this article might hesitate to attend due to the long distance to Japan. On the other hand, many may be excited, thinking, "What a great opportunity to finally visit Japan!" or "I can visit Japan again!" We hope this article inspires you to join us. Please mark "IPS 2026 FUKUOKA" in your calendar for June next year.

The Fukuoka team, led by the Local Organizing Committee (LOC), is already hard at work to ensure that every attendee feels, "I'm so glad I came to Japan." We're already excited just imagining the day we can welcome you to FUKUOKA.

Several members of our team attended IPS 2024 in Jena-Berlin last July. It was a remarkable conference commemorating the 100th anniversary of the planetarium, held in the country where planetariums were born. The rich program and warm hospitality made a lasting impression on us. We returned to Japan deeply inspired by the dedication of the IPS 2024 team, and we are truly grateful for the continued support and advice they've provided since the event.

In June 2025, Dr. Shannon Schmoll, President of the International Planetarium Society (IPS), visited Japan and participated in the JPA (Japan Planetarium Association) Annual Conference held in Osaka. During her stay, she actively engaged with numerous Japanese planetarians and shared the value and vision of IPS.

Following the conference, Dr. Schmoll conducted site visits to several venues for IPS 2026 Fukuoka, including the Fukuoka City Science Museum. She also attended meetings with the Local Organizing Committee (LOC), made courtesy visits to the local press and the Fukuoka City Officials, and observed an educational planetarium program for elementary school students at the Fukuoka City Science Museum. Her warm interaction with the children were later featured on local television.

We extend our heartfelt gratitude to President Schmoll for her dedication and for fulfilling such a demanding schedule during her brief yet impactful visit to Japan.

FUKUOKA, THE CITY THAT EMBODIES "ONE EARTH, ONE SKY"

The theme of IPS 2026 FUKUOKA is "One Earth, One Sky." For all of us living on a single planet, building a sustainable society is a challenge we must continue to address. Planetariums are tools for viewing the Earth and sky—they help us understand our place in the universe and envision the future. One of the core aims of this conference is to bring together colleagues from around the world who are connected to this remarkable instrument, and to collaborate for a brighter future.

FUKUOKA is the ideal host city. Leveraging its location ideal for both communication and living, the city was established over 2,000 years ago as a hub where people, goods, and information gathered. Through connections

via sea and land, Fukuoka has developed a rich culture and grown into the vibrant city it is today. Its history of encountering diverse cultures has fostered flexibility and creativity, making it an ideal place for a gathering of international cultures. We invite all participants to fully enjoy what FUKUOKA uniquely offers—its venues, cuisine, and w

TENTATIVE CONFERENCE SCHEDULE AND PROGRAM

Japanese planetariums have followed a unique path of development, and IPS 2026 FUKUOKA will provide a fresh and distinctive perspective on this evolution. Below is a draft of the current schedule and program (subject to change):

JUNE 18–19: PRE-CONFERENCE

A full-dome festival will take place at the Dome Theater of the Fukuoka City Science Museum, featuring curated feature-length films from various countries worldwide. We are also planning a short film contest in collaboration with the International Festival of Science Visualization (IFSV), showcasing dome productions by international creators, as well as Japanese students. Night sessions will include programs featuring anime characters—a uniquely Japanese experience.

JUNE 20–21: IMERSA / IPS BOARD MEETING

Workshops and public events hosted by IMERSA will take place at the Fukuoka City Science Museum. The welcome event will be held at the Ohori Park Noh Theater, where we will greet you with a traditional Noh performance, followed by a reception at a venue unique to Fukuoka.

JUNE 22–23: IPS CONFERENCE AT THE FUKUOKA CITY SCIENCE MUSEUM

IPS sessions will take place in the Dome Theater and Science Hall of the Fukuoka City Science Museum. Sponsors will demonstrate their latest equipment and visual technologies. Additional sessions and workshops will be held in the exhibition rooms and laboratories. The surrounding Ropponmatsu area is full of cafés, restaurants, and shops offering everything from fast food and traditional Japanese cuisine to Chinese and other international dishes—it will surely create delicious and enjoyable memories.

JUNE 24–26 (MORNING): IPS SESSIONS AT INTERNATIONAL VENUES

From June 24 to the morning of the 26th, the conference will move to the FUKUOKA KOKUSAI CENTER and the FUKUOKA INTERNATIONAL CONGRESS CENTER. These two venues are located next to each other, separated only by a hotel. At the KOKUSAI CENTER, sponsors will present their latest technologies and visual works. Meanwhile, at the CONGRESS CENTER—which features over 20 conference rooms, including a main hall with a capacity of 1,000—sessions and workshops will be held.

SESSION THEMES INCLUDE:

General Topics: (1) Philosophy, (2) Technology and Hardware, (3) Management, Operations, and Public Relations, (4) Public Programs, (5) Planetariums and Astronomy Education, (6) Inclusion, Diversity, Equity, and Accessibility, (7) Mobile Planetariums, and (8) The Future of Planetariums.

Special Sessions: (1) International Gathering of Planetarium Enthusiasts, (2) Star Lore from Around the World, (3) Planetariums and the Space Development Industry, (4) Japan's Planetariums and Observatories from Both Domestic and International Perspectives: The Progress and Future of Astronomical Education, and (5) Japanese Anime Culture and Planetariums.

We are looking forward to receiving proposals from participants showcasing your work and research.

ADDITIONAL EVENTS AND NETWORKING OPPORTUNITIES

Additional events such as LIPS, joint sessions, and happy hours are currently being planned. The Japan Planetarium

(Continued on pg. 25)

FULLDOME FESTIVAL BRNO MARKS A DECADE!

Brno Observatory and Planetarium had the honour of welcoming representatives of the fulldome community from around the world under their dome for the 10th time to binge-watch the newest content on the market.

This three-day fulldome marathon took place from June 10 to 12 and hosted professionals from 27 countries! Together, they had the chance to watch an incredible 46 shows, with a total runtime of 15 hours. Needless to say, this requires serious determination and enthusiasm. While many participants return year after year—some for the movies, some for the people and networking—there are always plenty of newcomers. The festival continues to grow in popularity, and its name is becoming recognized across continents. This makes us very proud, especially considering how minimalistic the original idea was.

It all began in 2014, when Brno Observatory and Planetarium invited colleagues from other Czech planetaria to Brno to present a sample of new fulldome productions from Mirage 3D. Robin Sip, the founder of Mirage 3D, not only agreed with the idea, but personally came to the event. It was Robin who persuaded us to repeat this idea, however on a larger scale. And so, the very next year, the first international festival was held in Brno.

At the time, it was called only a Central European Festival. We were modest and didn't expect much attention—it was just an experiment. But to our surprise, that experiment caught the eye of the team from Warsaw Planetarium, where the next IPS conference was to be held. It was a huge surprise when we were offered the chance to host the official IPS Fulldome Festival of 2016. Thank you Maciej Ligowski for believing in us!

That moment acted as a kickstarter, and since then, the festival has kept evolving, always striving to provide an unforgettable experience. Over time, the event's popularity has soared—demand for tickets has gone through the roof. For example, tickets for the 2025 edition sold out just 96 hours after release. Who would have thought, back in 2015, that people would one day queue for tickets to the Fulldome Festival Brno?

Ten years later, we're proud of what our small festival has become. We're grateful for all the friends we've made along the way and even more eager to make new ones. We are incredibly thankful to all the participants, producers, sponsors, and supporters who helped us on this journey. We promise to keep the original core idea alive: no lectures, no workshops, only shows—just friends gathering under one dome to chat, have fun, and binge-watch the newest fulldome content on the market.

Association (JPA) will hold its general meeting during the IPS conference, and the Japan Public Observatory Society (JAPOS), which is celebrating the 100th anniversary of Japan's public observatories, will also participate. This will be a wonderful opportunity to connect with many Japanese professionals in astronomy and planetariums.

JUNE 26 (AFTERNOON): EXCURSIONS AND BANQUET

In the afternoon of the 26th, excursions will be organized in and around the Fukuoka area. In the evening, a banquet will be held where guests can enjoy a fusion of Japanese and Western cultures. This will also be a highlight of the conference's social networking.

POST-CONFERENCE TOUR

Starting on June 27, post-conference tours are currently under consideration to offer participants the chance to further enjoy Japan. The tentative itinerary includes visits to leading planetariums, observatories, and sightseeing spots in Kyushu, Osaka, Nagoya, and more. We warmly encourage your family members to join us as well! More detailed schedules and participation information will be updated on our official website:

https://www.ips2026fukuoka.com/jp/

IN CLOSING

Fukuoka is one of the most convenient cities among Japan's major urban centers. It takes only 5–10 minutes by subway (just 2–5 stops) to reach the city center from the airport. Most international travelers will arrive via Tokyo or Osaka, but there are also direct flights from many Asian countries.

For first-time visitors to Japan, Fukuoka is known for its fresh seafood and over 1,000 varieties of richly seasoned ramen noodles. The Genkai Sea to the north, known for its rough waves, produces firm and flavorful fish that are a gourmet's delight. You can also enjoy culinary adventures at hundreds of food stalls (yatai) in the Nakasu area.

IPS 2026 FUKUOKA will be the first conference following the 100th anniversary of the planetarium. Our goal is to create a conference where planetarians from around the world come together under One Sky in Fukuoka to envision the next 100 years. As many new universes will be born as there are planetarians. We look forward to welcoming you in 2026—mark Fukuoka on your map today!

See you in FUKUOKA (IPS 2026)!

A HIGH-TECH SCIENCE THEATER

THE UNIVERSE THEATER OF THE ASTRONOMY DISCOVERY CENTER AT LOWELL OBSERVATORY

Glenn Smith, With Ian C. McLennan, Bill Peters

Sky-Skan International, Bill Peters Consulting

In our world, Lowell Observatory in Flagstaff Arizona requires no introduction. So when the opportunity arose for Sky-Skan to be part of their new Astronomy Discovery Center (ADC), they received our full attention. Chief consultants to the project, industry legends Ian C. McLennan and Bill Peters, had worked with Lowell to design the facility to be a high-tech interactive science center. It was to be the crowning finale to a decade-long expansion of the facilities on Mars Hill, which began with the off-site Lowell Discovery Telescope (LDT), followed by the Giovale Open Deck Observatory (GODO) featuring a superb collection of high-end telescopes for the public. The ADC would complete the expansion plans, allowing Lowell to accommodate more schools, larger groups and grow the overall annual visitor count with increased accessibility, parking facilities and enough activities to fill an entire day.

With its striking design, (Tim Whiteside, Architect), the ADC was conceived from the beginning to offer the best of the best, using modern technologies and exquisite exhibit design to create a signature science center focused on astronomy and physics, for both young and older visitors. The ADC includes several interactive galleries, a splendid central atrium with its mesmerizing big-bang sculpture, spaces for events, and on the roof, the unique Dark Sky Planetarium – an open-air theater under the dark skies of Arizona, complete with heated seats for all-season operation. Also included are a theme café featuring delicious local fare and a gift shop, enabling visitors to take a part of their experience home with them.

The jewel of the ADC is the Lowell Universe Theater (LUT) – a combination high-tech theater and science classroom unlike any other. While there was already the Dark Sky Planetarium

on the roof, the interior LUT was conceived to be something more. Ian McLennan and Bill Peters proposed a unique theatrical format to be an immersive window to the cosmos, a theater for science and exploration, and a place to actually visit and viscerally experience the wonders of the universe.

Occupying roughly a quarter of the ADC footprint, the Universe Theater features a 160-degree panoramic screen and tiered seating where every visitor has an optimum view. An additional screen filling in the curve on the ceiling adds to the immersion, along with a 20-channel concert-quality sound system.

From the original designs the theater was conceived to use multiple projectors on the wrap-around panoramic screen. Think Cinerama, the wonderful wide-screen cinema format from the 60's. Various video technologies were explored along with different projection screen types – from stretched textile to cylindrical aluminum. Designs were almost 90% completed before we mentioned, "it might be worth having a look at LED technology".

Sky-Skan had already been developing its SkyVision LED solution for domes for a couple of years, and the possibility of implementing it at Lowell was quite exciting. But of course, the cost for such an upgrade would have a major impact on the ADC project budget. (As would the COVID pandemic which was already starting to have major effects on construction costs and global supply chains).

The solution? It was agreed to create a design based on multiple possible technologies and move forward with all, while at the same time the Lowell fundraising engine, headed by Lisa Actor and her amazing development team, went into high-gear. Within a year, we were able to drop the projection system plan and focus on the LED screen as the preferred solution. The money still had to be found to finance the project, and Sky-Skan together with our US affiliates SSIA Technologies, were tasked to develop plans and budgets for several alternative scenarios – based on different resolutions, sound-system options and other variables.

At the ground-breaking ceremony in June, 2021, we arranged to set up three 1-meter square test screens, each with a different resolution. The setup included 1.9mm, 2.5mm and 3.125mm pixel pitches. Various groups were brought together to evaluate the quality, including some of the larger potential donors who attended the groundbreaking and a special donor-evening event. In the end it was unanimous that 1.9mm was amazing, but 2.5 would still be good. 3.125 was ok and should the budgets not appear, it would have been "acceptable" (and still superior to projection) – but the team decided to concentrate on the high-end 1.9mm solution so that we could have a virtually "pixel-free" image.

As an added challenge, we had to do the engineering to create a 1.9mm pixel pitch LED screen with perforated background to allow audio to pass through the screen, as well as forced air for enhanced cooling and climate control. At that time, there were no LED screens with such specs. However, after further analysis we were convinced that it was possible. Keep in mind, we did not yet have a firm order for the technology as fund raising was actively in process, in parallel. But we did have a design contract and there was already enough work to do. The LED screen had a six-month lead time, and we set a deadline in the project calendar to establish the final specifications. Thankfully with clever design, we could do all the planning, construction and infrastructure drawings down to the last detail. The LED tiles would be physically the same shape and quantity, regardless of resolution. Power and heat were also constant per square meter for all optional resolutions.

At the same time, there were other forces at play. COVID was in high-gear with no signs of letting up, and major supply chain issues were wreaking havoc on the construction company, their budgets, the subcontractors, and basically everyone else involved in the project. There were also major effects from the winters of 2022 and 2023, including an event that today is referred to as Snowmageddon!!

I have to take a moment to mention at this point, that never in my almost 40 years in this industry, have I ever been part of such a wonderful project team. The construction company, the sub-contractors, the architect, the client, and everyone in-between, were all focused on the goal of creating something spectacular. There were no major egos present and everyone brought their A-game to the table. Through all the delays, challenges and other issues common on large construction projects, everyone had each other's back and everyone pitched in. We had regular meetings via Zoom, so everyone was in constant contact and communication. And we all made a great number of new friends in the process. The designated project manager, Dave Sawyer (who had earlier managed the LDT project) ran the ADC project with amazing efficiency.

In the Summer of 2023, we received news that fundraising (thanks to Lisa Actor and her amazing team as well as the then director, Dr. Jeffrey Hall) had achieved all its goals and we were "go" for the top specs on all technical equipment. We could now focus on one specification. This meant the 1.9mm pixels for the SkyVision LED screen, and the full 20 channel high-end audio system, As 2023 came to an end,

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A TRIP TO THE SPHERE

Francine Jackson, James Hendrickson

Ladd Observatory, Seagrave Memorial Observatory

All images: James Hendrickson

It was at a planetarium conference where I learned that Cosm had built a unique facility in Las Vegas that, among other venues, could telecast a sports game so vividly that the audience would almost believe they were at the game, without paying the exorbitant ticket price. We were interested in experiencing this technological marvel ourselves, so we began to plan a trip. There was a note in USA Today stating that the Sphere wasn't attracting the revenue that it had projected, but we still had to visit it.

The outside screen – the Exosphere - consists of 580,000 square feet of pixels capable of lighting in all directions (except where it touches the ground), This Exosphere is the largest continuous projection screen in the world: 316 million individual LEDs capable of producing 256 million color variations, resulting in images of all kinds, from a July 4th fireworks display, to our neighbor Moon, in all of its phases, all of which changed flawlessly.

One tip to anyone who wishes to go there: Be sure to stay at the Palazzo and ask for a room facing the Sphere. Then, you might not want to sleep, as its outside will show a stunning, continuous array of images. Also, to get to the attraction, the Palazzo is connected to the Sphere by way of the Venetian Convention and Expo Center, so there's no need to go outside to wait in line; you can be comfortably inside.

The tickets stated a time of 7:00 P.M.; however, that was actually when the doors opened, allowing the thousands of patrons to file in, explore the atrium, which contained additional art displays, a humanoid robot, and food vendors, then make their way to their seats. It is said there are approximately 13,000 seats inside, and the crowds needed that time to settle down. Another tip: The stairs to get to your seats are steep, and don't allow a person who stopped at the food counter any leeway on climbing up. One person, equipped with a pizza slice in one hand and a drink in the other, had to rely on a Good Samaritan to help carry her cache to her seat several rows up.

Inside the 300-foot-high building, in front of us was a screen, reminiscent of the old, larger scale Cinerama, popular decades ago. When the production, Postcard from Earth, began on the screen, at first it was a bit disappointing, until the images began to expand, eventually encompassing virtually the entire ceiling. And, although the show was beautiful and entertaining, partway through the presentation a pixel shut off right at eye level for most of the audience.

The venue is also being used for entertainers, most recently the Eagles, U2, and the Backstreet Boys. Apparently, its financial problems are being taken care of, as their list of programs does continue for months, although it appears Postcard from Earth is the only presentation of its kind listed at this time; however, The Wizard of Oz is planned for the future.

There has been a lot of controversy concerning its 24-hour outdoor lighting; however, as it is situated in the middle of Las Vegas, which itself is rated a Bortle 9 on the night sky

(Continued on pg. 72)

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of Natural History

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Encounters in the Milky Way was developed with the major support and partnership of the National Aeronautics and Space Administration (NASA).
With deep gratitude to Van Cleef & Arpels. Generously supported by Robert and Kristen Peck.

A PAGE OF STARS

SUSAN BUTTON AND LORIS RAMPONI

The Astronomical Observatory Serafino Zani and the International Planetarium Society's Mobile Planetarium Committee are pleased to announce that Zachary Giese is the Honorable Mention winner in the competition, "Pages of Stars."

Each year planetarian colleagues from around the world are invited to prepare a short text, in English, that can be read or performed under a planetarium dome. The goal of this competition is also to build a collection of short audio clips (maximum 3-5 minutes each) that can easily be shared among planetarians.

Zachary Giese is a student at American Military University in the Astronomy program, a member of the University's Students for Exploration and Development of Space (SEDS) program, and the University's Exoplanet Research team. He also serves as Japanese cultural ambassador with a mandate to introduce and share aspects of Japanese culture, traditions, and values with students covering topics such as: Traditional Arts: Demonstrating tea ceremonies (茶道, sadō), flower arranging (生け花, ikebana), or calligraphy (書道, shodō), Teaching basic Japanese phrases, kanji, and sharing folktales or haiku poetry, introducing festivals like Tanabata or Obon, and explaining customs such as bowing, gift-giving, or seasonal traditions. He also shares Japanese modern culture: Discussing popular media such as anime, manga, or Japanese cuisine trends as well as Japanese history and society: Exploring key events in Japanese history, societal values like harmony (wa), and contemporary life in Japan. Here is Mr. Giese's submission for Pages of Stars:

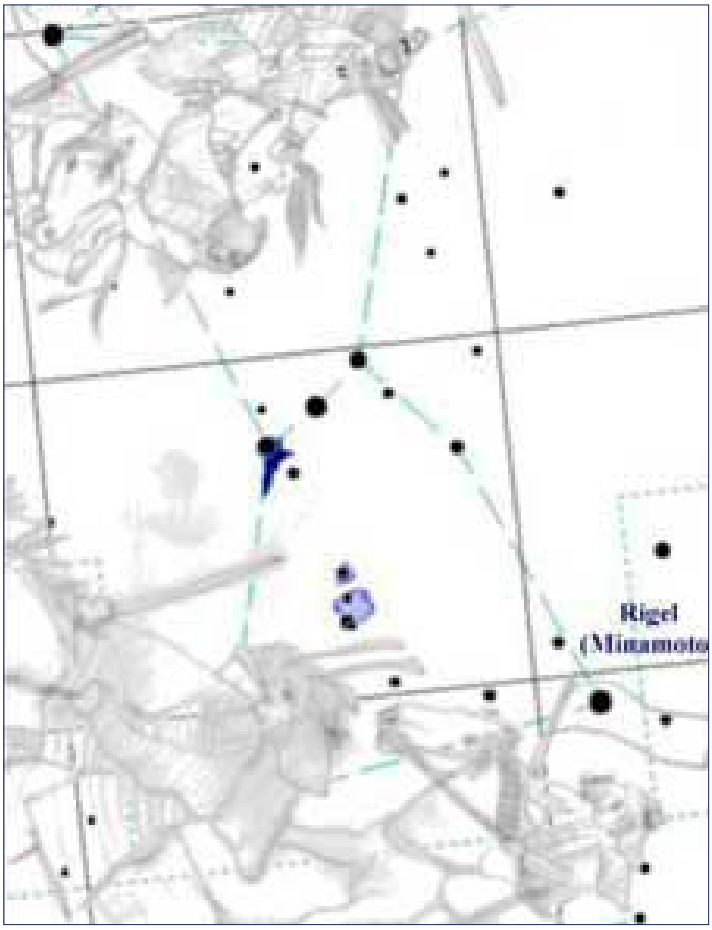
FROM THE STARS TO JAPAN: WAR OF CLANS

BY ZACHARY GIESE

War is an everlasting fate of humanity, under the stars of night that shine down clueless of the trivial matters of a small place called Earth.

Japan has a history of these wars. In the early first millennia Japan was plagued by feudal wars between families for land and power. Our story of two stars raging war with each other comes from the end of the Heian era (794-1192) where two powerful families, Taira and Minamoto, fought for control of the throne of the emperor of Japan.

Betelgeuse and Rigel have special significance in many prefectures of Japan. Rigel is sometimes called Genji Boshi, and Betelgeuse is called Heike Boshi. It is the colors of these stars, white and red respectively, that came to give this part of Japanese history a significance in the stars as the Taira family is represented by Heike or Betelgeuse with the family wearing red colors and the Minamoto family represented by Genji or Rigel representing the white of the glowing star. These families fought violently, ending a more peaceful time and ushering in a new era of samurai and war. In the end the Minamoto family would win and move the capital of Japan from Kyoto to Kamakura.



Betelgeuse in relation to Rigel: Rigel is the bright blue-white star at the lower right corner of Orion with Betelgeuse in the top left. *Credit: https://www.crystalinks.com/japanastronomy.html*

To this day the Japanese people look to these stars and remember their roots of conflict and resolution. They too can see this in the flag of Japan with the white and red both represented.

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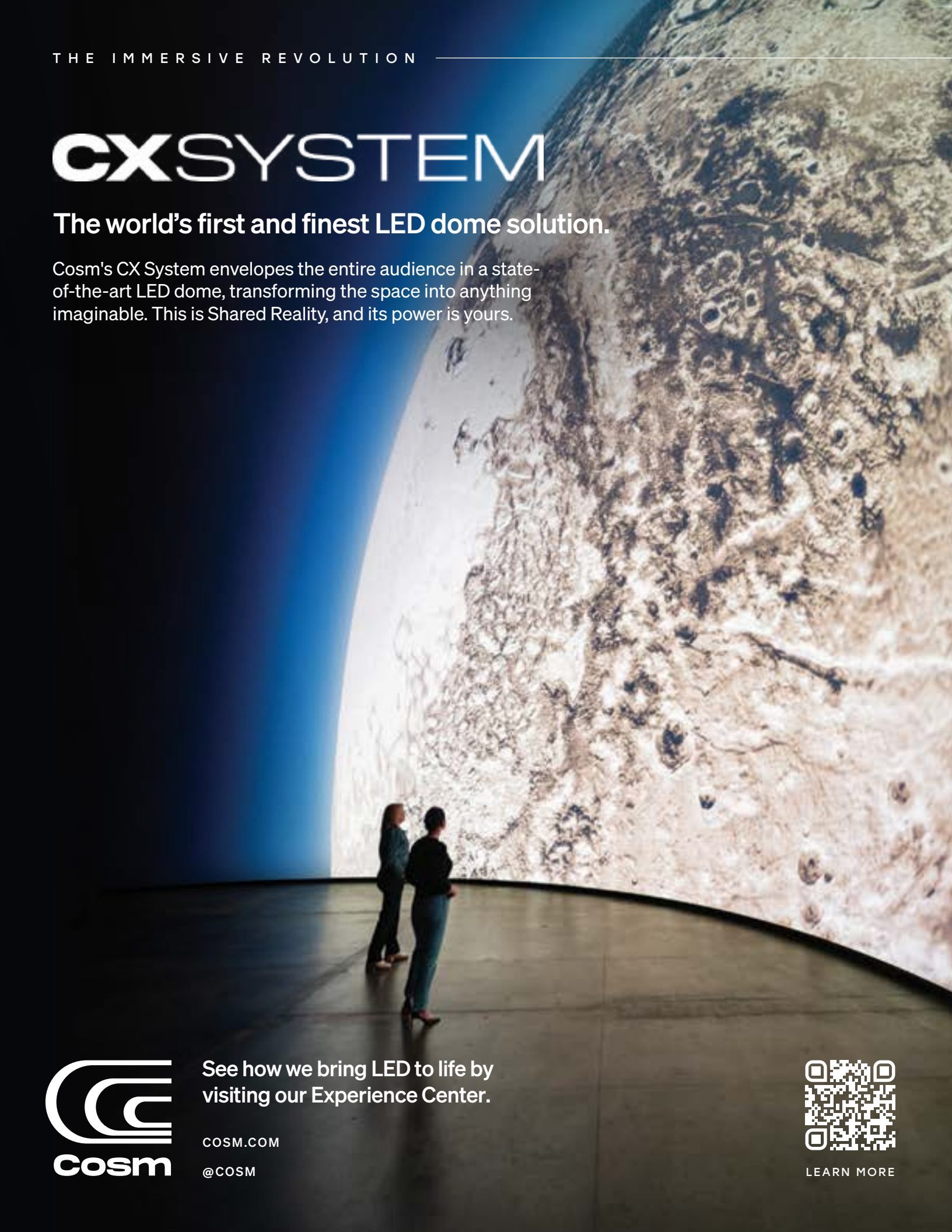

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UNDER THE CLASSDOME
KINESTHETICS

There is a plaque outside my planetarium honoring my predecessor, Bob Reilly. He kept our dome busy and relevant for 28 years. This coming year will be 25 for me, but that will be it. It will be time for me to hang up my laser pointer at the end of this next school year. I will stay active in our community through roles that aren't in focus yet, but I won't be teaching school kids on a daily basis. That also means that it is time to start transitioning the authorship of this ClassDome column. A true giant in our field, Ken Brandt is contributing to this edition and will transition into leading the effort over the next few issues of the *Planetarian*.

Our topic this quarter is kinesthetic learning. Audio-Visual Imagineering's *The Moon and The Weather* introduced me to the power of getting their little bodies involved. Let's hear about a few more innovative ideas that you might try in your classdome!

KINESTHETIC ACTIVITIES FROM YOUR PLANETARIUM SEAT

By Ken Brandt, Director, Robeson Planetarium

Fellow, IPS 2024, Co-Chair, IPS Education Committee

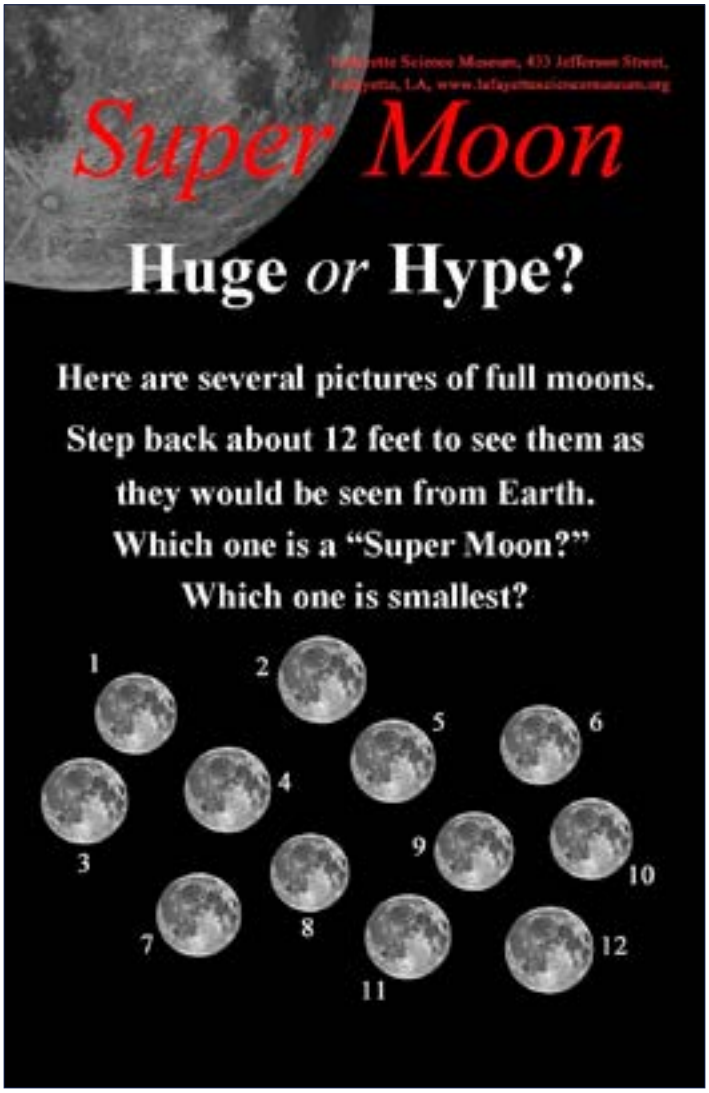
While learning styles was all the rage in educational circles a few years ago, some of the concepts remain valid. By getting your body into the act, your brain is grasping these concepts in new and different ways. According to Morrow and Zawaski, Kinesthetic learning is another way for your audience to construct a scaffold of learning that can dampen misconceptions about various astronomical concepts. Plus, the literature is rich with discussion of "brain breaks," designed to give students a break from whatever they're studying. While not a break for your audience, these activities can emphasize various points in your programming, or act as standalones to perk up the audience. In this brief treatment, I will discuss four kinesthetic techniques that you can try with your audiences-all from the comfort of their seats!

1. SUPERMOON?

> Materials Needed: Thumbnail, light, sight, print out of lunar handout, below.

Procedure: Tell the audience to put one thumb at arm's length, elbow straight. "Let your thumb hang without any pushing or pulling. Your arm should be fully outstretched. Hold your thumb upright, and relax." Ask "how big is your thumbnail right now?" You should have the audience come up with ways to measure, using something in the background. Next, the thumb should be extended as far as you can, keeping your arm outstretched. "Does the thumbnail look bigger or smaller to you?" You should extend and relax your thumb to check and see.

Does your thumbnail appear larger? Any guesses about how much larger? Most people won't be able to see a discernible difference. Now look at this set of images of the moon, and ask "which one or ones of these full moons is a "supermoon?"



Courtesy Lafayette Science Museum: Dave Hostetter

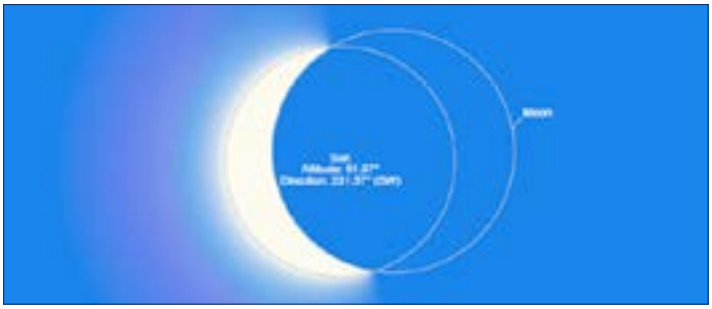
Concepts addressed: estimation, drawing conclusions made from observation and data collection, Elliptical orbits, Kepler's 2nd law, perigee and apogee.

2. COSMIC COLLISION?

A simple way to answer the question; "During an eclipse, can the Sun and Moon hit each other?" This was an actual question from a 3rd grader.

> Materials needed: pinky on one hand, thumb on the other, one eye.

Procedure: tell the audience to hold one pinky close to one's nose (2-3 inches). Have them hold the other thumb at arm's length. Without moving either elbow, look through one eye at the "eclipsed thumbs." Move your arms back and forth, to

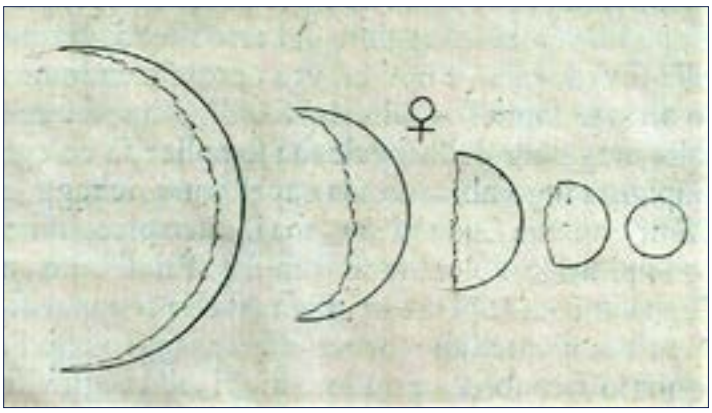


simulate a potential collision. Ask, "Can they hit each other if you don't cheat by bending elbows?"

Concepts addressed: estimation, drawing conclusions made from observation and data collection, Elliptical orbits, Kepler's 2nd law, perigee and apogee.

3. GALILEO WAS RIGHT

Proving a heliocentric Solar System:



To your audience: "Hold your thumb in front of your nose, at arm's length. Measure using one eye. Your thumb represents a Venus-sized object orbiting Earth. Note that the apparent diameter doesn't change much as you circle your thumb around you." Identify a central object as the Sun, and move to the far side of it, relative to your audience. Announce, "I am now on the far side of the Sun. If I hold my "Venus-sized" thumb up, and you hold their thumb "next" to mine, which thumb appears larger? Why? Note that both versions (you're further away/my thumb is closer) of this answer are correct. Compare observations to the following sketch:

Concluding question: Based on what you've just observed using your thumbs, which model of the solar system is most likely to be correct?

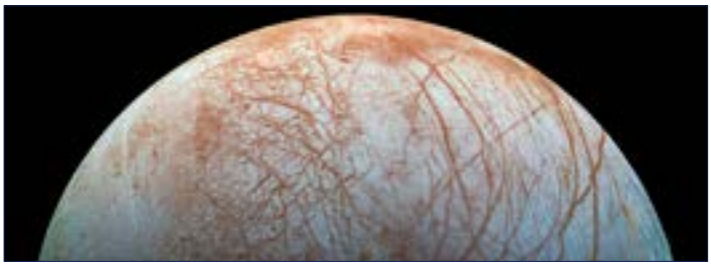
Concepts addressed: Heliocentrism, Orbit, Kepler's Laws, Observing planets, Comparing observations, drawing conclusions, using data to make a hypothesis.

4. SHIVERING, AND TIDAL FORCES ACTING ON BOTH EUROPA AND ENCELADUS:

> Materials needed: bare forearms, ability to sense heat.

Procedure: ask the audience to uncover their arms up to the elbow. They should then be instructed to rub their forearms together for 5 seconds. The same frictional heating also melts ice and creates cracks in the ice through which water escapes. This can help explain the lack of cratering on Jupiter's moon, Europa, and Saturn's moon, Enceladus' Southern hemisphere, by tidal gravitational forces melting the subsurface water ice. As for shivering, which happens when muscle fibers twitch automatically to warm you up. This explains shivering pretty nicely.

Concepts addressed: gravity, physiology, frictional heating, tidal flexing, and properties of water, insulation.



Hopefully, these techniques will provide some opportunity to scaffold new knowledge, or reinforce what your audience already knows about the various concepts.

HOW FLEXIBLE SEATING CAN ENCOURAGE MOVEMENT OR RELAXATION

By Neil Pifer

Margaret C. Woodson Planetarium at Horizons Unlimited, Salisbury, NC

Have you ever wondered if you can keep "those crazy kids" from running around the dome, if you choose to use flexible seating? How will a multi-age group sort themselves with both fixed seats and flexible seats available?

The problem we had:

In our 30 ft' dome, we originally had 72 seats that were from around 1989. Some springs were broken and about 15 seats were what I referred to as "obstructed view", seats that only provided a partial view of the dome. Also, for our public openings, the last seats taken were the 14 seats in the very front row. Finally, our shows were becoming more live, varied, and interactive. Our staff made a bold decision to remove the front row of seats, in theory reducing capacity.

The excitement we saw:

Once that decision was made, we received a "free" carpet remnant to cover up the holes in the floor created by the bolts. With the removal of the seats, I was only down for one afternoon for seat removal and one morning for the carpet install. The maintenance crew from our school district were an amazing resource, but I could have removed these seats and ground down the bolts myself over two afternoons.

Simultaneously, our staff chose the large pillows from Lakeshore (*https://www.lakeshorelearning.com/products/classroom-furniture/chairs-seating/flex-space-giant-comfy-pillows/p/LC558X/*). Our sofa style furniture is Yourogami available at multiple retailers. We wash each cover quarterly or after staining. Before student use, we treated the fabric

(Continued on pg. 76)

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INTERNATIONAL NEWS

Dear fellow planetarians...

Below you'll find descriptions of not one, but two, new shows, that don't take place in space – but under water. You can also read of celebrations of the invention of the microscope, Einstein's theory of relativity, the summer solstice and other summer events. All these activities show how versatile the domes are and how they continuously serve their communities.

For this section I'm indebted to contributions from Andreas Schmidt, Loris Ramponi Amie Galagher and Andrew Kerr.

Let's start this tour around the world in Switzerland.

SOCIETY OF GERMAN SPEAKING PLANETARIA

SWITZERLAND

Exploring Inner Space is a jurney into the Caves of the Bernese Oberland. Since their invention, digital planetariums have been gateways to the Universe. But not all exploration leads upward. Beneath our feet lies a different kind of frontier: vast, silent, and largely unseen. In the second quarter of 2025, Space Eye in Niedermuhlern, Bern launched a fulldome production that shifts the view downward—into a cave system deep in the Bernese Alps. Altogether the project posed an unusual question for their dome: what if the most alien landscapes weren't light years away, but hidden right beneath us?

GDP. Nestled in a dark sky zone, the Space Eye observatory was built underground—like a modern cave—to preserve the surrounding environment. Only the telescope tower rises above. Courtesy of Eliane S. C. Dubois.

The cave featured in the production is part of an extensive (more than 170 km length), still not entirely mapped system, not open to the public and known only to a small group of researchers. The Siebenhengste-Hohgant-Höhle is located in the mountains above Interlaken. The specific location of the several access points to the cave system will purposely not be revealed here, so as to prevent untrained spontaneous cavers and other curious minds from trying to explore the vast system on their own. Through close collaboration with Swiss speleologists and a documentary filmmaker specialized in virtual reality productions, they were granted unprecedented access. The footage they captured—narrow passages, underground rivers, silent chambers with crystal ponds—offers a glimpse into a world that very few have seen, and hopefully, few ever will. The preservation of such untouched ecosystems was a central motivation for the project.

Filming in a cave is a technical and physical challenge. The team had to work with challenging lighting conditions, tight spaces and had to spend several days underground. The footage was captured using specialized equipment, which had to be at least waterproof. Transforming this footage for the dome then required additional steps of which careful editing to avoid motion sickness was maybe the most important one. Fascinatingly enough, the planetarium turned out to be almost a natural fit for this kind of footage, since it's providing a cave-like structure in itself. Sound also played an important role in shaping the experience. Instead of using continuous background music, they focused on the real sounds from inside the cave: dripping water, the noise of underground streams, footsteps on sand and rock, and even the calls and instructions of the explorers. These sounds were made more noticeable on purpose. In key scenes of the production—such as when a vast chamber opens up before the viewer— atmospheric music was used to trigger the right emotions and deepen the sense of awe.

During production, the team wase struck by how closely the psychological profile of cave explorers mirrors that of astronauts. Both operate in extreme isolation, rely on their suits and team members for survival, and face the ethical question of intrusion. Should we enter places that have never been touched? Is it our right to give in to our curiosity, or our duty to leave it untouched? Or is it actually very important to document these environments, so they might be shared with the wider public? After all, humans tend to value and thus protect things and places that they have experienced or at least seen with their own eyes. In the post-show discussions, these questions often arose. The dome became not just a window into the Earth, but a space for reflection about humanity's instinct to explore—and the responsibility that comes with it.

The programme has so far been presented only once, in a test screening for a selected audience—among them several experienced cavers and researchers from related fields. The reactions were deeply emotional. Many described the experience as astonishingly real—like being transported straight into the heart of caves that would normally require days of physically demanding exploration to reach. The fulldome environment allowed them to feel present in a way that still images or conventional footage simply cannot.

It's a reminder of how powerful the planetarium medium can be when it comes to triggering emotion, immersion, and memory. For experts, enthusiasm came naturally. But it raised an essential question: how do you spark that same sense of wonder in someone who has no prior connection to the subject? Alongside praise came thoughtful suggestions—feedback that continues to guide the next phase of the project. How can this material be made accessible to a broader audience? And more importantly: how can the its depth be preserved while making it understandable to those encountering the topic for the first time? The team are now working on refining the footage—and selected photographic material—into a version suitable for general release. The aim is to strike a careful balance between scientific authenticity, emotional resonance, and clarity for newcomers. This future film also holds potential for use in educational settings, where it could spark discussion on geology, biodiversity, and the ethics of exploration. As we continue to look up, it is worth remembering: exploration isn't always a question of distance. Sometimes, the furthest places are the ones just beneath our feet. The production team sends special thanks to Rolf Siegenthaler for sharing his knowledge and opening access to the cave system, to Michael Litzko for capturing the underground world with great skill, and to Christian Stöckli, who first recognised the potential of the planetarium as a medium for this story and made the connection possible.

GDP. Footage from Exploring Inner Space: An underground pond with crystal clear water. Despite the almost claustrophobic intensity of the narrow rock passages, the experienced audience showed no signs of panic or discomfort. Apparently, the edges of planetarium domes are surprisingly sturdy—who knew they could hold back that much water? All courtesy of Eliane S. C. Dubois.

BADEN-WÜRTTEMBERG

Underwater Beats is audiovisual dives under the planetarium dome in Stuttgart. Dive down with us! Experience coral reefs in all colours and deep drop-offs. Marvel at the incredible diversity of species and look forward to encounters with sea turtles, schools of mackerel, manta rays and a school of dolphins in the wild. A night dive reveals fascinating images that you have never seen before. The immersive 360° fulldome underwater experience is a production of GooGho – The Good Ghost in collaboration with the Stuttgart Planetarium. GooGho is a collective of artists from the Stuttgart region, consisting of photographer Ludwig Migl (multiple German champion and world championship participant in underwater photography) and musician Achim Stohr. Their passion lies in the fusion of image and sound. The duration of the show is approx. 45 minutes and is described as: "Impressive underwater shots set to electronic beats are a successful combination that you can really immerse yourself in. The underwater world and outer space have a lot in common. No upside and downside, we move weightlessly through both worlds. The love and closeness to nature is palpable in the creations of the two artists. The Underwater Beats event explores the beauty, but also the fragility of our spaceship Earth." by Ubbo Grassmann of the Planetarium Stuttgart.

BAYERN

The Sparkassen Planetarium in Augsburg is getting a facelift. The S-Planetarium will undergo the first real facelift since it opened in 1989: In August, the crew will renew the

GDP. Footage from Underwater Beats at Planetarium Stuttgart. Courtesy of Achim Stohr.

planetarium's impressive dome during the mega-microscopy sessions. Both school groups and individual attendees had the chance to delve into the microscopic world firsthand. The Microscopic Theater event showcased the fascinating diversity of small cells. Selected 360° fulldome programs allowed immersion into the seemingly invisible world of microorganisms. Esteemed lectures provided insights into current research topics. In the foyer, an exhibition featured historical microscopes (1830–1960), large-scale video projections, information booths, and interactive experiment

GDP. Invisible Worlds at Zeiss Gross-Planetarium. Courtesy of Pedro Beccerra.

stations. Art and literature were also integral to the theme days: the audiovisual performance <MAKRO | MIKRO> combined science and music into a unique experience. Presenter Clarissa Corrêa da Silva introduced her children's book Mein Wunderbares Ich on epigenetics. A curated film program in the in-house cinema rounded out the offerings.

110 years ago, Albert Einstein made scientific history in Berlin: On 2 June 1915, he presented his general theory of relativity to the public for the first time in the large lecture hall of the Archenhold Observatory in Berlin-Treptow. This new perspective on space, time, and gravity revolutionized scientific thoughts and our understanding of the Universe to this day. Under the motto "Everything is relative", the Stiftung Planetarium Berlin invited the public to the Cosmic Summer Festival: Einstein Edition at the Archenhold Observatory on 14 June to commemorate this anniversary. From 2 p.m. to 1 a.m. the observatory transformed into a galactic festival ground, where 6,000 visitors engaged with Albert Einstein's revolutionary ideas through an inspiring programme. Fascinating sky observations with the Cassegrain telescope and in the Solar Physics Cabinet, 360° insights into the program of the modernised Zeiss Small Planetarium, as well as exciting lectures in the legendary Einstein Hall awaited the visitors. Outside, a glowing planetary path, water and air rocket launches, interactive stations for children, music, and culinary delights invited guests to explore and linger.

Thirteen emerging creatives from the master's programs in Stage Design_Scenic Space and Architecture at TU Berlin (**Technical University of Berlin**) designed artistic interventions specifically for the anniversary on the grounds of the Archenhold Observatory. The five teams, under the direction of lecturer Franziska Ritter, engaged in diverse ways with Albert Einstein's life and work, particularly his theory of relativity. Thus, the Einstein anniversary was uniquely experienced on-site through immersive light and sound installations, interactive audio walks, and participatory spatial installations.

The Archenhold Observatory, Germany's largest and oldest public observatory, became one of the most significant venues

GDP. Cosmic Summer Festival: Einstein Edition at the Archenhold Observatory. Both Courtesy of Pedro Beccerra.

of modern science through Einstein's lecture. For over a century, the observatory has been imparting astronomical knowledge to tens of thousands of visitors annually in an accessible manner. "When Albert Einstein presented the theory of relativity 110 years ago, he revolutionised our understanding of space and time. We are proud that this groundbreaking moment in the history of science had its first public presentation right here in our hall. Today, we not only celebrate this monumental work but also the enduring fascination with science that Einstein's theory continues to inspire in research and the general public", said Tim F. Horn, president of the Stiftung Planetarium Berlin. To mark the anniversary, the Stiftung Planetarium Berlin, in collaboration with Madame Tussauds Berlin, presented the lifelike wax figure of Albert Einstein during an exclusive photo session on 11 June in the Einstein Hall of the Archenhold Observatory — the very place where Einstein first delivered his groundbreaking theory.

ITALIAN ASSOCIATION OF PLANETARIA

In May, an artist from the Aosta Valley, Mathieu Gorelli, 25, donated one of his works, Vuoto, to the Municipality of Nus, to be placed in the planetarium. Specialized in hyper-realistic pencil drawing, Gorelli has distinguished himself in

GDP. Wax figure of Albert Einstein at the Archenhold Observatory. Courtesy of Pedro Beccerra.

the local artistic scene thanks to a profound and recognizable style. The donation of the work to the Municipality of Nus is only the latest testimony of his commitment and his desire to share art with the region. Domitilla Tapinassi, of the PLANit board, conducted the interview with the artist that can be read on the website planetari.org.

Also in May, the city of Naples was chosen to make knowledge of the activities of the Association of Italian Planetariums (PLANit). After the occasion of the International Planetarium Day, celebrated at the Città della Scienza, a second opportunity for PLANit was the 58th national congress of the Italian Amateur Astronomers Union that took place in the INAF Astronomical Observatory of Capodimonte. Simonetta Ercoli took part, representing PLANit, and illustrated in detail the activities and recent news of the association that brings together the Italian planetariums.

In recent years, PLANit has created an archive of the speeches and photographs of the annual meetings. The available editions concern the following years: 2022, 2023, 2024 and 2025. The latter is dedicated to the speeches of the 40th Conference of the Italian Planetariums (Matera, 11-13 April 2025).

On the occasion of the national conference, the prizes of the competitions organized by PLANit were awarded. The 13th edition of the PLANit prize was awarded ex aequo to the fulldome videos Lost in the middle of the sea, by Lionel Ruiz (Marseille Planetarium, France) and The era of exoplanets, created by Michelangelo Rocchetti (Museo del Balì, Pesaro and Urbino). The first is a video of about 16 minutes, dedicated to navigation with the stars, in which a grandfather tells his granddaughter about orientation with the stars on Earth and in navigation, the problem of orientation in the open sea in ancient times, up to the use of satellites. The topics are treated with a tone particularly suited to young audiences, thanks also to a notable work of graphic animation. The second award winner, The Age of Exoplanets, addresses in 23 minutes the topic of extrasolar planets from the point of view of "Star Wars". The use of the digital planetarium is

IAP (counterclockwise from top left). The activities of the Eratosthenes Network took place in different cities like Ravenna, where the famous experiment was repeated, in collaboration with the library of Alexandria and with the team that had reached Aswan to see the well illuminated by the Sun. Courtesy of Ravenna Planetarium. The Terrace of the Stars of the Planetarium and Observatory of Crespano del Grappa (Treviso) took part in the activities organized on the occasion of the summer solstice. Courtesy by Centro Don Paolo Chiavacci. The panoramic Torre degli Sciri in Perugia is the place where Starlight – a Planetarium Between Your Fingers organizes observation activities of astronomical interest open to all. Courtesy of Starlight.

noteworthy. The music is very engaging. Even though it was a joint prize, the PLANit board of directors awarded the full prize, 500 EUR, to each winner.

The Lara Albanese 2025 prize (5th edition) was awarded to Sara Zarrinchang, teacher and INAF associate, for her work Gli anni-luce, proposed in class 3E of the G. Nicoli Middle School in Settimo Torinese, Torino, and with which the class participated in the Calvino tra le stelle competition by EduINAF. According to the PLANit board of directors, the activity reflects the creativity of Lara Albanese and is in line with the laboratory and scientific spirit that has characterized her career. The laboratory invited students to try their hand at analogue and digital musical technologies to create a particular model of planets arranged in order of arrival of sunlight.

On the occasion of the summer solstice, numerous observational activities were carried out, documented almost live on the WhatsApp network of the Association of Italian Planetariums. At the Classense Library in Ravenna, Eratosthenes' experiment was repeated, in connection with the library of Alexandria and with the team that had reached Aswan to see the walls of the well illuminated by the Sun. Other planetarium operators engaged in activities that took place on the Terrace of the Stars of the Crespano del Grappa Planetarium and Observatory, on the Torre degli Sciri in Perugia, curated by Starlight – un Planetario Tra le Dita, in Soraga in Val di Fassa and others had also joined the Eratosthenes Network.

On June 21, as part of the Cassinian event (G.B. Cassini, Perinaldo 1625 - Paris 1712), the transit of the solar disk on the meridian line of the Church of San Petronio in Bologna was observed. In the video produced by INAF, Walter Riva (Osservatorio del Righi) was filmed describing the meridian of the University of Genoa Palace. Before the solstice, two original events took place in Liguria and Sardinia. The Astronomical Observatory of Genoa was on the road in San Giacomo di Roburent with Lorenzo Pizzuti and Matteo Benedetto, for a performance of Melody on time, stories, mythological tales of the sky. In Osilo, on the Bonaria hill, at 750 meters, Gian Nicola Cabizza intervened in the evening entitled The Pride among the stars, as part of the program of Pride Sardinia.

One of the protagonists of the new interviews in the series Voices From the Domes is the Venetian constructor, Romano Zen who, for many decades, worked on optics for astronomy. The recording of the video interview is available on the pages of planetari.org. Romano Zen did not only work on mirrors and telescopes but also created five projectors for planetariums. The first of these models, visited by thousands of people on the occasion of the exhibition on Halley's Comet set up in Padua in 1987, is still in operation in Lumezzane. On 22 June in this industrial town, a rich

IAP. A historical photograph with Umberto Donzelli (right) on the occasion of the transport of the first planetarium built by Romano Zen in the second half of the 1980s. Courtesy of Lumezzane Planetarium.

day of activities dedicated to Umberto Donzelli took place, accompanied by the family. For three decades, he gave lectures at the Serafino Zani Observatory and he took care of the maintenance of the Zen Planetarium located in the former town hall of Lumezzane. The Einstein Toys room was also set up in the spaces of this historic building, which contains over fifty instruments, assembled by Umberto Donzelli himself. With Einstein Toys you can carry out various fun physics experiments.

MIDDLE ATLANTIC PLANETARIUM SOCIETY

The Middle Atlantic Planetarium Society and Southeast Planetarium Association held a joint conference 17-21 June 2025 at the Irene V. Hylton Planetarium in Woodbridge, Virginia. This East Coast Planetarium Conference was hosted by Tony Kilgore and attended by over 120 colleagues. Dozens of papers were presented, and the attendees even had field trips to Washington, DC. Conference speakers included Astronaut Jose M. Hernandez and Dr. Jennifer Levasseur, National Air and Space Museum curator. The highlight was having the Smithsonian's Udvar-Hazy Center to themselves

MAPS. Drone group photo from the joined MAPS-SEPA conference. Courtesy of Ken Moore.

for the banquet, with the tables set up behind the Discovery Space Shuttle. The banquet speaker was Galileo himself, as portrayed by MAPS's own Mike Francis.

PACIFIC PLANETARIUM ASSOCIATION

Summer is in full swing at the planetarium at The Lawrence Hall of Science (LHS). This summer the planetarium team is giving a variety of shows for the in-house camp groups, including topics of Mars, the Moon, Jupiter's moons, satellites, Solar System and more. The public shows for the summer are as always made in-house and completely live and interactive. Public shows are currently The Sun's Fury, Traditions of the Summer Sky, and Diving into the Blue Planet. All recent shows at LHS, such as Sun's Fury and Blue Planet, are made using OpenSpace and the team is working on making these more available to other planetarians. If you ever have interest in these shows, please feel free to reach out to the Planetarium Manager Mary Holt at *mholt@berkeley.edu*.

The Pacific Planetarium Association continues to host [nearly] monthly Planetarians' Zoom Seminars. Upcoming seminars are listed on the seminar schedule page (*https://www.ppadomes.org/events/online-seminars/pzs-schedule*). You can lead or present at a seminar. The schedule page includes possible dates for the usual «last-Fridays-of-the-month», but there›s flexibility if you have particular limits for days that would be good for you. The schedule page also has the 4 simple steps it takes to get on the schedule: 1. Choose a date for your presentation. 2. Invent a catchy Title. 3. Compose and submit brief (one paragraph) description of what you have in mind. 4. Compose and submit a brief bio (who you are, where you work, 1-3 sentences).

In other PPA News, three PPA Mini Grant awardees are on this year list on the PPA Mini Grant page (*https://www.ppadomes.org/business/mini-grants*):

- Mary Holt, The Lawrence Hall of Science, Berkeley California. Support to attend GLPA/WAC conference in Minneapolis, represent PPA, and make a presentation about what it's like being a manager, including her experiences as a new manager as well as sharing experiences from managers with various levels of experience.
- Josh Roberts, Astroeverywhere, Bay Area, California. Equipment upgrades, mainly a sound system to allow for more versatile (and more comfortable) presentations in louder environments. Josh is still getting started as a live presenter in an inflatable dome with his new company Astroeverywhere.
- Sarah Weaver, Como Planetarium, St. Paul, Minnesota. Pay a computer science graduate student with the University of Minnesota's (UMN) Interactive Virtual Lab to design interactive technology that enables students to work together to influence visuals on the dome using tablets. For example, a virtual canoe that paddles up and down the Mississippi River with students tapping to "paddle" the canoe, with a local indigenous elder and star expert to share knowledge and stories connecting the river and the sky.

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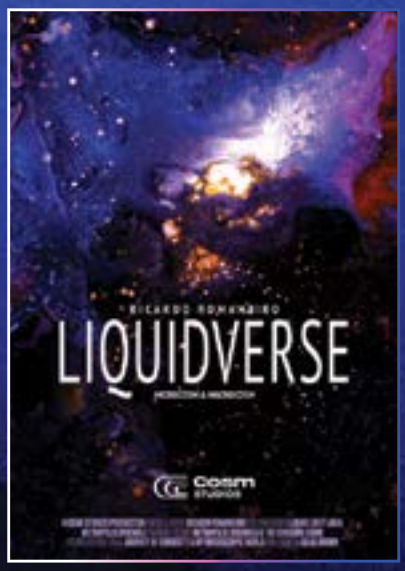
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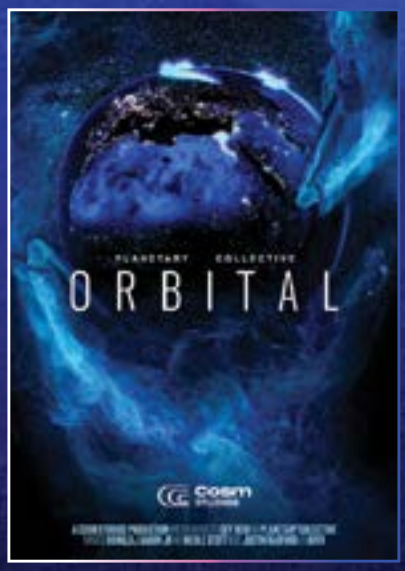
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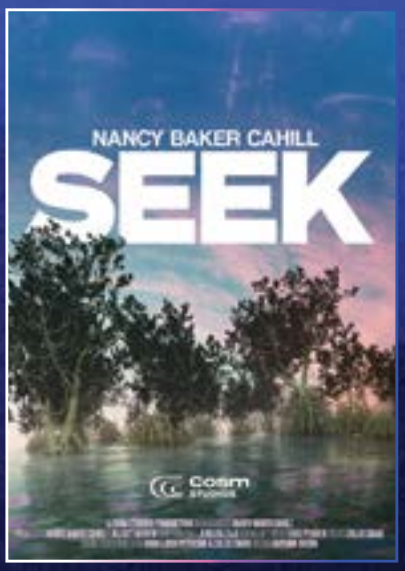
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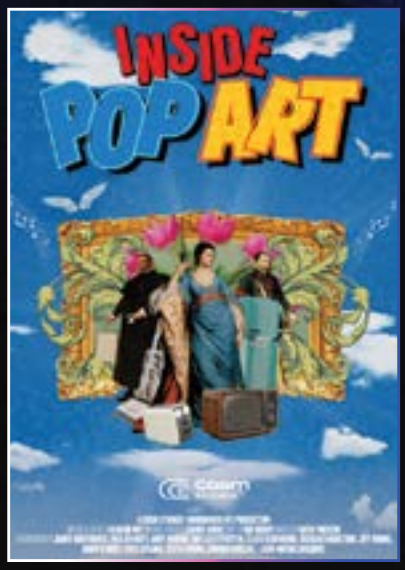
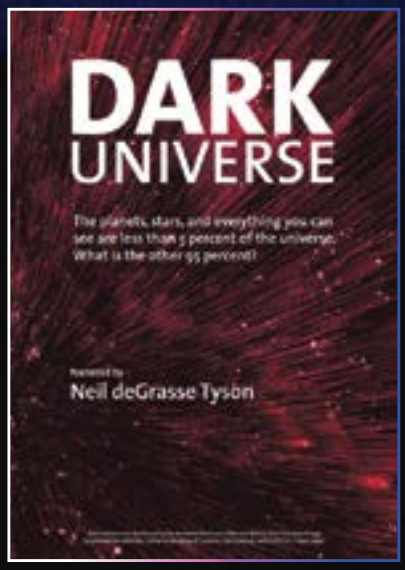
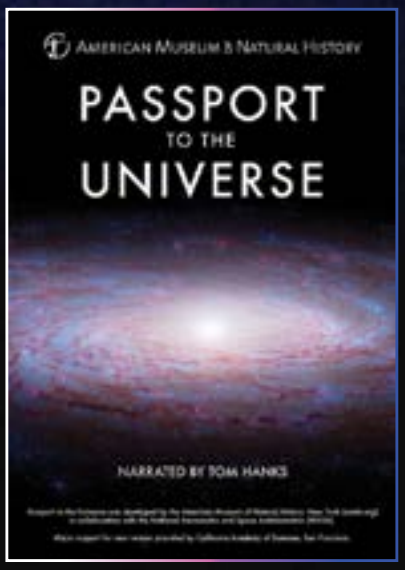
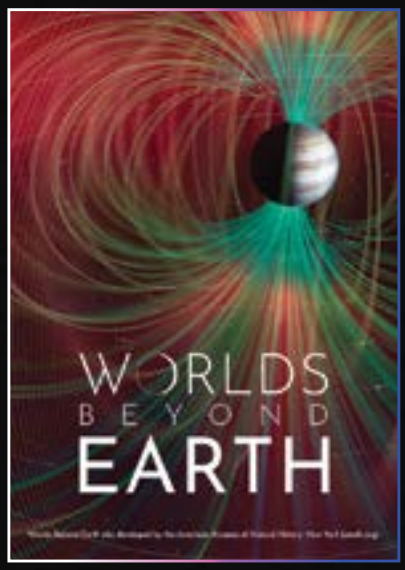

INSIDE POP ART
Cosm


DARK UNIVERSE
The planets, stars, and everything you can see are less than 5 percent of the universe. What is the other 95 percent?
Neil deGrasse Tyson


AMERICAN MUSEUM & NATURAL HISTORY
PASSPORT TO THE UNIVERSE
NARRATED BY TOM HANKS


THE ARCTIC
OUR LAST GREAT WILDERNESS


WORLDS BEYOND EARTH


BACK FROM THE BRINK
SAVED FROM EXTINCTION

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TALES FROM DOME UNDER
MEETING DR. MOOG

If you were around in the late 1960s, you might recall Wendy Carlos' hit classical record, "Switched On Bach" (a.k.a. "SOB"). This vinyl LP (like I said, the late 1960s, 1968 to be specific) was a runaway best-seller which had everyone talking about the instrument it was recorded on; the Moog (pronounced like "vogue") synthesizer. This led to a large number of similar records coming out, with other recording artists trying to cash in on this new musical phenomena.

While the music of Johan Sebastian Bach (1685 - 1750) adapted well to this treatment, it was debatable whether or not the same could be said for rock, country, or reggae. Perhaps one of the more successful efforts was by classically-trained composer and electronic music pioneer, Hans Wurman (1922 – 2001), who released "The Moog Strikes Bach" in 1969. Outside of the catchy pun in the title, he also expanded the classical palette of synthesized music to include Chopin, Mozart, Rachmaninoff, Prokofiev, and Paganini in addition to, you guessed it, more Bach.

The real beauty with "SOB" was that the synthesized tones of the Moog allowed the interplay between the different voices in the original music to distinctly come through and be heard. It took what had been hidden in subtle timbres before with conventional instruments and brought them forth in much greater clarity. This purity, however, divided listeners into two camps; either you liked it or you hated it.

This first of analogue music synthesizers was the brainchild of Dr. Robert A. Moog (1934 – 2005), who originally got started designing and making theremins in kit-form. Theremins? If you've watched a sci-fi movie from the 1950s or the 1960s, you may have heard this early electronic instrument's eerie, wavering whistly-sound. Patented by inventor Leon Theremin in1928, if you were to spell out how it sounded, it might be something like Ooh-wheee-uuh, but higher-pitched, and with a quaver to it.

The typical theremin itself looks like a low rectangular box with a U-shaped antenna coming out of the left side, and a vertical antenna coming out of the top. You play it by moving your hands relative to these two antennas. One controls the pitch (the vertical antenna) and the other the volume (the loop).

Where do planetariums come into this? Theaters using taped soundtracks as part of their productions often used music copied from LPs (yep, we're still in the 1960s and even earlier), which were then mixed in some sort of sensible sequential order with the narrator's voiceover. Or they did until about 1971.

The Strasenburgh Planetarium in Rochester, New York, hired what was the first in-house composer in such a facility; Tim Clark. Not only was he adept at putting together soundtracks from dropping needles on vinyl, but he was also capable of creating original music on both flute and

At the Planetarium

Audience at 1972 "Rochester Dreams."

Multi-media 'Dreams'...

...or walk through space

A copy of the 1972 article in the Rochester Democrat & Chronicle newspaper talking about both the "Rochester Dreams" special nighttime event at the Strasenburgh Planetarium, and the opening of the new UV blacklight "Space Tunnel" in its exhibits area. Credit: public domain.

Left: Bob Moog sitting at the keyboard of a Minimoog Model D synthesizer, with a larger modular system in the background. This is about how he appeared when he popped in to Strasenburgh the night of the event. *Credit: Bob Moog Foundation Archives, courtesy of Michelle Moog-Koussa*. Above: The well-known Minimoog Model D, first sold by Moog Music between 1970 and 1981. Used by many of the progressive rock groups of the 1970s, it can be heard on dozens and dozens of famous record albums. It was also popular with jazz, pop, disco, rock, and electronic musicians. The first synthesizer portable enough to travel with easily and was sold in retail stores, around 12,000 were made during the years it was in production. *Credit: public domain via Wikipedia.*

one of Moog's latest creations, the Minimoog Model D.

If you've been around our profession long enough, you know that he was followed by others, like Ron DiIulio, Barry Hayes, Mark Petersen, Cary Ratcliff, and Jonn Serrie to name five, and some of them are still producing today.

Located in a city of around 300,000 in the early 1970s, the Strasenburgh Planetarium was always looking for interesting things to do in the theater along with their regular offerings of school and public star shows. Concerts and plays put on by local groups, even psychedelic multimedia extravaganzas, produced by The Heavy Water Lightshow from San Francisco, were a part of the mix. Perhaps the most unusual and novel of them all took place in the dead of night.

You might find yourself saying aren't planetarium shows kind of "in the dead of night"? You might also find yourself saying, "Isn't the dead of night when most normal people are sleeping?" And you would be absolutely right, but in this latter case, it was with a twist.

Imagine if you would a planetarium chamber, all its 240 seats filled with sleeping people, some even with their own pillows and/or blankets. As they slumber, the dome overhead is filled with a variety of different films, images, planetarium special effects, and a slowly rotating starfield provided by the theater's Zeiss Model VI planetarium projector. Snatches of both sounds and music play through the sound system, adding to the experience.

What kinds of images were they? According to a description, they came from a variety of sources, including video tapes, [simple] computer-animated films, space documentaries, live-action films, 3-D slide progressions, and film loops. The intention was the stream of images playing on the dome overhead would trigger, and therefore blend into the viewer's dreams.

If someone in the audience was seen to wake up, someone associated with the event would come around with a clipboard and a standard form to ask them some questions about anything specific they remembered from their dreams. This was to see if there was a correlation between the overhead show, the sounds, and what turned up during their sleep state.

This whole event was the idea of experimental cameraman Stan VanDerBeek, with this Rochester showing its first outing. I even found online references that, even though its creator (1927 – 1984) is no longer around, it is still being run as it was especially designed to show in planetariums. According to an article, the current "Cine Dreams" consists of a compilation of 41 films, in multimedia projection, designed to simulate a night's sleep, including nightmares, abstract images and the period of R.E.M, a pattern of deep sleep. There was a showing, for example, in the Rio de Janeiro planetarium in 2015.

I was standing at the theater's control console with Tim Clark, and someone came in through the door right behind this U-shaped space from the back control room. This was where Strasenburgh's large special effects switchable patch bay, D.E.C. PDP-8 minicomputer for controlling show SFX, and the planetarium show reel-to-reel playback tape decks were all located.

Normally no one outside of staff ever came thorugh this way, but when I turned to see who it was, I was more than surprised to see it was Bob Moog, the inventor of the analogue music synthesizer. In spite of only ever seen him in photos with people like Wendy Carlos (1939 -) and Keith Emerson (1944 - 2016), there was no mistaking it was really him in person.

The other two began to talk like they were old friends, with Bob eventually getting around to showing us a small tom-tom drum (a.k.a. typically referred to as just "toms" today) he had brought with him. The drum itself was brown-colored wooden shell about 25.4cm/10" in diameter, around 20cm/8" deep, with a chrome-plated rim. Moog said it had a prototype for a percussion trigger, with the trigger module itself mounted on the inside at the rim. There was a single,

Carl Palmer sitting behind his $50,000 steel drum kit in 1978. Those of you who might be familiar with rack drum set-ups, note that the individual shells—for example on the tom right in front of Palmer—are supported by a three-leg "spider" underneath each one rather than being mounted via a lug on the side attaching them to the rack itself. *Credit: CC Attribution-Share Alike 2.*

gray-sheathed, thin cable coming off of it about 38-61cm/15-24" long, ending with a multi-pin connector.

Leaving the theater and going down the spiral staircase to the planetarium's basement where the sound studio was located, we went inside. Tim fired up the studio's power, and switched on our Minimoog Model D synthesizer sitting on its stand.

After patching the synthesizer's output to an input on the studio's mixing board, plugging the cable on the drum into the trigger input on the back of the synthesizer, and fading up an output to a speaker, the drum's head was hit with an old wooden drumstick Tim had used with hand-held percussion instruments. Whatever had been the last patch set up on the Minimoog's sound-shaping controls came playing out of the speaker every time the drumhead was struck.

While this allowed something to be played, it didn't allow the changing of notes, or pitches. It just initiated the envelope generators for the filter and amplifier. This is the same thing as pressing a single key on the keyboard would do. When trigger signal was sent from the drum to the trigger input, it caused the envelopes to fire, producing sound if the oscillators and signal path are active and audible.

We went back upstairs after the demo, and Bob stayed around for a little while before leaving. Little did I know at the time this would evolve into something far more interesting than what Tim and I had just witnessed.

I would be remiss if I didn't mention the fact that the participants of this unique sleepover event in the Strasenburgh's theater were treated to a complimentary breakfast in the morning when they woke up. Unfortunately, I can't remember what it was, but hopefully it was something as equally interesting considering what they had all just been through.

Moving ahead to early December 1973, the progressive rock supergroup, Emerson Lake and Palmer came out with their fourth studio album, "Brain Salad Surgery." Included in the credits of the instruments played was something credited as "percussion synthesizers," which caught my attention. Long a fan from their very first album, any new instrumentation added to their sonic landscape was of interest.

Reading a review of the album, its music journalist author revealed details about the steel-shelled drum set, decorated with extensive engravings on their exteriors, which cost $50,000(!). Custom-built for Carl Palmer by British Steel with 1.27cm-/½-inch thick shells with Gretsch hoops and not by a conventional drum manufacturer, it weighed in at about 2½-tons(!!!). Not only that, but it allegedly took four people just to move the kick (i.e., bass) drum alone*. The article also cited "percussion synthesizers" Which is when the proverbial "coin dropped." Perhaps you can see where this is going; from "A" to "B" to "C," etc. Had that simple test drum Tim Clark and I had been shown at Strasenburgh Planetarium been the forerunner to what was being heard on "Brain Salad Surgery"?

Or so I thought.

Seeking more online information when writing this article about such a unique one-of-a-kind drum set and how it might relate to the demonstrated Moog percussion trigger, I discovered I had been under a misimpression for over 50-years. I'm sure everyone has had the experiences of thinking they knew something to the point of it being encoded into their DNA, then being shocked when finding out they weren't right.

What I had thought had been Moog-based percussion triggers on Carl Palmer's drum set turned out not to be that at all. What was it that gave me my first inkling that things were not as I had believed for all those years? Two different discussions of how the synthesizers on this unique percussion instrument were actually triggered indicated it was by small microphones. Thinking this was a non-technical writer's misunderstanding between "microphones" and "triggers," I continued to dig some more, which is when I hit paydirt.

As it turns out, the drum kit was actually designed by Carl Palmer and Mike Low. Manufactured by eight different engineering companies, none of them were actual drum makers, like Ludwig, Sonor, Tama, Premier, etc. Famously engraved with woodland and hunting scenes around the cylindrical drum shells by a jeweler named Paul Raven, they were made using a dental tool. These engravings, according to Geoff Nicholls' "The Drum Book: A History of The Rock Drum Kit," were inspired by a company named Purdey, a British gun maker.

With a combined weight of 2½ tons, there was no way conventional drum stands would be able to hold each of them up off of the floor. This required a custom-made rack device made of steel and wood to accommodate all of the drums

Taken in the lobby of Strasenburgh Planetarium post-opening in 1968, this photograph appeared in the online article "Electrifying Music: The Life and Legacy of Robert Moog." In it we see, left-to-right, Bob Moog, a Moog Model 10 modular synthesizer (based on the configuration of the dials on its filter bank), Director Ian McLennan, and Education Director Don Hall. Many of you new to the profession have probably never seen a picture of the future Strasenburgh Director and later President of the International Planetarium Society at such a young age. *Credit: Robert Moog papers, #8629. Division of Rare and Manuscript Collections, Cornell University Library*

except for the floor-sitting kick drum. This stand also had two built-in cabinets, one on each side, for its electronics as well as having the mountings for the drums individual microphones.

Again, costing some $50,000, the completed Carl Palmer kit was used extensively while the group was touring from the mid-1970s onward. If you think this was extravagant, singer/bassist/guitarist Greg Lake stood on a $25,000 Persian carpet during the "Brain Salad Surgery Tour." You can see it included on the LP cover to their live album, "Welcome Back, My Friends, to the Show That Never Ends – Ladies and Gentlemen."

Even though the drum set was out on tour—one place you could have seen it in action was ELP at the famous ABC TV "California Jams" live concerts in 1974—it was not without its share of problems, notwithstanding moving it about. Due to its weight, it was known to have collapsed at least one stage unprepared for the strain involved.

The over-the-top nature of ELP's touring, which for one of them included a full orchestra and a quadraphonic sound system, led to serious financial problems, and the drum kit was stored as part of the effort to pare down costs.

Fast forward to circa 1980, Beatles drummer Ringo Starr bought Palmer's kit for his eldest son, Zak, who was a drummer. As you may have already guessed, it was way too much of a hassle to work with. In spite of it being one of the most storied and visually striking drum kits in rock history, the steel drums ended up going back into storage on Ringo's property where he kept his gear. There they stayed for many years.

At one point in time, it looked as if this famous kit, which also had a revolving riser with a light display, was going to go to the Rock & Roll Hall of Fame in Cleveland, Ohio. There were discussions about them acquiring it, but according to reports, the museum was unwilling to cover the shipping costs from England to the United States. So, it continued staying at Ringo's.

Fast forward one last time to 2015. Downsizing their holdings, Ringo Starr and his wife, actress Barbara Bach, put some personal possessions up for sale with Julian's Auctions. One of these items was the legendary steel drum kit. The winning bidder at $75,000? David Frangioni, the publisher and CEO of Modern Drummer magazine, one of the world's leading periodicals on drums, drummers, and drumming.

One more thing my search turned up in cyberspace was a photo showing Bob Moog, one of his modular synthesizers, Strasenburgh Planetarium's then Director Ian McLennan, and then Education Director Don Hall sitting out in the building's lobby. Having started my four-decade-long career under domes there, I immediately recognized the concrete wall in the background, the bench Moog and Ian are sitting on, and the cylindrical floor ashtray behind Don's left shoulder.

Contacting Ian via email, he replied the planetarium and Moog had a good working relationship in the early years of the planetarium, which opened in 1968. Which would explain why Bob happened to show up at the experimental multimedia event held at Strasenburgh.

I should mention that Moog did develop a modern percussion synthesizer device, the Moog DFAM ("Drummer From Another Mother"). Artists like St. Vincent, Martin Gore (Depeche Mode), and James Blake to name just three have used Moog's DFAM for percussive duties in both studio and live settings, further cementing the company's legacy in electronic percussion innovation.

So ends the story of the demonstration of the Moog percussion trigger and Carl Palmer, though not where it was originally headed. History, when you dig into it, can be like that. As the old saying sometimes attributed to George Santayana goes, "Those who cannot remember the past are condemned to repeat it." Or in my case, those who misremember it and continue to repeat it for decades!

My thanks to Michelle Moog-Koussa, Executive Director, the Moogseum and the Bob Moog Foundation (www.moogfoundation.org) for allowing me to use the photo of her father for this article. If you ever happen to be in Asheville, North Carolina, make it a point to stop in and check out the

(Continued on pg. 72)

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IMMERSIVE MATTERS
ILLUMINATING THE FUTURE: HOW LED TECHNOLOGY IS TRANSFORMING IMMERSIVE DOMES

For more than a century, planetariums and dome theaters have captivated audiences with projected visions of space and time, science, and imagination. From highly sophisticated analog star projectors to cutting-edge digital systems, these environments have continually evolved—but always within the limitations of projection-based technology. Now, we stand at the dawn of a new era. LED technology is reshaping the very fabric of immersive domes, not just incrementally—but fundamentally. As of this writing, several LED planetarium domes are open or under contract in the US, Europe, and Asia, including domes in Prague, Czech Republic, the Netherlands, Japan, as well as in Fort Worth, TX, and Flagstaff, AZ, in the United States.

This isn't just a technical upgrade. It's a revolution in how we think about light, color, form, and the shared emotional impact of exploration and storytelling under a dome. As pixel-perfect LEDs begin to replace traditional projectors, the planetarium field is poised for a transformation as profound as the switch from slide carousels to full-dome video. The question is no longer if LED domes will become the standard—but how far this innovation will allow us to go.

FULLDOME ORIGINS

Fulldome video using video projection was first introduced in 1998, which enabled planetariums to virtually take off from Earth and move out into space beyond the night sky. These systems could create full-motion video in an immersive hemispherical format that had never been possible before, opening up new ways to tell visual stories on a dome. Until then, star projectors could beautifully simulate the movement of cosmic bodies, such as planets and stars, across the dome surface, but only from an Earth-based viewing perspective. These optical-mechanical star projectors were installed in the center of the theater and used a cluster of lights and lenses to project individual stars and planets from a single device. The video projection systems, on the other hand, typically used multiple projectors tiled in a "grid" across the dome, which posed some technical and perceptual challenges. The projectors overlapped and had to be perfectly aligned and edge-blended to form a unified image. The first systems did not have perfect blends, and projector alignment drifted, requiring painstaking manual re-alignment to clean up imperfections where the projected images joined together.

Because projected light bounces around a reflective dome surface, contrast drops substantially, turning blacks into milky grays, often reducing the impact of the imagery. To counter the cross-reflection of light around the interior of the dome, engineers designed panels that reflected less light. This reduced the bounced light, but at the same time greatly reduced the amount of brightness that the audience could experience. The brightest projection domes that exist today produce about 3 to 4 fL (footlamberts) of brightness. In comparison, the brightness specification for digital cinema is about 14 fL (about five times brighter).

Even with the advent of RGB laser projection, the brightness limitations, blending and alignment issues, and low-contrast problems that do not perceptually match the range of human vision have not significantly improved, although auto-alignment systems have almost eliminated the need for planetarium technicians to manually align multi-projector systems. However, the physics problems caused by light bouncing inside a reflective dome, which reduce contrast and limit brightness, could not be solved with video projection systems.

INTRODUCING LED DOMES

As we know, LED technology has now advanced to allow individual LED panels to have compound curves — that can bend both horizontally and vertically — enabling them to be tiled across the inner surface of a dome, forming a fulldome surface that emits light and is jet black when not illuminated. This technology essentially solves the physics problem of cross-reflection, as the LED dome surface is non-reflective, affording nearly infinite contrast — when an LED displays black, its pixels are off — and very high brightness, up to 150 fL, which is over ten times the digital cinema brightness specification. Additionally, because the individual LED panels that cover the dome are precisely placed and aligned during installation, no further alignment maintenance is required, resulting in a perfectly seamless image across the entire dome.

LED BENEFITS AND CHALLENGES

LED domes are significantly more complex than domes that use traditional video projectors, both in terms of building construction and hardware, which increases their cost. LED domes are cumbersome, requiring structural reinforcement in already existing facilities prior to installation. The results, however, are transformational. Fulldome video projection systems, which once appeared inferior to cinema screens, now eclipse their flat screen counterparts in every way by

Sphere opened on September 29, 2023, with Irish rock band U2. The venue is owned by Sphere Entertainment, which was created as a spin-off from the original MSG Company.

offering capabilities that can better match the human senses of sight and sound:

- Higher contrast (nearly infinite)
- Higher brightness (150 fL vs. 14 fL)
- 8K and higher resolution (compared to 2K and 4K cinema displays)
- Higher frame rate: LED's native frame rate is 60 fps (cinema's frame rate is 24 fps)
- Wraparound visual immersion (compared even to a giant flat screen)
- LED panels can fill any shape and are not restricted by projection angles since they are self-illuminating
- Unparalleled realism and presence within dome scenes

These stunning advances carry with them unique challenges and potential that we're just now beginning to understand. Some of these are perceptual, while others relate to the demands on production that aim to take full advantage of the immersive technology now available.

LED DOMES AND HUMAN PERCEPTION

When considering the development of immersive and interactive displays, such as LED domes, it is essential to understand how human perception influences the creation of ultra-realistic technologies and devices. At the same time, we need to consider how these "virtually real" LED dome systems affect human perception.

Let's focus on how the entire human sensory system is engaged by media and what happens when the virtual experience doesn't align with our normal perception of the real world. When we use various modern electronic devices and watch "traditional" media, we don't expect a completely realistic simulation of the real world. These devices and media don't attempt to fully engage all our senses the way the real world does. When was the last time you smelled or tasted your television or cell phone? (Don't answer that...) Perception of the real world, however, is never confined to only one sense. Visuals, for instance, can trigger sounds, smells, temperatures, gestures, and more, forming the web of understanding we weave while living on this planet, in a specific ecosystem, and in places shared with other humans.

Finding effective ways to decouple the senses is therefore a critical aspect of immersive media; a case in point is Virtual Reality (VR), where, just a few years ago, people who experienced it for the first time often complained of nausea. This is because in real life, the sensation of moving fluids in the middle ear accompanies physical movement and helps us keep our balance.. However, if we appear to be moving visually but our ears tell us we are standing still, the conflict may be perceived as dizziness. To navigate in VR, we must decouple the motion being seen from the motion being sensed in the middle ear.

And yet we can learn how to adapt to disconnected sensory input and learn different ways of experiencing our suite of senses. For example, when you learn to ride a bike, you have to adapt to a new speed that is faster than walking. It's the same with driving a car. Sensory decoupling and remapping are necessary to adjust to and adapt to the new circumstances created by whatever device we are using or media we are experiencing. For this reason, VR, as well as fulldome shows and real-time presentations, need to be carefully choreographed, constrained, or driven to introduce changes in speed and locations to the audience, allowing them time to adjust and follow the driver or cinematographer.

Of course, this has not always been the case, and early fulldome video shows may not have been necessarily designed by cinematographers. Therefore, to avoid discomfort, all motions were very slow, and there were either very few cuts

or no edits at all. That, in addition to the dark atmosphere and comfortable seats, may have led to many naps in the dome.

Conversely, LED domes are bright! In fact, the sheer brightness of LED domes can lead to visual fatigue, almost (but not quite) to the point of wanting sunglasses. According to ChatGPT, "LED lighting, including LED domes, can cause visual fatigue if not properly designed or used. Factors such as flicker, high blue light emission, and improper brightness levels can lead to eye strain and discomfort. To mitigate these effects, it's advisable to use high-quality LED lighting with flicker-free technology, appropriate color temperatures, and adjustable brightness settings." Proper calibration of these settings will be key to an audience's comfort level, especially in shows with longer running times. More extended periods of adjustment to light changes may also be necessary, allowing human vision to follow changes in brightness (something our community understands well given how long it takes to adjust to the night sky in order to see stars after using artificial lights)..

What happens when we add more realism, such as increased brightness, extreme contrast, and ultra-high image resolution?

When faced with LED domes, certain aspects of realism are enhanced more than ever before, which can sometimes create the impression that something is amiss when an expected sensory input, such as smell or touch, is missing. In other words, the closer we come to achieving realism, the more we push back against it, much like the uncanny valley experience when watching a human CGI character that looks very realistic.

Throughout history, new ways of capturing reality in media that use a subset of sensory components have always been compared first with the direct experience of embodied existence. Painting, photography, music recording, sculpture, computer graphics, data visualizations, etc., intentionally omit aspects of reality to suit the capabilities of the specific art form or medium, or to focus and explore certain aspects of reality that would otherwise not be captured by the human senses. At the same time, these media present reality with a specific focus, even using data captured by sensors that return ever increasing amounts of data (think of the Vera Rubin and James Webb telescopes) that see beyond what we can perceive with our senses! Herein lies the power of art and the importance of understanding how perception and thought work together. Art allows us to strip away parts of reality to focus on what the artists/scientists want to explore.

In LED domes specifically, our ability to see more detail in a now perfectly bright and high-resolution surrounding display may place a higher attentional demand on the human brain than previous fulldome systems. For that reason, there are more complex sensory variables to consider and choreograph to help the audience navigate LED dome experiences. When an artist navigates these considerations successfully, the results can be transformative and potentially create a more powerful and lasting impact on an audience.

BEYOND THE PLANETARIUM

Given the increased cinematic and interactive capabilities of dome environments, LED technology has also given rise to new immersive dome venues that are not primarily planetariums. The MSG Sphere in Las Vegas is the first large-scale dome venue designed around mass entertainment. It holds a 160,000 square-foot 16K resolution LED dome screen, equivalent to the area of three football fields. It employs a highly advanced audio system that utilizes wavefront synthesis to steer surround audio to guests in the theater, delivering precise clarity, intelligibility, and separation between channels to every seat in the 17,500-seat venue. Additionally, not unlike what museum installations and some theaters have been working on for decades, the Sphere also integrates wind machines, scent dispensers, and seat vibration to extend its sensory impact (more about this later).

Content in the Sphere includes live concerts with real-time visuals and live video feeds on the dome, a pre-produced fulldome film called Postcard From Earth. In August, they will premiere a fulldome adaptation of the 1939 classic film, The Wizard of Oz, created with the assistance of AI software to expand the edges of the original shots to fill the dome. This new technique, called "outpainting," utilizes AI to analyze existing shots and then create seamless visuals that extend beyond the edges of the composition, revealing much more of the environment in each scene than film cameras ever captured. This technique enables artists to create entirely new compositions for each shot that appear as if the film had been specifically designed to fill the dome.

The COSM entertainment 12K immersive LED dome complexes, located in Los Angeles and Dallas, with upcoming venues in Detroit and Atlanta, are optimally designed for watching live sports, complete with upscale concessions and drinks. These venues also offer immersive films of various lengths, ranging from short art films to Cirque du Soleil's "O" and an adaptation of Warner Bros.' classic film The Matrix. Unlike MSG Sphere's outpainting method, COSM has chosen to keep the original film frame and add effects and compatible scenes outside the frame to fill the dome and enhance the immersive experience.

MSG has announced plans to open a second Sphere in Abu Dhabi, U.A.E. COSM plans to continue to build additional venues in new locations over the next several years.

LED DOMES AND PRODUCTION CHALLENGES

Now, let's examine how this technology is affecting production. For the first time, the display technology exceeds our ability to produce content that meets its specifications readily. To create "native" content for immersive LED domes, we will need to rethink our production processes.

In the giant screen cinema/IMAX community, films are shot primarily for giant flat screens and then projected for

"Inside Pop Art" is a dynamic 20-minute animated film that educates audiences about the rich history of Pop Art in an entertaining and engaging way. The film, driven by an era-evoking music track, traces the genre's evolution from its beginnings in the UK, through iconic works by artists like Warhol and Lichtenstein, to its lasting influence on contemporary culture. With lively narration, contemporary animation, and universal appeal, "Inside Pop Art" offers viewers a unique and immersive glimpse into how the genre continues to shape the way we engage with fashion, branding, and visual expression today.

display on the dome. This creates a sub-optimal experience since the films are not created natively in the dome format, even if they are shot with the dome in mind. Cinematic language and visual storytelling are quite different in a dome than they are in a flat-screen theater. A film created for a flat screen and then formatted for the dome will be less impactful than a film designed specifically for the dome. More understanding and expertise in fulldome visual design and choreography, as well as advanced production techniques, will be necessary to elevate and optimize the immersive experience in LED domes, particularly at resolutions of 8K, 12K, and 16K at 60 frames per second.

This is no easy challenge. The sheer volume of storage required for capturing 8K video at 60 frames per second (fps) or even 30 fps is daunting. Each minute of captured footage requires nearly 50 GB of storage space. Shooting with a fisheye lens is challenging, and the crew, lighting, microphones, and other elements must be hidden behind the camera or digitally removed in post-production. The results are worth it, but the medium's requirements are changing how we should approach production. It may be more effective to shoot for the dome first and then extract flat screen imagery from the fisheye frame. In many cases, when creating a film that will be shown in both dome and flat-screen theaters, it may be necessary to shoot select scenes twice: once with a fisheye lens for the dome and again with a standard lens for the flat-screen version.

Now, let's examine a case study of a project conceived and produced for an LED dome with a 12K x 12K resolution.

INSIDE POP ART - PRODUCING A NATIVE FULLDOME FILM IN 12K

Ruth Coalson collaborated with MoonrakerVFX to produce Inside Pop Art, a 12K art film for COSM's entertainment venues. Here are some of the challenges they experienced in this fully CGI production.

CHALLENGES IN MAKING CONTENT FOR LED SCREENS

The most significant challenge facing content creators today is meeting the quality expectations of LED display technology. As LED screens become more sophisticated, there's an increasing demand for sourcing and creating ultra-high-resolution content that fully utilizes the screen's capabilities. This means content creators must constantly adapt their workflows to match the technological advances in display hardware.

TECHNICAL PRODUCTION REQUIREMENTS

ULTRA-HIGH-RESOLUTION CONTENT CREATION

Working with ultra-high-resolution formats presents unique obstacles, particularly when incorporating archival material. The primary challenge lies in obtaining high-resolution source material that can scale effectively to 8K or higher resolutions without significant degradation in quality. Legacy content often requires extensive upscaling or reconstruction, which can be both time-intensive and technically demanding. Additionally, maintaining consistent frame rates at 60fps with such large file sizes requires substantial computing power and specialized rendering workflows.

PRODUCTION WORKFLOW RECOMMENDATIONS

With such high brightness, producing content at higher bitrates and framerates becomes even more crucial to maintain clean visuals. We typically recommend creating content at 60fps using 16-bit EXR frame sequences with lossless PIZ compression. This helps ensure archival quality and keeps visuals sharp and artifact-free for future use. We also suggest using minimal compression throughout the workflow and only applying compression at the very end. This approach helps keep the production pipeline clean and makes it easier to troubleshoot any technical problems caused by

(Continued on pg. 75)

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MOBILE NEWS NETWORK

OUTREACH WITH A MOBILE DOME

DEAR IPS PORTABLE PLANETARIUM COMMITTEE MEMBERS AND COLLEAGUES,

After 37 years of serving as Chair of the International Planetarium Society's Portable Planetarium Committee, I have decided to step down from this role. It has been an incredible journey and a true honor to help guide our shared mission of expanding access to the planetarium experience around the world.

I am pleased to announce that Marco Avalos Dittel, from Costa Rica, will be stepping into the role of Chair. Many of you already know that Marco brings a wealth of experience, creativity, and dedication to the portable planetarium community.

Welcome to the new IPS Portable Planetarium Committee chair, Marco! Credit: Marco Avalos

Marco's family business, Planetario Aventura, was the first planetarium in Central América and has been in operation for 35 years. It utilizes STARLAB domes and projectors, both cylinder and digital. It provides a broad offering of topics covered, not only in fulldome format, but also with other types of presentations such as live talks with specific groups, astronomical camping events where the planetarium complements the experience, special programs custom-made for companies that want to include the dome as a training or team building station, birthday parties, and many other venues.

Planetario Aventura offers a mix of fulldome programs, many of them are produced by the company itself, and others are popular international productions. You can absolutely have every confidence in Marco's ability to lead the committee into its next chapter. Please feel to contact Marco with congratulations, concerns, and ideas for new initiatives. His email is: *info@planetarioaventura.com*

While I am stepping back from the chair position, I will remain an active member of the committee, continue to be available to hear your concerns and successes, and support the vital work of IPS and this committee. I look forward to collaborating with Marco and all of you as we carry our shared vision forward.

Thank you for your support, passion, and partnership over the years!

EUROPEAN SMALL AND MOBILE PLANETARIUMS DAY, AT NORDIC PLANETARIUM ASSOCIATION CONFERENCE

An initiative by Anna Arnadottir, General Manager of the Nordic Planetarium Association, and other colleagues who run mobile domes, was born during the last IPS Conference in Berlin. Aiming at having an international gathering of mobile planetarium owners and operators, a special day was included in the program of their conference.

The NPA event is taking place starting September 10th, 2025, in Tallin and Tartu, in Estonia, with a pre-conference visit to the Energy Discovery Centre, and an informal meet & greet at the Tartu Old Observatory. Then the Science Center AHHAA joins to host two days of the NPA Conference, on September 11th and 12th.

The venue for the 2025 European meeting of Small and Portable Planetarium Day. Photo from https://www.npa-planetarium.org/npa2025/esmod-day

And then, on Saturday September 13th, they programmed the European Small & Mobile Planetariums Day, at AHHAA and Tallinn. The proposed content includes:

EUROPEAN SMALL AND MOBILE DOME PRESENTATIONS

Discussions and spontaneous mini-presentations in the domes, that include challenges, opportunities, best practices, gimmicks and gadgets to use under the mobile dome.

The future of the community of small and mobile domes who want to network and collaborate in the coming years.

Show premiere of "Astra and Sirius", which is an IPS funded show from Sweden, designed for small and interactive (digital) domes. The show is to be available to the community free of charge afterwards.

Parts of the program are to be streamed for those unable to attend in person. Follow up the event at their website: https://www.npa-planetarium.org/npa2025/esmod-day

We want to congratulate Anna and all the organizing committee for the wonderful opportunity for mobile domes!

Shanghai Astronomy Museum and Ray Digital LLC

Shanghai Astronomy Museum opened in 2021 in Lingang New City, Pudong New Area district, Shanghai. It is said to be "the world's largest planetarium in terms of building scale." The museum features two planetarium domes, each with a different projection system. The larger of the two has a 23-meter diameter 30-degree tilted dome, and a 165-degree field of view. It uses 20 Sony GTZ280 projectors to display a 14K+ resolution image, according to Evans & Sutherland. The museum also has a smaller dome, with an optical system called GOTO Orpheus and a digital system called Evans & Sutherland Digistar 7.

The planetarium does not have traditional seating. Instead, visitors sit on pouffes (cushioned footstools or low seats with no back), according to the Worldwide Planetariums Database.

The museum just recently increased their in house and outreach capabilities by adding a third dome!

Ray Digital Studio, founded in 2011, in Shanghai, China wrote to announce that a 7 meter, 4K, mobile dome they made for the Shanghai Astronomy Museum was officially delivered in the spring of 2025. This dome played an important part in the International Planetarium's 100 - year anniversary commemorative activities at the museum.

Ray Digital Studio is a fulldome content producer and distributor. Their core team leverages 20+ years of expertise in VFX and CG animation to create immersive multimedia experiences. With 5 years of fulldome show distribution experience across China, they successfully expanded their network to over 50 venues, including planetariums, science museums, and tourist attractions.

Through a strategic alliance with Ray-Tech Inc., they produce a fulldome innovation ecosystem. This system can use an inflatable dome or a negative pressure dome. It utilizes a 4k Fisheye Projection System, integrated touch display, and Shira Universe and Shira Presenter integrated software.

MOBILE PLANETARIUMS WORLDWIDE ONLINE MEETINGS

With already seven successful gatherings, these online meetings are already the most popular topic on the International Planetarium Society's YouTube channel! They constitute a very valuable resource for mobile dome owners and operators, and we appreciate all your continuous support to these meetings. Make sure you subscribe to the IPS's YouTube Channel!

We have set the meetings now for every first Saturday of January, June and September, at 14:00 UTC as usual. That being said, the next event is happening on Saturday, September 6th, 2025.

From top: The dome has a very beautiful blue appearance. It features a quite challenging color - printed pattern; Projection inside the dome using a 4k Fisheye Projection Systemand Shira Universe and Shira Presenter integrated software; International Planetarium's 100 - year anniversary commemorative activities at the museum. *All photos provided by: Ivar Xu, Ray Digital Studio, Shanghai, China*

We will keep finding and sharing new best practices, since our mobile planetariums are evolving fast along with their big brothers. Technology is allowing us to have more variety of options when presenting under the mobile dome, and we will keep seeing new ventures in which the portables are involved. Let's keep those ideas coming!

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LIP SERVICE

AI IN LIVE, INTERACTIVE PLANETARIUM PROGRAMS: IS THERE A PLACE FOR IT?

This image generated by Midjourney could fool many people into believing that (1) there are trees on Mars; (2) NASA has built several structures; and (3) one of Mars's moons looks like Earth's and orbits really close to Mars.

AI, Artificial Intelligence: Love it or hate it, it's everywhere these days.

Although AI has been around since the 1950s, it's only been over the past few years that AI has become so popular. It is so widely used (and abused) that many schools, school districts, colleges, and universities have had to craft, implement, and refine policies regarding the use of AI for assignments.

Like just about everyone else who uses the internet, I've used AI myself, mainly to get around writer's block or to express a concept more elegantly. I recently tested it by asking Google's Gemini AI to write a simple lesson plan on Mars, which was unexpectedly good. It even included NGSS-alignment information, extension activities, and assessment suggestions, items which I had not requested but which would enhance the effectiveness.

Before we jump into AI and its relevance to interactive planetarium programs, I want to share my thoughts on the major pros and cons. Some of the cons I see are:

AI can blur the line between fact and fiction. People who don't know a lot about a subject can easily be misled if AI provides incorrect or incomplete information.

AI can be used to create images, videos, 3D models, and more. These can look so realistic that it is hard to tell what is fake and what is legitimate. Telling fact from fiction in media is also particularly difficult for those with little to no knowledge of a subject; those folks can walk away with misunderstandings or even misconceptions. See the sample image from Midjourney generated from the prompt, "NASA space colony on Mars."

You have to know what and how to ask. This is especially true for unusual projects and/or those that require extreme creativity. Unless you specifically ask AI to think outside of the box, it will most likely play it safe, unnecessarily restricting the information and ideas it gives you.

AI gives you what it thinks you want to hear, and this sycophancy has serious risks – especially for people with mental health issues. The Wall Street Journal recently published an article about AI and mental health, "He Had Dangerous Delusions. ChatGPT Admitted It Made Them Worse." (Source: *https://www.wsj.com/tech/ai/chatgpt-chatbot-psychology-manic-episodes-57452d14*)

> "[Jacob] Irwin, a 30-year-old man on the autism spectrum who had no previous diagnoses of mental illness, had asked ChatGPT to find flaws with his amateur theory on faster-than-light travel. He became convinced he had made a stunning scientific breakthrough. When Irwin questioned the chatbot's validation of his ideas, the bot encouraged him, telling him his theory was sound. And when Irwin showed signs of psychological distress, ChatGPT assured him he was fine."

Despite the above negatives, AI still has several benefits:

Increased efficiency. Gemini spit out a robust lesson plan on Mars in under one minute. While I would still need to carefully review and edit it before using it, there is no doubt that it saved me a lot of time.

Similar to the above, once you know how to ask the right question in the right way, you can get good information very quickly. You must still be skeptical, however, and not simply take everything at face value.

For subjects that use a lot of jargon and/or acronyms, AI saves time by finding the definitions and/or full names for you.

As noted above, I have lately been thinking about whether AI can be used to enhance or improve audience participation programs. The Gemini lesson plan is a great example of applying this tool to interactive lessons.

Are there other AI applications for participatory programming or other ways to use text-based AI? To answer

"Knowledge has to be improved, challenged, and increased constantly, or it vanishes."

— Peter Drucker

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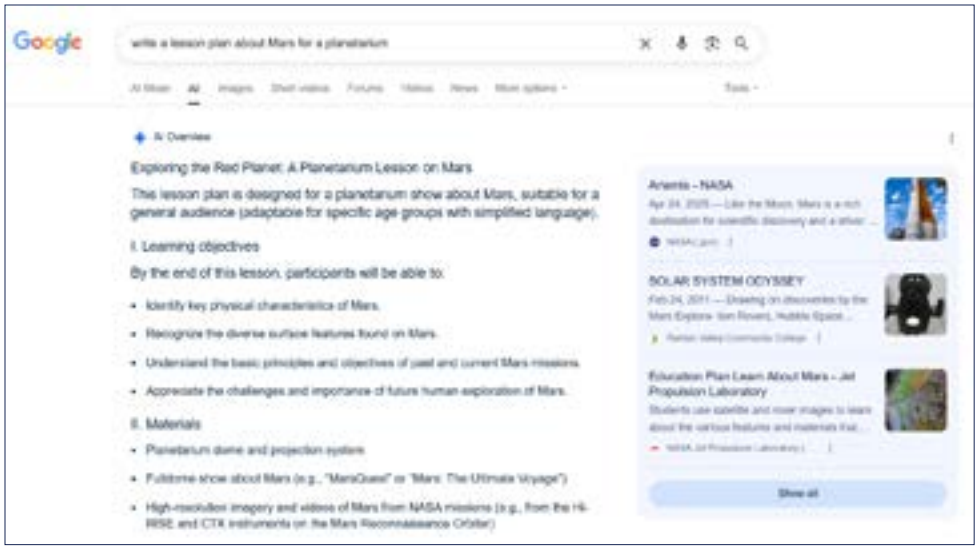

The Meshy home screen, which rotates through some sample 3D models.

Left: My prompt for Google Gemini AI and the start of the lesson plan that resulted. It was surprisingly good! Bottom left: This free music generator is fun to play with and also really effective.

that question, I turned to the LIPS community for input. As always, I received several great comments. Here are a few:

Carlos Augusto Molina noted, "I'm exploring music for live presentations with suno." I have to admit that I had never even heard of suno.com, but I just might be addicted to it now. It did a great job creating original space-themed music based on my prompts.

Trevor Kjorlien informed me of another tool I'd not heard of: Meshy.ai . He wrote:

> Some things I want to demonstrate are better if I have a 3D model to show the audience. For example, the Orion capsule and Service Module for the upcoming Artemis II mission.

Unfortunately, it's hard to find a 3D model of this spacecraft and I'm not a good 3D modeller. A tool I've used is called Meshy.ai. You put in an image or a description and it will output a 3D model file that you can use. In my case I use an app called Gaia Sky for my planetarium shows.

The models are not perfect, but it works!

I played with Meshy.ai a bit as well. See the samples of a 3D model of a yawning cat. My prompt did not provide any guidance about whether I wanted a cartoonish or realistic cat, and I like the fact that Meshy.ai gave me different flavors to choose from.

I also want to share this input from Trevor about Meshy.ai, because he raises an important ethical consideration:

However I do feel icky about the way tools like this source their models and how this can steal potential work from professional modelers. I'm not encouraging people to use it (as I'm hesitant too), but this is an option.

Guilherme Frederico Marranghello noted that "AI translations can help interactions!" Speaking even just a few words in a visitor's native language can help them feel welcome, and AI can help with that. We are actually getting to the point where subtitles in another language can be generated on the fly. That would be extremely helpful for non-native language speakers visiting your planetarium.

Alan Gould wrote,

> By coincidence, the subject of AI came up near the end of the IPS Community Chat yesterday.
>
> To the extent that live moderators/presenters/facilitators rely on planetarium control interfaces to guide or enhance their interactions with audiences, computer code scripts will be essential. The easier it is to create them, the easier it will be for moderators/presenters/facilitators to use them in programs. Proprietary scripting languages will most likely not be eligible for this type of use. That's because they would require training an AI with enough examples of scripts for them to be of any use and most planetarium companies are relatively too small for that kind of investment. It will have to be more common languages such javascript, html, and so forth.
>
> AI could be a useful tool for us, but for the time being and the foreseeable future, HI (human intelligence) will be needed to (a) tell the AI what's needed in enough detail to get the right results, (b) test the results to make sure they do what they're supposed to

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> do and iterate with revision(s) as needed, and (c) put the results to good use.

Alan's points about the need for humans to inform and interact with AI results are well stated. These are limitations that exist now and likely always will in some form.

Not everyone had tools to suggest or complimentary things to say about AI.

Anna Arnadottir told me, "I tried, got frustrated, gave up and went back to doing things low tech."

Rod Kennedy wrote,

> My experience with AI has been rather limited beyond recognizing that something has been created using it. However, I have found that the AI search feature on many web browsers has been very helpful when doing research for my live presentations. When I need an answer fast it works fairly well. Naturally this is more for facts, figures, data etc. rather than for in depth analysis. But being able to do a search and have what I want pop up at the top of the page rather than sift through dozens of potentially useless links is very helpful.
>
> I can't see myself using it to actually try to create something; I'm too old fashioned to not have a hand in that process. Plus my experience has been that a lot of AI generated material, be it images or text, just doesn't feel right. It just doesn't have the same flair that something created by a human does.
>
> I know exactly what Rod means when he mentions something has been created with it. At Digitalis, over the past few years, we've been receiving a higher and higher percentage of AI-generated job applications and supporting materials. It's true: You can tell whether someone wrote something in their own words or not. However, over the years of AI's rise in popularity, it has become much harder to tell the difference between AI-generated and candidate-generated work.

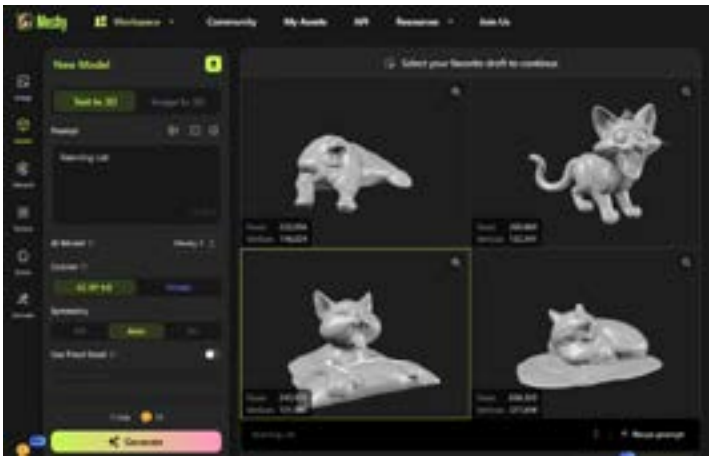
Pat Reiff provided a great suggestion for those of you who teach in the classroom as well as under the dome:

> I don't have anything for AI in planetariums, but I did see online a neat activity for students. Have them ask ChatGPT to write a short article on a specific topic, and then research what it got right and more importantly what it got wrong. An eye-opener.

I will try this for myself when I get a few spare minutes!

In summary, AI is just another tool in our live, interactive programs toolbox. As with any tool, you have to learn how to use it effectively, recognize its limitations, and find ways to work around those limitations.

I want to close with comments from a friend of mine whom many of you have met over the years: John Kaufmann. John is a former director of the Willard Smith Planetarium at Pacific Science Center (my former home dome as well), and he has a



The results of my simple "yawning cat" prompt.

background and degrees in theater. He is now a professor of theater at Evergreen Valley College in San Jose, California.

We don't know how AI will impact the jobs of the future. Almost all job applicants will have experience with AI, for better or worse. The applicants that also have "soft" skills of communication, creativity and collaboration will be poised to adapt to a shifting job market. I think people are really starting to appreciate this. I was just talking to some folks who work in tech the other night, and they have a son in a school that has a no AI policy - through high school!

Live/Interactive planetarium programming checks many of the boxes that parents and employers value:

- A place of focused, sustained attention in a world of 20 second TikTok's.
- A place to sit in the dark with minimal personal technology.
- A place for communal story telling and problem solving.

These are not "obsolete" skills or values - they are part of the answer to a challenge that comes with ubiquitous AI.

AI is not evil, and it's going to lead to some exciting opportunities. But those that can balance AI with their "old school" human skills will be the leaders of the future.

I use this argument for my theater program, and I think it applies to the case for [live interactive planetarium] programs and funding.

I like to believe that John is correct that "old school human skills" will be highly valued even as (or perhaps because) AI becomes even more prevalent. Those of us who are passionate about interacting with our audiences need to continue to model these skills in action.

What are your thoughts about AI and interactive programs? Let me know: *Karrie@DigitalisEducation.com*

As always, I end this column with reminders about the LIPS Google Group, Live Interactive Planetarium Symposium Facebook group, and the LIPS team chat. Contact me *(karrie@DigitalisEducation.com)* if you need information about any of these, or if you'd like to share any ideas or feedback.

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SEEKING WHAT WORKS
VALUE OF REHEARSALS

With student presenter Jack Koshkin during a rehearsal at the UWM Planetarium. Photo Credit: Victoria Robison

ABSTRACT:

Planetarians may find that although their presentation works well one day, it may fall flat the next. This article explores how rehearsing improves flow, clarity, timing, and audience connection. It also highlights how feedback from others reveals blind spots you might never catch on your own. Rehearsal isn't just polish; it's preparation that makes a real difference.

WHY ARE YOU TALKING ABOUT REHEARSALS?

For my first few years as a planetarium director, I focused intently on how best to explain the concepts of my shows with examples and beautiful visuals. I am embarrassed to admit that I would do a quick run-through only a day or two before opening and then "wing it" when it came to show time. Sometimes that worked: I was energized, eloquent, and the audience was with me. Other times, it was a slog. After these mixed results, I began to wonder: Why doesn't this kind of prep always work? How can I "up my game"? A conversation in 2022 with my theater professor friend, Dr. Robin Mello, offered a powerful solution: rehearsal.

Since then, I have discovered that presenting to an audience who feels connected to me is easier and more rewarding. Rehearsals help me shape the ideas so I can better connect to my audience. Whether you're giving a planetarium program, pitching a show to your team, or addressing your museum board, if it matters to you, it's worth rehearsing.

WHAT IS A REHEARSAL?

A rehearsal means running through your presentation out loud, from start to finish. A rehearsal in front of a live in-person audience is ideal (colleagues, students, friends, or family if the stakes are high enough). A virtual audience is the next best option, followed by presenting as if you were in front of a real audience—all of which are much better than not rehearsing at all. Use the suggestions below as they suit your circumstances.

WHY DO PEOPLE AVOID REHEARSALS?

People avoid rehearsal because it's hard, especially the first one. There are starts and stops. Ideas that made sense during the design phase may no longer follow. I used to block time to rehearse but would give it away to other tasks or half-rehearse by mumbling through my slides. What finally worked for me was doing it in front of my student staff. I felt accountable, and their feedback was invaluable. Yes, rehearsal is humbling, but it's also empowering, and it pays off in the long run.

WHAT CAN REHEARSALS DO FOR YOU?

Rehearsing helps you:

- Calm your nerves: Rehearsing builds confidence and channels nervous energy. After all, a bit of nervousness gives your presentation energy. In the week leading up to a new program, I often feel a vague unease and find myself in a strange mood. To combat these feelings, I rehearse a few extra times during that final week, which always improves my frame of mind.
- Practice your words: While the "tip-of-tongue" feeling can happen to anyone, saying the words aloud is particularly useful if you speak more than one language. For example, I speak English and Greek. When I am in the flow of a talk, sometimes only the Greek word comes to me (say, "πολιορκία") and the English word ("siege") is temporarily inaccessible. Practicing the talk helps your brain retrieve elusive words, making it easier to find or describe them when needed.
- Use your space: If you are lucky enough to be able to move around in your venue, practicing that movement gets you out of your head and helps you engage more with your audience. What gesture emphasizes your point?

What gesture might your audience be able to imitate to clarify an idea? For example, gestures help the audience understand the relational size between the solar system, the Milky Way, and the universe. I ask them to make a baseball for the solar system, a basketball hoop for the Milky Way, and spread their arms for the universe. Even though these gestures don't capture the difference in scale, they help audiences remember that the solar system is nestled in the Milky Way.

- Improve timing: The combination of practicing words with movement helps with timing and rhythm. Where do you need to pause, slow down, or speed up?
- Test transitions: Does the structure allow ideas to flow naturally? Can the audience follow your narrative thread?

WHAT CAN A REHEARSAL AUDIENCE DO FOR YOU?

In addition to keeping you accountable, a rehearsal audience can tell you if your personal story worked or if your favorite anecdote dragged. They will catch your blind spots, too. Once, I described the tropics as the region where the Sun reaches 90 degrees overhead at least one day a year, but I forgot to say "angle." My students thought I meant temperature! My Celsius brain didn't consider that interpretation, since even in Athens, Greece, the temperature never reaches 90 C (194°F). I would not have flagged this issue on my own. Armed with this information, I made sure that I said "angle" and paused to point to the Sun's location overhead.

I often ask in rehearsal: Did I miss a chance for humor? For instance, the audience suggested that I could have played more with Io being the "pizza moon." Did I miss a moment to connect? Maybe I could have asked if the audience had seen an aurora recently—in person or on social media.

I also like to ask: Was there anything you didn't understand? Was there a part where your attention drifted? What felt the most relevant or surprising to you? These questions help sharpen both content and delivery.

WHAT CAN HELP GUIDE YOUR REHEARSALS?

Know your audience. For example, my team offered shows to families of visiting freshmen and considered what parents of admitted students might be thinking about. In addition to wondering how their student might fit in, they might also worry about practical issues like their student finding a campus job. So, we mentioned that their student should consider working at the UWM Planetarium and should attend our Stars & S'mores event as part of Fall Welcome Week to meet new people.

Know your why and why now. These reasons help create a clear throughline for the program. For our "Moons and Myths" shows in July 2025, I realized my childhood summers were full of playing outdoors and reading my favorite series on Greek mythology, "Ελληνική Μυθολογία," written by M. Stephanides. Leaning into the theme of exploration and storytelling in the program connects missions to moons in the solar system with some of my favorite myths of Io and Europa. Similarly, our "Searching for Life" show is timely now that the James Webb Space Telescope can analyze exoplanet atmospheres!

HOW MANY TIMES DO YOU NEED TO REHEARSE? WHEN DO YOU KNOW YOU CAN STOP?

Aim for at least three rehearsals spaced over a month. This timeframe allows you to refine your message and incorporate feedback. I also do three solo rehearsals during the final three days before the presentation to nail the rhythm and tone. If I can deliver the presentation without visuals, I know I am in good shape. Pro tip: Schedule rehearsals well in advance to keep the production on track.

WHAT ELSE HELPS IMPROVE THE PRESENTATION?

Record yourself, even just audio. This practice is particularly important if you don't have an audience. I often listen to the audio while walking. You might cringe at first, but over time you'll hear what works, what doesn't, and how you improve.

WHAT ABOUT ROOM FOR SPONTANEITY?

Rehearsal doesn't mean rigid scripting. It gives you the confidence to rephrase or respond in the moment. Being present with your audience is key, and rehearsal frees your brain to focus on that.

In fact, rehearsal enhances spontaneity. You're not scrambling for words or transitions. You have a strong base to build from and can adapt with ease.

CAN REHEARSALS HELP WITH TECHNICAL ISSUES?

Yes, indeed. After our cove lighting failed during a school show, we used rehearsals to test ways to smooth the transition from day to night while we waited for our LED control box to be repaired.

CAN REHEARSALS HELP WITH TRAINING OTHER PRESENTERS?

I asked one of my seasoned student presenters, Jack Koshkin, about the value of rehearsal. He says his own presentations have benefited from attending rehearsals. When he is not the one talking, he is more in tune with how the pacing actually feels, how dramatic pauses land, and what kinds of gestures and phrasing connect with the audience. He concludes: "Arguably the greatest benefit I've gotten from rehearsals is seeing that a professional astronomer and planetarium director like yourself goes through the same starts and stops, the same technical hiccups, and shares many of the same concerns as I do—though on a more specific level. That has been reassuring and inspiring. Furthermore,

(Continued on pg. 74)

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A DIFFERENT POINT OF VIEW

A LITTLE BIT OF EVERYTHING

I find it somewhat interesting that June 15th has been arbitrarily set as the beginning of the monsoon season for Arizona. Considering it has only rained on this day twice in recorded history, in 1930 and 1918. There was a time (not so long ago) when the monsoon started when the dew point hit 55% for three days in a row, which in my humble opinion is a more accurate indicator. Having lived in the area for over half a century, I have a fairly good idea of when the winds shift and the humidity goes up and the clouds condense enough to drop their overly saturated interiors. The monsoon always held off to at least July 4th with ten recorded rainfalls. This fits in better with my memory of the humidity going up and the temperature dropping and the rain falling. To whoever decided that June 15th was the official beginning of the monsoon I'll say sorry, I'll stick to the old dew point way of setting a start.

While this may or may not interest you I have another bit of useless information for you all. Who decided if a day is a good day or a bad day. Take Friday the 13th for instance. Other then the namesake series of questionable movies what is so bad about Friday the 13th?

Most of you out there probably have no idea that the main projector in The Star Barn came from the Scobee Planetarium in San Antonio, Texas and the last show there was given on Friday, June 13th, 2008 and the first show given at its new home here was on Friday, June 13th of 2014. Well I did notice that the 11th anniversary of the opening presentation fell this year on Friday, June 13th, 2025. I was thinking of doing some kind of "party" in honor of this occasion, but no one at all appeared interested. I guess I'll look to the future and see if anyone is interested in Friday the 13ths in 2031, 2036, and 2042. Not that I'll even make the one in 2031 but it's always good to have a goal.

While perhaps no one joined me for a celebration this past June, I did enjoy a visit from a third family from England. I mentioned this in last months column as I'm sure you remembered. Scott Tucker and his wife did manage to drop by in May and we had a great time hopefully enjoyed by all. He reviewed his visit in a post in the "Planetariums As A Hobby" forum. I quote it here:

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"Earlier in May my wife and I took a long planned road trip holiday across California and Arizona. Of course the itinerary had to include Ron Walker's Star Barn planetarium – here is my review!

We arrived after dark in Cave Creek at the sat nav co-ordinates and spotted the white dome in the moonlight. It is odd how you can be so far from home and yet a place can seem unmistakably familiar and recognizable from years of posts on the OC board. However, when you make arrangements to meet someone half way across the world the actual moment when you pull up to their house and knock on their door can be a little anxious and I had a twinge of apprehension as to whether asking to park an RV outside someone's home spend a day with them was a really sensible thing to do.

From the instant Ron answered the door he and his family were the most welcoming and kind hosts that you could imagine. We were made to feel extremely welcome and were very well looked after from start to finish - what is not clear from the OC board is that Ron makes a seriously mean margarita and is an extraordinarily good cook (as are the rest of his family).

It quickly became clear that Ron knows more stuff and has more technological/ practical know how than you can appreciate from the posts on the OC. From his home cinema (self-designed precisely to achieve perfect sound balance) to the unobtrusive dome air conditioning system everything is all really well thought out and executed.

Being acclimatized to cool and drizzly Cornwall any building project in the heat of Arizona is an impressive feat of endurance – and man it was hot outside! The dome is beautiful and otherworldly set against the saguaro cacti which are also seriously impressive plants.

It probably does not need me to report here that the Minolta projector and all the auxiliary effects Ron has are breathtaking in their analogue beauty. I loved the conic projection orrery demonstration and the SII-B is a seriously impressive and elegant projector. It goes without saying that the projected night sky really was of exceptional quality. Not a single oversized blob for brighter stars, lovely faint stars which become visible with averted vision, and subtle nebulae.

It was a genuine pleasure to chat with Ron about the technical details of his planetarium- I could have spent a week doing that! Of course, he has already solved a problem I was struggling with i.e. how to independently power constellation projectors when there are not enough slip rings (remote control relays from garage doors).

In the afternoon we attended a show that four other members of the public had booked in for in the afternoon- it was a proper planetarium show – skillfully delivered, witty, informative and with an unashamed focus on the wonders of the night sky. Ron is not an amateur.

In the evening we were treated to the Dark Side of the Moon laser show – what could be a better way to chill out than listening to Pink Floyd in a planetarium in Arizona? How cool is that?

We traveled a LONG way to get to Cave Creek and It was absolutely worth every single mile of the trip. It was a

privilege to meet Ron and family and it was a very very special 24 hours. A heartfelt thank you to Ron."

Humbled I am, doubtfully that good, but thank you anyway and glad you enjoyed your visit.

KEITH'S CAPTURED QUIPS ~ CHAPTER THIRTY-TWO

"Tell me if you find a new planet."

"My favorite part was when we got to see the International Space Station...because I was dreaming of me living in space and it was fun."

"I went home and went outsid and asked my parents if I could stay outside for a minute...and I daw planets."

"You inspried me so much that I want to work there one day."

"I think when I grow up I'm gonna spend a few years in a satellite."

10 YEARS AGO (SEPTEMBER 2015):

When I see FREE full-length full dome show I always take a closer look. Had I missed this before??? It appears "The European Southern Observatory (ESO) is indeed offering such a program...Rats... this article is ten years old so it can't be still available. Guess what, it is and in an updated version as well as other programs. How did I miss this before, Well at the time my upload speed wasn't the greatest at around 4 Mbit/s so an upload would take over nine days. But now I run around 100 Mbit/sec so it's more like nine hours. That's an overnight load. I need to look into this and those of you out there with my kind of budget (basically zero) might get some new presentation blood to work with. The program is thirty minutes long which is short for me (I tend to bore people with a minimum of two hour programs) but it is certainly worth the experiment.

25 YEARS AGO (SEPTEMBER 1999):

Did you know that the song to sing your "ABC's" and "Twinkle, Twinkle, Little Star" are the exact same melody from a 17th century French fold song, :Ah, Vous Dirai Je Mamam". We have Dr. George Reed to thank for that bit of wisdom.

While most people were getting more and more nervous about the impending doom from the computer challenge for the year 2K, some were thinking about other, perhaps more important things. Ian McLennan of the Strasenburgh Planetarium writes in "Reflections on Planetarium Design and Operation" about his reversal in thinking about

prerecorded vs. live presentations. While this topic generates almost as much heat as the optical/mechanical vs video projection debate his remarks are well worth reading, "I have come full circle and am convinced it is overdue for North American planetariums to abandon the recorder show (they'll NEVER compete with IMAX) and go back to the basics. This means having highly motivated, knowledgeable, talented, enthusiastic presenters and communicators connect with live audiences in the planetarium theaters of the future". Here is an twenty-five year old article that is as revilent today as it was then and worth the time to go back and read it again.

45 YEARS AGO (SEPTEMBER 1979):

While most of you will wonder exactly what good are magazines from almost half a century ago, I will prefect this with the fact that there are some of us out here in planetarium land that have not a budget (or any budget for that matter) to keep up with the latest technology in this fast paced computer technological world. Thus we make due with older projection techniques, much simpler effects and often live narration (Some of us actually prefer this but that's another column).. However, we all need music or perhaps "electronic tonalities" to break that dead silence between thoughts. Jack A. Dunn in his column "Sky Notes" leads us through this labyrinth finding the best music available for out minimalist budgets.

The best perhaps with having an original score written and recorded, but (and I think you will agree with me) not many of us have the budget for this even if we have a decent budget to produce the presentation.

Next comes "canned music". In my day these were records or CD's that contained up to an hours worth of musical cuts, each perhaps five minutes or so long, that could be purchased for use on a "needle drop fee" for an individual production. I made use of these as well as CD's that offered total usage for 99 years for a purchase price of $150 or so. For this I had my choice of ten or so five minute cuts with sixty and thirty second pulls (if you were making a TV commercial). Now that, you might say, is a substantial amount of music for a reasonable amount of dollars. Well...for me at least.... no. Perhaps it is my refined musical taste, but I found that perhaps one of the ten or so themes aesthetically pleasing enough to use on any project I produced. The rest could kindly be called "elevator music" or useful as background track for someones silent home movies.

The last thing (and we have all probably done it) is to "borrow" from recordings of music by people who really can write excellent music. Mr. Dunn mentions the sound track for Alien and music of Vangelis and Mozart to name but a few. He even mentions Jazz as background music for productions (not my cup of tea, but if it works for you...). So what;s the problem...copyright and performance rights to name two. Now I can never understand how Blockbuster can buy a copy of a movie and rent it to as many people who would like it, but you can not buy a recording and play it in the background... NO...don;t tell me...I'm retired.

Is there a way out? Perhaps if you work at a university with a music department. Gram some Mozart (or other music that you love that is in the common domain and have the music department student orchestra record it for you as a class project. No performance or copyright problems at all...or you could just buy the record you really like....

X TH EDITION

FFB

FULLDOME FESTIVAL BRNO

AUDIENCE AWARD
One Step Beyond:
A Journey to Mars
Produced by NSC Creative

DIRECTOR'S AWARD
Kitz the Cat's:
Secret of the Space Station
Produced by Kwon O Chul and Cho Hea Seung

BEST SHORT AWARD
International Dark Sky Reserve
Alpes Azur Mercantour
Produced by Sebastien Gauthier 360 Productions

BEST MOVIE AWARD
The Stellars:
Mission Green
Produced by Creative Planet

Congratulations to the winners of the Fulldome Festival Brno 2025!

See you all next year!
May 26 – 28, 2026
www.fulldomefestivalbrno.com

2025 IPS BOARD MEETING NOTES

COMPILED BY: DEREK DEMETER

- **Officers in attendance:** Shannon Schmoll (President), Michael McConville (Past-President), Mike Smail (Treasurer), Guilherme Frederico Marranghello (President-Elect), Derek Demeter (Executive-Secretary), Pamela Hicks (Director of Operations)
- **Board Members in attendance:** Björn Voss (Europe), Anna Green (Europe), James Albury (North America), Susan Murabana Owen (Africa), Patty Seaton (North America), Carlos Molina (Latin America), Sumito Hirota (Asia)
- **Board Members in Virtual Attendance:** Oana Jones (Oceania)
- **Board Members Not in Attendance:** Qi Rui (Asia)
- **Committee Chair in Virtual Attendance:** Manos Kitsonas (Awards Committee)
- **Conference Bidders in Attendance**: Estefania Coluccio Leskow from the Galileo Galilei Planetarium in Buenos Aires, Argentina. Brian Koehler of the Treworgy Planetarium in Mystic Connecticut, USA.
- **Others in Attendance (Non-voting):** Marco Avalos Dittel (Proxy for Susan Button, Portable Planetarium Committee)

CALL TO ORDER AND WELCOMING REMARKS (PRESIDENT)

Meeting called to order at 1329 UTC. S. Schmoll welcomed everyone to the first day of the annual board meeting. She thanked the staff of the Planetario de Chile in Santiago Chile for their hospitality and allowing us to host our meeting at their facility. She also thanked everyone who participated in the strategic planning meeting and commented on how productive it was.

OFFICER REPORTS AND AWARDS COMMITTEE REPORT

Executive Secretary Report: D. Demeter provided an overview of the last two meetings (March and May) minutes to the board. S. Schmoll asked for a motion to approve the minutes. A. Green made a motion to approve the minutes. B. Voss seconded the motion. Minutes were approved with all in favor.

Treasurer's Report: M. Smail presented a full report to the board. A concern regarding increasing membership dues was presented and the board agreed to discuss this at the old business section of the meeting. Full reports can be viewed by request to the executive secretary.

Past-Presidents Report: Production for the Centennial closing ceremony was done at the Abrams Planetarium in Michigan. Thirty official greetings from sites around the world were achieved. Centennial closing event analytics from the YouTube live stream currently has at the time of this report over 9,000 views and 157,800 impressions or how many times the video was shared by YouTube. Top 5 global locations viewing the event were the United States, India, Japan, United Kingdom, and Philippines. Over 150 subscribers were added to our YouTube channel. Demographics include between the ages of 18 to 44 years old. The success of this event suggests we should use our YouTube account more for IPS related events and programs.

Awards Committee Report: M. Kitsonas provided the report and asked for a closed session, asking all non-board members to leave the room during the report. Nominations remain confidential and were recorded and made available for voting board members and officers. M. Kitsonas reported that medals have not been created but have the design. M. Kitsonas requested that the completion of medals be done in the USA. S. Schmoll has offered to help with the manufacturing of the medals. The estimated cost will be around $3000 USD. M. Kitsonas noted that his term ends next year and is looking for someone to chair the committee.

PRESENTATIONS OF THE 2028 IPS CONFERENCE HOSTS FINAL BID

Mystic Seaport Museum, Treworgy Planetarium in Mystic Connecticut, USA: B. Koehler provided his presentation bid to the board. Dates for the conference will run from the 12 August to 19 August 2026. 12 and 13 August will be provided for the board meeting. 14 August will feature Mini LIPS and Welcome reception. The hotel selected for the conference is Mystic Marriott Hotel that will host the sponsor hall. 15 August will feature conference sessions and an evening outing at US Coast Guard Observatory (astronomical society star party, can change the evening due to weather permitting). 16 August will host additional conference sessions, followed by a tour of the Connecticut Universe Observatory. 17 August will feature mid conference tours, including options such as the Discovery Science Center and Stamford Museum and Nature Center. 18 August will continue conference sessions and the IPS Banquet dinner. 19 August will be the final day of conference sessions and will feature a Cross Sound Ferry conference farewell outing. 20 August will host several post conference tours, including the Setmout Planetarium in Springfield Massachusetts USA. Conference elements like the IPS Business Meeting, group photo, etc are being explored. The conference theme being considered is "Under Shared Stars: Navigating our Future". Conference sessions are defined as paper sessions, workshops, panel discussions, and sponsorship demonstrations. Guest speakers for the conference will feature experts from the local area. Delegate registration will be $525, non-member $650. Sponsorship pricing includes simple $1,000, break $2500, minor $5000, major, $10,000 and top $20,000 USD. Sponsorship pricing was determined by a survey poll to the sponsors. Estimated revenue is expected

to be around $355,000 USD. Food costs will be locked in and will not change based on market price at the time of the conference. Expenses estimated around $300,000. Estimated profit of $55,000. Marriott will provide all meeting and conference space available for the conference with 20,000 square feet of space. Conference hotel rate is $209 a night with additional hotel options nearby. The ballroom will have 500 seats with additional space for other options to allow as many people as possible to all sit and attend sessions. Planetarium space capacity of around 90 seats. The museum has made a strong commitment to DEI and Brian currently serves on the DEI committee.

Planetario Galileo Galilei: Buenos Aires, Argentina: E. Coluccio Leskow provided her presentation for the conference bid: The conference theme will be "From the South to the Stars". She noted that this would be the first possible conference hosted in South America and will strengthen connection to those that live in the region. The conference is supported by the Association of South American Planetariums. Buenos Aires is a global hub for events with over 500 hotels and many conference centers. It is a very welcoming location for all. Planetarium opened in 1967 with over 400,000 visitors. The planetarium has a 250 seat capacity with an upgrade in 2025 with a Megastar IIa featuring 9,000 stars and a Sky-Skan Digital system. The planetarium also features an exterior LED dome display. The planetarium has a 60 person team and is supported by the Ministry of Culture and the City of Buenos Aires. Conference dates are slated for 15-16 June 2028. A fulldome festival will proceed with the main conference beginning on 18 June and conclude on 23 June 2028. Sunday check in and orientation, opening reception with keynote speaker. Monday-Friday features keynotes and invited speakers, parallel sessions, workshops, sponsor showcase and dome sessions, lounges for networking, free time to relax, business meeting, and gala dinner and night party. Saturday will include post conference tours. Main conference venue is the Venus is Usina del Art (The Art Power Plant). This is located in La Boca and is a restored power planet. Features include a 1,200 attendee auditorium, a 280 seat chamber hall, 600 m^2 room, 500 m^2 foyer, internal courtyard, external plaza. Buenos Aires is an accessible city and venues include ramps, elevators, accessible restrooms, audio guides, rest areas, and space for kids. Staff is trained with accessibly training. Planetarium was awarded for its inclusivity. Tours included many wonderful locations throughout the city including the Astronomical Observatory. Lodging in a wide range of hotels that are close to the main venue space. Price ranges from $40 to $250. Two main airports serve the city (regional and international) and transportation via taxis or metro rail are available. Live performances were suggested throughout the conference such as music, living statues, etc. The budget is projected to be $870,000 which will cover all areas of the conference. They are aware that the audio visual needs are expensive but want to make sure all venues are covered. Early bird registration will be $450, $570 non-member, and regular registration will be $510, and $685 for non-member.

Questions for Conference Bidders: Board members had a chance to ask each conference bidder. MS is for Mystic Seaport and BA is for Buenos Aires.

- **Question:** What is your recommended airport for travel? **BA:** There are two airports, both regional and international. Both require an 1 hour drive with shuttles, etc. A. **MS:** The closest international airport is in New York City or Hartford, Connecticut. There is an Amtrak rail line from both airports that stops in Mystic.
- **Question:** Will you require a visa? Do you have visa support? **BA:** No visa support required, but there are some exceptions. Will find out more. **MS:** Visa needed for research scholars but haven't investigated all the information needed for visas.
- **Question:** Will there be childcare options available? **MS:** There is a childcare option but will need to update the budget to take care of that. It would be helpful to have an estimated number of members that plan to attend with kids so we can investigate this option. **BA**: Included childcare for up to 50 kids for the conference. The Powerplant has a special place specifically there for kids with qualified childcare professionals. Kids field trips are being investigated.
- **Question:** How will you address climate control in the venues? **BA:** Central heating system available in planetarium and same with Powerplant. Both prepared for both summer and winter conditions. MS: August time is summertime, but indoor venues will have climate control and outdoor venues will be covered next to water to allow for breeze.
- **Question:** If Sponsorship revenue is expected to be lower than projected, how can you adjust? MS: Investigate into saving money by excluding high cost for free or cheaper options. Look for additional support from the local community. BA: We are backed by the city government and reports will be given so alternative options can be looked into. Look into cheaper options for food.. We will find a way to ensure to cover all the proposed activities for the conference.
- **Question:** What connections do each institution have for involvement with local indigenous populations? **BA:** We are open to all people to come visit the planetarium. We find ways to provide people from all walks of life to attend our programs, even for free. We have support from APAS, and we can work together with all communities in Argentina to attend the conference. **MS**: Current administration working with local indigenous populations. We have an exhibit that explores our indigenous populations. Corrected an issue at the museum that local indigenous people found within our museum. I want to include people from indigenous

people into the conference including planetarium programming.

- **Question:** How can people seek medical health while attending the conference? **MS:** There is a local health center nearby. **BA:** Public health service will be available in case of emergencies.
- **Question**: How can we get more planetariums to join IPS if we host the conference at your location? **BA**: Hosting a conference in our region should be able to show that we care and want them to attend. It would be a much cheaper option for those that live in S. America. Spend a good amount of time to reach out to local regions to encourage them to attend. **MS**: US is made of different parts that is a welcoming, inclusive part of the US and there are concerns from parts of the world to visit. All we can do is do our part to help people understand we care, and we are able to support them in any way possible. It's a challenge, but it is one I am up to the challenge.
- **Question:** If you must choose one task that is the most important part of the conference, which task would that be? **MS:** Make sure the schedule runs exactly as is. I don't want to run late on the schedule and be unable to accomplish some activities due to lack of time. **BA**: Planning the programs of the conference. There is time for all the things we have planned, and I want to make sure we have the time to do it all.
- **Question:** Have you considered having a space for mobile planetariums to promote their business as well as workshops? **BA**: There is plenty of space available to offer an opportunity for this and we would love to work to accommodate that to the program. **MS**: Having one or more domes can help alleviate using domes since my dome is small. We are easily able to accommodate this with various areas to install mobile domes.
- **Question:** Are there any specific plans to include non-English languages to the conferences? **MS:** Technology that allows us to do real-time language translations would be wonderful and I would like to explore those options. **BA:** We have considered AI or devices that can help with translation. All written language for the conference can be written in English and Spanish. We would like to include languages someone speaks to be featured on the name tags.

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Closed Board Discussion: This portion of the meeting was not recorded in the official minutes. All guests and non-board members were asked to leave as board members discussed in private.

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IPS 2024 CONFERENCE RETROSPECTIVE:

A. Green provided a presentation to the board with an overview of the conference, aftermath, and survey results from sponsors. Attendance at the conference was 654. Full details can be found in the presentation made available by request to the executive secretary.

SPECIAL PROJECTS REPORT

Centennial of the Planetarium: B. Voss provided the report. Thank you to Guilherme for all his work in helping. B. Voss gave an overview of the previous centennial events such as the centennial celebration event in fall 2023. A working group met to discuss what could possibly be achieved for the closing celebration. The centennial website was presented and it was noted that it is still up. The question on how to archive the information associated with the site was brought up to the board. Additional projects were highlighted such as the fulldome movies Kira and 100 Years of Eternity. He noted that Japan also contributed with their own show for the Centennial as well as many centennial activities were done throughout the country. He shared the artwork and poster contest winners, music album, and the centennial book "100 Years of Planetaria". He reported that a project to make the planetarium a UNESCO Cultural Heritage designation was achieved in Germany on 04 April 2025. Another country is needed to support an international designation. A stamp honoring the Centennial was created with support from GDP. ESO Planetarium celebrated 100 days of the Planetarium event. The most recent was the May closing Centennial event which was hosted live on Youtube and was received very well. Japan presented a closing Centennial event of their own which was very successful. The next steps will include an exit survey to evaluate all the events, archive the Centennial website and materials used (possibly on the IPS website). Several projects that weren't achieved can continue to be explored such as the International UNESCO recognition. Suggestions to have either the USA or Japan as the second country. A planetarium emoji is another project that would like to be completed and there are several emoji drafts available. Future dome casts can continue to be achieved and history research on the planetarium.

Pink Floyd: Dark Side of the Moon Fulldome Show: M. Smail provided the report. Agreement and obligations ended in December 2024. NSC Creative has made arrangements with PFML to take over distribution of TDSOTM50 for 2025 and 2026. Full reports made availiable by request to the executive secretary.

BOARD HIGHLIGHTS FROM AFFILIATES

North America: SEPA/MAPS has a meeting in Woodbridge Virginia, USA. A member of MAPS has been vocal on expressing the idea of not being an affiliate of IPS and is pushing a national organization. This view does not reflect MAPS or the board of MAPS.

Latin America: Reunion meeting in Santiago in December. Considering a Latin American association to unify all associations within the region.

Europe: A. Green presented the results of the survey. She noted that it received great response but was concerned about the lack of response from Spain. Memorandum

of Understanding with the European Space Agency (ESA) still has not been achieved and one of the issues is reorganization changes happening so often within the organization. B. Voss will continue his role as liaison for ESA. B. Voss is finishing his Full presentation made availiable by request to the executive secretary.

Asia: Arabic Planetarium Society reported in Feb 2025 of a new planetarium in Alexandria. The JPA (Japan Planetarium Association) held its annual national conference in Yokohama (HAMAGIN SPACE SCIENCE CENTER) in June 2024, and a national workshop in Toyama (Toyama Science Museum) in December. Full report made availiable by request to the executive secretary.

Africa: S. Owen is finishing her term and she has thanked everyone for her time serving and all the wonderful things she attended and participated in during her time serving the board.

Oceania: Australasian Planetarium Society held its 2025 conference held in Charlotteville Queensland at the Cosmos Centre, which is the second largest planetarium in the region and largest in Queensland. There are staff issues with several planetariums due to financial hardships. A mailing list for the region needs to be created. New Zealand wants to create a small national mini group. IPS member benefits list is recommended to help increase membership. IPS board representative for the region is up for election.

Approval for Remission to Day Two: Board remission was approved at 1546 UTC and to resume on day two at 1300 UTC.

DAY TWO 13 JUNE 2025 | 1300 UTC

- **Officers in attendance:** Shannon Schmoll (President), Michael McConville (Past-President), Mike Smail (Treasurer), Guilherme Frederico Marranghello (President-Elect), Derek Demeter (Executive-Secretary), Pamela Hicks (Director of Operations)
- **Board Members in attendance:** Björn Voss (Europe), Anna Green (Europe), James Albury (North America), Susan Murabana Owen (Africa), Patty Seaton (North America), Carlos Molina (Latin America), Sumito Hirota (Asia)
- **Board Members in Virtual Attendance:** Oana Jones (Oceania)
- **Board Members Not in Attendance:** Qi Rui (Asia)
- **Committee Chair in Virtual Attendance:** Manos Kitsonas (Awards Committee), Martin George (Elections and International Development), Jenny Shipway and Ken Brandt (Education), Charlie Morrow (Immersive Audio), Shiloe Fontes and Scott Mitchell (Publications), Dani LeBlanc and Shaaron Leverment (EDI)
- **Committee Chair in Attendance:** Marco Avalos Dittel (Proxy for Susan Button, Portable Planetarium Committee)
- **Conference Bidders in Attendance**: Estefania Coluccio Leskow from the Galileo Galilei Planetarium in Buenos Aires, Argentina. Brian Koehler of the Treworgy Planetarium in Mystic Connecticut, USA
- **Guests (Virtual):** Tetsukazu Yahara and Hiroyuki Kamano (translation)

Call to Resume Board Meeting: Meeting was placed out of remission and resumed at 1311 UTC

BOARD DISCUSSION OF 2028 CONFERENCE FINAL BIDS & FINAL VOTE:

Board held a final discussion before vote. Discussion was private and all non-board elected members were asked to leave during this discussion. A vote was cast. The majority voted in favor of Galileo Galilei Planetarium in Buenos Aires, Argentina.

2028 IPS CONFERENCE ANNOUNCEMENT TO BIDDERS

Both bidders were asked to come back in for the announcement. S. Schmoll provided the results to both bidders. The Galileo Galilei Planetarium was officially announced as the winner of the 2028 IPS Conference. S. Schmoll thanked both for doing an outstanding job in their bids.

COMMITTEE REPORT:

Committee reports made available upon request to the executive secretary.

Elections: M. George provided the report.

International Development: M. George provided the report.

Conference: IPS 2026 Report: T. Yahara provided a presentation and H. Kamano provided translation. The full presentation can be viewed here.

Questions from the board: Travel agency is an issue for many members to purchase accommodations. The Fukuoka team will investigate this but stated it has worked well for other institutions. Having registration that included the banquet.

Fukuoka will investigate adding this. Justification is based on IPS 2024.

Portable Planetarium: M. Dittel provided the report on behalf of S. Button.

Immersive Audio: C. Morrow provided the report.

Education: J. Shipway and K. Brandt provided the report.

Planetarium Design and Operations: No report was provided at the meeting. No official report submitted.

Equity Diversity and Inclusion: D. LeBlanc and S. Leverment provided the report.

Membership: M. Dittel has been accepted as the new membership chair. Congratulations Marco!

Publications: S. Fontes and S. Mitchell provided the report.

History: No report was given.

History of the Planetarium Working Group: No report was given.

OLD/UNFINISHED BUSINESS

Collaboration with Space Organizations: This item was reported on during the Europe report regarding the MOU with ESA.

By-law/Standing Rules/Conference Revisions: This item was not discussed due to time and will be reviewed at a later meeting.

Increasing Membership Dues: S. Schmoll apologizes for the lack of communication on this and will improve communication with the board in the future. It was noted that 2008 was the last time membership dues have been raised. Concerns about the due increase were brought up because several board members have worked on getting membership information out to everyone that reflects the current rates. Also, cost of living increases are making it hard for people to afford the increase. A postponement of dues has been considered and more discussion on this must be done soon. A suggestion was presented to restructure memberships. Discussions will continue until the next virtual board meeting. O. Jones would like to share her document to the board to verify if this is ok for dissemination. M. Smail motioned to defer dues to further increase but no later than September. J. Albury seconded the motion. Motion carries all in favor. Membership Fee History report made available upon a request to the executive secretary.

NEW BUSINESS

Present Strategic Goals from 11 June session: IPS board has adopted these mid-term strategic goals with an aim to conduct wider consultation and develop a more in-depth strategic plan in the next two years. M. McConville presented a motion to adopt our current strategic priorities of "Community Connections, Member Benefits, Professionalization & Professional Development, and Organizational Improvement" for IPS with intention to develop an in-depth strategic plan in the next two years. P. Seaton seconds the motion. Motion carries all in favor.

ACTION: Work with Board Meetings to coordinate leads for each Strategic Planning Initiative (ALL), Create summary of Strategic Planning Meeting. (D. Demeter)

Proposal for a new IPS affiliate organization (Marco): This was featured in Marco's report during his portable planetarium committee report.

100 hours of astronomy (Shannon and Guilherme): International Astronomical Union Office of Astronomy Outreach and IPS have been partnering for the 100 hours of astronomy this year. It will happen in October. It will include an online live stream of Big Astronomy followed by a talk by Ardis Herrold about the Rubin observatory. We will have 24 hours of planetariums sharing their work and skies through both videos and live presentations. Plus we will have folks be able to share their events they want to do for local communities.

FOR THE GOOD OF THE ORDER:

Thank you everyone for all that you have done and look forward to the next opportunities. Our goal is to do the best for our members. Call out to Susan, Bjorn, and Sumito for serving as board members and LOVE YOU! M. Dittel is very grateful for all the years of being a part of IPS and for his daughter to be involved as well. This was J. Albury, G. Maranghello, and C.Molina first time attending the board.

Adjournment: A call to adjourn the meeting was presented to the board. M. McConville made a motion to adjourn. A. Green seconded the motion. Motion carries with all in favor. Board meeting adjourned at 1759 UTC.

GOTO

The sky has no borders.

Around the world, GOTO's opto-mechanical projectors are recreating the starry sky with artistry and unprecedented realism. Let us take you there!

The historic city of Kaunas, Lithuania, a UNESCO World Heritage Site, is renowned for its stunning landscapes and exceptional modernist architecture.

The city's most recent innovation is a captivating new facility, Mokslo Sala, Lithuania's first Science and Innovation Center. The new planetarium uses a GOTO Aetherios projector synchronized with Digistar 7. This synergy creates an immersive experience that is delighting audiences.

IPS INTERNATIONAL PLANETARIUM SOCIETY

We hope to see you at IPS 2026 in Fukuoka! To help you plan your visit we will soon be posting information about tourism spots throughout Japan on our website.

GOTO INC

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ELECTION OF IPS BOARD MEMBERS FOR 2026-28

IPS has one candidate standing in each of five continental zones – Africa, Asia, Europe, North America, and Oceania – to serve as Board Members from January 2026 to December 2028 inclusive. I encourage members in each of these continental zones to read these statements from the candidates. Voting on the IPS website will begin on 30 September at 12h UT and end on December 2 at 0h UT. Only members in the relevant continental zones will vote for the candidate for that zone.

Although we have only one candidate in each zone, I urge to you vote to approve your candidate on the website, for which there will be a link on the IPS home page at *www.ips-planetairum.org.*

PATTY SEATON

Hello again, IPS Family! Or is it, hello STILL? I have appreciated your trust in me as I have served as Executive Secretary and most recently as one of the two Executive Board members for the North American region. I would like to continue to serve you for the one remaining term that I am eligible to serve. My term as Secretary coincided with our transition time to the new Board structure with a paid part-time Director of Operations position. Since then, the Executive Committee has continued to work to define the roles of the Affiliate representatives and to communicate the value of each region obtaining and maintaining affiliate status. We realize that we still have work to do in this area and others, and at our Executive Board meeting in June, we devoted a day to strategic planning and have defined goals and deadlines for meeting these goals. Remaining in my role on the Board will allow me to continue pursuing these goals seamlessly. I will continue to work towards establishing better communication with each of our North American affiliates and bring your voice to the table. I absolutely love being an active member of this international organization. My personal goal is to serve you with passion and precision. I appreciate your consideration in allowing me to complete my work by allowing me to serve my remaining available term!

ANDREAS SCHMIDT

I am delighted to have been nominated as a candidate to represent Europe and its multifaceted planetariums on the IPS Board. My journey to this point has been both exciting and full of surprises, and now I find myself here, at another opportunity on my journey. I am convinced that I can contribute a great deal to further advancing our planetarium community.

My planetarian adventure began with a degree in physics, where I developed a particular interest in astrophysics. Nevertheless, I did my PhD in geophysics, as it offered me more opportunities. This scientific foundation has helped me not only as a researcher but also as a university lecturer, enabling me to impart knowledge and share my enthusiasm for the natural sciences. However, life always has a few extra twists and turns in store that can throw a spanner in the works. In 2017, I took the plunge into the world of planetariums – and it was a very groundbreaking decision! Here I was able to share my passion for the universe with people of all ages and fill them with wonder. Planetariums! You can't get any closer to space unless you're an astronaut.

In recent years, I have worked in various roles: as a lecturer, in day-to-day planetarium operations, and in management positions. These experiences have shown me how versatile and important planetariums are. In addition, I have been volunteering on the board of the Society of German-Speaking Planetariums (GDP) since 2019 and was elected vice president in 2025. This work often shows me how important it is to stand strong for our community.

Since 2020, I have represented the GDP on the IPS Advisory Council, where I have gained many international perspectives. In 2022, I joined ZEISS, where I work as a marketing manager in the planetarium division. This has given me a whole new perspective on the economic and technological aspects of our business. My current job also allows me to connect with representatives from a wide variety of regions around the world more than ever before. Anyone who knows me knows that I always strive for honest interaction with others.

Apart from that, planetarium operations remain close to my heart, and I firmly believe that small and medium-sized planetariums need special support. These places are incredibly important for education and inspiration, especially in regions with less opportunities, and deserve special attention. I am also committed to greater diversity in the planetarium landscape, whether in terms of content or cultural offerings. I believe that we as planetarians should become more visible and raise awareness of the importance of our work in society.

I am highly motivated to work with you at IPS to shape the future of our community. Let's work together to strengthen planetariums as places of education, inspiration, and cultural diversity!

LÉON SNYMAN

I am incredibly grateful and honoured to have been nominated and am standing for the position as the African member on the Board of the International Planetarium Society so as to be more involved in shaping the future of the Planetarium of Africa.

I believe the interdisciplinary immersive nature of the Planetarium makes it uniquely positioned to reach and teach future scientists and, indeed, artists, on a continent that is perhaps viewed as trailing behind the rest of the world. However, that viewpoint need not be as negative as it first appears. It can result in opportunities to implement new technologies and systems more quickly than elsewhere: the impact of which would be far reaching and produce results for many years to come.

Africa is at a crossroads and, while freeing itself from not only the shackles of (post)-colonialism but also from its own lack of confidence in its ability, it has the potential to position itself at the cutting edge of the sciences and the arts, and thus the potential to become a repository and disseminator of knowledge worldwide.

This is a continent containing a huge (untapped) potential of not only budding planetarians but also scientists, artists, and other content developers and presenters, eager to be encouraged and their skills supported and developed — not as top-down authoritarianism, but rather as a meeting of minds and the development of skills to grow the reach of both planetariums and planetarians throughout the continent.

With this in mind, I view the role of the IPS in Africa as supporting the local planetarians so that they are empowered and equipped to reach out into their wider communities. To paraphrase Richard Branson: look after the planetarians; they, in turn, will look after the planetarium visitors and technologies.

Africa has more planetarians than the IPS continental membership reflects (as was seen at the African Planetarian Association workshop in Johannesburg in March 2025) and the potential for further growth of IPS membership is promising.

I would build on the work done by Susan Murabana, expanding the membership throughout the continent and also finding ways to connect emergent planetarians and content developers with experienced trainers in the worldwide community. And to find affordable and implementable cutting-edge technological models that could be replicated throughout the continent.

I have been a presenter and content developer at the Naval Hill Planetarium in South Africa for ten years and an IPS member for six. I have recently been elected to chair the African Planetarium Association and I am reading for a master's degree at the University of Pretoria researching the experiential impact of large-scale, immersive environments (ostensibly planetaria) on audiences. I have been working in immersive environments for a number of years and have an interest in especially multidisciplinary works — an aspect neatly housed in planetaria.

I am committed to serving the planetaria and planetarians of Africa to the best of my ability and humbly seek your endorsement.

OANA JONES

Kia ora koutou,

My name is Oana Jones and I'm an academic at the University of Canterbury researching immersive dome experiences and interaction in the Dome. I have worked in planetariums since 2012, including animation and public communication at the Stardome in Auckland, New Zealand and heading up the planetarium operations and production work at the Otago Museum in Dunedin, New Zealand. I've been an active member of the Australasian Planetarium Society in that time, and been to several international conferences.

I've served as the IPS representative for Oceania for the last two years and would be honoured to serve for an additional two year term. In this time, I've worked on strengthening ties between planetariums in the region as well as bringing IPS initiatives and resources back to Oceania from the international level. I've championed discussions about resources and benefits beyond conferences, communicated IPS operations, grants, activities and developments to the planetariums in Oceania and worked on strengthening ties between us. I have further work I'd love to do at an international level on the future of planetariums, especially around funding, professionalisation for the purposes of increasing pay for planetarium professionals, and closing the gap even further between Oceania and the rest of the world.

I am now well connected in the international planetarium network and have worked to ensure that many of the members in this region have benefited from those connections. I've worked with members to get our members voices into the Education and Equity, Diversity and Inclusion committees in IPS, connected planetariums in Australia to China for joint funding opportunities, and brought ideas and new developments to the APS conference for the benefit of all our members.

International organisations are slow moving bests, and after this two year term, I feel like I have more to do. I want to work on your membership getting you more benefits that are

relevant to you, I'm passionate about looking into interactive and game-related experiences in the dome and finding strategies to gain you funding from new avenues in the technology space, and I want IPS to do more at a governance level to champion funding and equity with governments as an international standards organisation. Our new president is passionate about strengthening the researchers contributing in this space, and connecting them to you to in order to help improve your visitor experience and solve the problems you face day-to-day.

If anyone would like to ask further questions or discuss specific issues, I'm more than happy to do that if you'd like to get in touch.

Nga mihi nui,

Oana Jones

MARWAN SHWAIKI

Dear Planetarians,

It is a great honor to be nominated for the IPS Board Member position representing Asia. My name is Marwan Shwaiki, and I am the Chairman of the Arab Planetarium Society and Planetarium Expert at the Sharjah Planetarium in the United Arab Emirates.

With over 34 years of experience in the field of planetariums, I have served at three major institutions: Haya Cultural Center Planetarium (Jordan, 1990–2000), PDO Planetarium (Oman, 2000–2014), and planetarium Director at the Sharjah Planetarium (UAE, 2015-2024), and currently I am still in the same planetarium as Planetarium Expert.

The Sharjah Planetarium operates within the Sharjah Academy for Astronomy, Space Sciences and Technology (SAASST), under the University of Sharjah. It features an 18-meter hybrid dome with 200 seats and serves a diverse audience from schools, universities, and the general public.

Throughout my career, I have been dedicated to developing planetarium shows and advancing educational outreach. From early analog systems like the ZEISS KP3 and GOTO GII to modern digital systems such as Uniview (v3.3), PowerDome, SkyControl, and Ohira's MegaStar, I have actively evolved with technology to enhance the planetarium experience.

In addition to show production, I've contributed to astronomy education by developing content for various age groups (6–18 years), including virtual and hands-on workshops delivered through innovative platforms like Google Sheets. I also led the design and construction of two observatory domes in Jordan during the 1990s.

As a member of the Jordanian Astronomical Society (JAS) and the Arab Union for Astronomy and Space Sciences (AUASS), and the Arab Planetarium Society (APS), I continue to advocate for the essential role planetariums play in science education across Arabic-speaking countries.

Looking ahead, my vision for the IPS includes:

Expanding access to planetariums in underserved regions—particularly in Asia, Africa, and low-income countries.

Introducing a low-level IPS membership, including an affordable basic level (no more than $10), to ensure global inclusion and access to core educational resources.

Empowering the next generation of planetarians by supporting small startups and promoting sustainable, innovative operational models.

Encouraging manufacturers to offer low-cost, fixed-dome planetarium solutions (under US$100k) for domes ranging from 6 to 12 meters—making planetariums more accessible worldwide.

I am committed to supporting the planetarium community with dedication, innovation, and inclusiveness. I would be honored to serve and represent our region on the IPS Board.

Tales from Dome Under (con't.)

Moogseum (www.moogseum.org). Here, in this one-of-a-kind immersive, interactive museum, you can learn about Bob's pioneering work in synthesis, discover the science of sound, and how both can be successfully used in education.

* For those of you who have an interest in drumming, play yourself (like me), or have a fondness for progressive rock, here are the specs for Carl Palmer's one-of-a-kind steel drumkit: 6" x 5 1/2" Tom, 8" x 5 1/2" Tom, 10" x 6 1/2" Tom, 12" x 8" Tom, 13" x 9" Tom, 14" x 10" Tom, 15" x 15" Tom, 16" x 15" Tom, 18" x 18" Tom, and 28" x 20" Kick. The snare drum was a Ludwig Super Sensitive Concert Model, measuring 14" x 5.5" and was one of the few off-the-shelf components in his otherwise custom-built kit. As for the kit's cymbals, they were 18" A. Zildjian Rock Crash (late 1970s/1980s), 16" A. Zildjian Medium Thin Crash (1960s), 1 pair 14" A. Zildjian New Beat Hi Hats (1960s), and a 16" Ludwig/Paiste Crash Medium Thin (1960s/1970s). This information comes from the original Justin's catalogue description from Ringo Starr's auction of this piece of rock history in 2015.

A Trip to the Sphere (con't.)

brightness scale, it's not contributing any more light than most casinos within its area.

Would I want to visit the Sphere again? Definitely: The inside is like one of the biggest planetariums ever, and just watching the outside images parade before your eyes, makes it a unique experience, one that should be part of a person's to-do list.

A High-Tech Science Theater (con't.)

the building was nearing completion, and it became time to focus on the delivery and installation of the technical systems and other contents.

Installation by teams from Sky-Skan and SSIA was done in three phases in order to accommodate coordination with the construction schedule. Speakers were hung and the main LED support frame was installed in February to March, 2024. Later, in June 2024, racks were installed, cables were pulled and the LED screen tile installation began. In August and September, commissioning of the main system was done, as was sound system tuning and lighting system configuration.

Construction was about a month behind schedule due to weather issues in late 2023 and early 2024. As such, the final installation and commissioning from our side was running right into the planned production and rehearsal activities of Lowell. Their opening show was a very ambitious production combining live theater with actors, together with the high-tech display and software. We had allowed a month for training, and assistance before heading into production, and that time simply evaporated! This is a common problem with projects that run over several years... The last parties on site end up in a time crunch leading right up to the opening. This was a major "juggling act" for the project's Creative Lead, Samantha Christensen. (Samantha first visited Lowell Observatory as a five year old child, never forgot the experience, and vowed someday to work there!)

Training and production support was ad-hoc, together with our last work to solve the dozens of tiny details that inevitably remain on a punch-list. Needless to say, the theater was in constant use around the clock leading up to the opening.

But what an opening it was! First came the preview event for the major donors. Lowell funded the complete $54 million budget with mostly private donations and the extremely generous mega-donors had their own evening as part of a week of soft opening activities. With a few rough edges showing, the evening went off without a hitch! Everyone gasped when the first images appeared on the main screen. I am admittedly, somewhat biased but I can't recall ever seeing such a clear and sharp display anywhere. There are no visible pixels even from the front row of the theater! A montage of greetings and well-wishes from prominent figures around the world started the show, followed by some custom produced content. Christopher Browne, director of the Smithsonian National Air and Space Museum was the keynote speaker for the evening.

The next day was open house all day for everyone involved with the construction and their families. It is rare that such an event happens, and it was greatly appreciated. Here, we heard the first screams of joy from the many children running from gallery to gallery in the ADC. The evening then had another soft-opening event for the next tiers of donors.

Training and rehearsals continued then for another two weeks until the big public opening. Over 3,000 people attended the official opening event.

Lowell together with a lively team from Matheater, created the live action show "Imagine the Universe" for the opening, combining on-stage actors interacting with a computer. The show is quite innovative and Matheater did a great job converting astronomers to actors for the premiere!

The Universe Theater is really a special venue that combines the science theater idea that we know from science centers, with a high-tech immersive, multi-media presentation space. The display is stunning and the unique combination of panorama and ceiling screen act like a wide-angle window to the universe. Sky-Skan's Dark Matter software powers the entire theater, and makes it possible to seamlessly cross-fade from real-time visualizations of the cosmos, to pre-rendered content. In addition to the "Imagine the Universe" show, there is also the daily "Celestial Visions" with various changing content – including short films and current astronomy themes. A weekly series called "Worlds Revealed," features guest speakers and a variety of topics ranging from science and technology to pop, historical, Indigenous astronomy, and beyond.

Lowell is still coming to terms with production for the huge display and Sky-Skan are helping, as needed, to advance other production projects and uses for the theater. A number of demo pieces are installed to show off the displays and a lot of existing fulldome content can actually be adapted to the display, with impressive results.

In designing the theater, Sky-Skan, together with Ian and Bill in close collaboration with Lowell's Creative Lead, Samantha Christensen, created a long list of "use-case scenarios" in order that we might anticipate all the possible future uses for the theater. Live concerts, corporate presentations, weddings, birthdays, conferencing and live-streaming of special events were all considered and there are connections and interfaces to enable all this, and more. With a flexible network patch-panel, cables and connections to all parts of the theater can be rapidly configured in minutes to be DANTE audio, HDMI video, network connections or anything else that can function with Cat6e ethernet cable.

The audio system is the perfect complement to the amazing visual experience. With the specially designed perforated screen, Sky-Skan achieved what no cinema has been able to do up to now, namely have the sound come directly from behind the screen like in traditional theaters. Current LED cinemas are not acoustically transparent and instead, rely on speakers around the perimeter of the screen, or bouncing the audio off the screen using special loudspeakers. Our acoustical consultant, Dr. Jim Barath, helped ensure the sound integrity of the entire room space.

The Universe Theater has six powerful screen channels to enable smooth audio-panning across the screen. Additional

speakers are hidden in the walls and ceiling, and with the 19 channels, it's possible to emulate just about any format from stereo, to classic 5.1 and 7.1 formats up to Atmos and Ambisonic systems. Experts in ambient audio, the company Encircled Audio from Berlin was brought in to tune the theater and create a number of presets to support the use-cases that were defined, and it's a simple mouse-click or script in a show that can switch between modes on the fly. Giant Screen industry veteran Tim Archer of Masters Digital, mixed the first productions and said the theater was a joy to work in. We agree!

The team at Lowell Observatory, now headed by their new executive director, Dr. Amanda Bosh, are excited to explore all the possibilities of their new theater – and we look forward to continue collaboration and see what else is possible with this unique facility. They love to greet visitors and colleagues from the industry, so please do find time to stop in and visit the award-winning ADC and its stunning Universe Theater.

THEATER SPECIFICATIONS:

MAIN SCREEN

- SkyVision LED, 100'x 29' (30.5 m x 8.8 m), 160-degree cylinder on a 40' (12 m) radius
- 15.000 x 4.000 pixels, 60 megapixels total
- 1.9mm pixel pitch, 12 bit, 60fps rec 709 color
- Roughly 100 pixels per degree equals 17-18K equivalent dome resolution.

"CAT'S EYE" CEILING SCREEN

- SkyVision LED, 35'x 15', (10.67 m x 4.5 m) flat with slight tilt
- 8,000 x 4,000 pixels, 25 megapixels total
- 1.9mm pixel pitch, 12 bit, 60fps rec 709 color
- SkyVision PC cluster with 30x 4K graphic channels.
- Capture and display of 4 simultaneous streams at 8K60fps
- SkyAural, 19.1 Ambient Sound System – Custom configuration with supplemental voice channel
- 7x JBL Cinema Series C222HP Speakers behind the screens
- 4x JBL Cinema Series C221 Speakers above the audience
- 8x JBL Synthesis Series hidden in the side and rear walls
- 2x JBL 4642 Sub Bass Cabinets
- 1x Ambisonic HDL-6-Bin line-array center for voice
- 32 Channels of LEA Connect Series Amplification
- BSS London Signal Processing
- Aux Inputs from stage boxes at theater front, audience area, console, and Bluetooth.
- Complete System on DANTE
- Manual and automated control.
- Theater LED Lighting Package with 10x Moving Heads, 9x Zoom Wash Spots
- Integration into house architectural lighting
- 180 Luxury Seats from Dream Seat
- Complete Production Studio

Seeking What Works (con't.)

I've seen how rehearsal isn't just for first-time shows but continually improves your performance—whether you last gave the show a week ago or a year ago."

WHAT HAPPENS AFTER THE PUBLIC PERFORMANCE?

Finally, the day arrives when I perform in front of the public. After each performance, I ask three audience members, "What stood out?" or "What would you share with a friend?" Their answers often surprise me. I also ask my staff for feedback, which I fold into the next rehearsal. I rehearse before each Friday night show to stay sharp. This ongoing feedback helps me track what's working and refine what isn't. Over time, the program evolves, and I feel that I have upped my game.

CONCLUSION

Rehearsal isn't a luxury. It's a tool to find your voice, shape your message, and connect with your audience. Like any skill, the more you do it, the more natural it becomes. If you want to "up your game," carve out time to rehearse. Say it out loud. Say it to others, if possible. Repeat. You—and your audience—will be glad you did.

Opening the Universe... (con't.)

social media. Local news and apps can also feature your facility and programs for people who actively seek such events out as well.

What we noticed was that in the first 7-month slow rollout, we've had an increase in planetarium and museum attendance by 15%.

We intentionally looked at the slowest performing day each month and picked that second Sunday to implement this program. And with the help and inclusion of partners such as the Capital Area Autism Network, Families Helping Families of Greater Baton Rouge, and The Autism Society of Greater Baton Rouge, we were able to transform our slowest day of the month to a thriving day of community building for families.

Bayou Buddies Pet Therapy has been visiting us on these Sensory Sensitive Second Sundays and their inclusion has been a big hit. They've already agreed to make visits to our facility through the rest of 2025.

As we move forward with this program, we are trying to garner sponsorships the same way we do for our Free First Sundays.

A lot of families with a child or children with sensory needs do not necessarily have the resources to pay regular admission to attend, and that could be one of the obstacles for attendance currently. There are groups we have been recommended to reach out to for eventual support in building the program. We also plan to get more sensory supplies, sensory pea pods, etc. as the program grows.

Implementing a sensory sensitive initiative at your facility is simply low-risk and high-reward. Spending the money on the resources I've listed and mentioned before isn't something that is necessary. You can build your own sensory bags if you wanted to. Of course, it's beneficial to be listed on their site and to have the help of their staff training, but you can certainly implement a version of this on your own and with your own budget in mind.

When it comes down to it, you're opening your doors to an underserved audience by making easy adjustments such as dimming lights, reducing audio levels, and offering sensory kits and quiet zones.

You can look at your attendance to find your off-hours and use those times to try out a sensory sensitive day of activities while bringing in new revenue streams. After all, it aligns with many museum and planetariums' mission statements while also helping qualify for grants and sponsorships. It will help cement your facility as one of the forerunners of innovation in inclusion.

Immersive Matters (con't.)

early compression artifacts. This, of course, results in huge storage requirements to accommodate the size of 12K files and the number of files required for 60fps production. (One minute of content consists of 3,600 frames.)

DISPLAY TECHNOLOGY CHARACTERISTICS

IMAGE QUALITY AND CONSISTENCY

LED technology offers superior reliability compared to traditional projection systems. Image quality and consistency remain stable throughout extended presentations, provided venues maintain proper environmental controls. Unlike projectors, LED screens are less susceptible to lamp degradation or color drift over time. However, venue lighting conditions still play a crucial role - light bleed from external sources or inadequate backlighting management can compromise the viewing experience and undermine the technology's inherent advantages.

ENHANCED VISUAL IMPACT

The movement in LED domes can feel even more intense compared to traditional projection because the images are brighter and sharper. That extra brightness and clarity amplify motion, making the content feel more dynamic and impactful, but can also become too much for sensitive viewers. It's something content creators might find helpful to keep in mind, and if possible, conduct motion testing before committing to a full production.

DESIGN AND COVERAGE CONSIDERATIONS

GEOMETRIC FLEXIBILITY CHALLENGES

Another important consideration is that LED domes can be configured in many different shapes beyond the traditional hemispherical projection setup. This flexibility can present challenges for content creators, as they must ensure their visuals fully capture these unique geometries. When planning productions, it's safe to assume you'll need to create content that exceeds the standard 180° by 360° coverage, and you should be prepared to expand your visuals as necessary.

BRIGHTNESS AND CONTRAST MANAGEMENT

Content creators must carefully consider the psychological and physical impact of extreme contrast changes on audiences. The ability of LED screens to produce true black can give audiences the impression that the presentation has stopped or malfunctioned. Conversely, sudden transitions to bright whites or saturated primary colors can cause visual discomfort, requiring the audience to adapt over several seconds.

These contrast extremes can be powerful storytelling tools when used strategically, but they require careful implementation. Creators must balance visual impact with audience comfort, ensuring that dramatic lighting changes enhance the viewing experience rather than detract from it.

CONCLUSION

Successfully creating content for LED screen formats requires a comprehensive understanding of both technical

specifications and audience experience, in addition to a thorough understanding of the visual storytelling language inherent in the fulldome medium. As display technology continues to advance, content creators must remain adaptable, combining technical expertise with creative vision to fully realize the potential of these robust display systems while ensuring viewer comfort and engagement.

This is just one example of how the LED dome medium is shaping new production processes.

INNOVATIONS SPOTLIGHT DAY AT GSCA

To help the industry grasp the potential and capabilities of this powerful immersive medium, the Giant Screen Cinema Association (GSCA) is producing an Innovations Spotlight Day featuring LED dome technology at the Fort Worth Museum of Science and History on September 20 this fall. The GSCA's Innovation Committee has created a wide variety of demonstrations that delve deeply into the technology and specific production methodologies that can make LED domes look and sound as incredible as possible, taking full advantage of the medium's capabilities to immerse an audience as never before.

It is our hope that this showcase will inspire filmmakers to further push the boundaries of immersive dome content, creating innovative and compelling experiences that connect with and attract audiences in groundbreaking ways never before seen. Coupled with LED technology, immersive domes have the potential to redefine cinema and reinvent wraparound, near-real experiences, paving the way for the future of immersive cinema.

The transition to LED dome technology is more than a shift in hardware—it's a leap in possibility. With seamless surfaces, richer blacks, breathtaking contrast, and the flexibility to reimagine dome architecture itself, LEDs are empowering immersive theaters to dream bigger than ever before.

As creators, educators, and visionaries, we now have the opportunity to shape a new chapter in immersive storytelling—one that fully honors the wonder of the cosmos while embracing the brilliance of innovation and exciting new experiences across limitless genres. The dome is no longer just a surface for projection; it is becoming a canvas of living light. And the future it illuminates is dazzling.

Under the Classdome (con't.)

with a fire resistant treatment consistent with our school district policy. In total, we hoped that 14 customers could fit in the space we created.

But, would it work? Could we still "sell out" with about 15% of our seating now not seats at all?

The results are promising:

I feel like pictures are worth more than me talking about it… the overwhelming answer is YES! Our flexible seating is working for us. The students relax, ask more questions, and move. I used to be asked "what are the best seats in the dome?" Kids and adults now just quickly walk to the front of the dome to fill in our colorful seating. They are excited to sit near their caring adults as younger students, but actually sit away from their adults as they get older.

We also have more space in the front to allow for special speakers, hands-on lessons, and even reading stories under the dome. Our presentation style involves setting the scene, allowing for movement, and interacting individually with each audience. As you can see, we get to do this at a much higher level now than with only fixed, unidirectional seating!

Another happy accident is that our dome now fills up front to back during public shows, naturally. That never happened before. People would generally fill the seats from back to front. This change allows for easier ingress and egress from the dome, increasing the time that we get to be immersed. Consider flexible seating. Our process was started because of budget constraints and broken springs, but yours can be because now we have a new data point that relaxation opportunities, flexibility of space, and movement under the dome is more important than 14 more fixed seats. Keep looking up!

Top: Our Pre-K pre show with parents and flexible seating. Our flexible seating allows for our instructors the space to read to our multi age groups under the dome. Credit: Kelly Crews

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INTERNATIONAL PLANETARIUM'S CALENDAR

COMPILED BY: LORIS RAMPONI

2025

- **6 September.** 9th Worldwide Meeting online dedicated to traveling planetariums and in particular to operators, producers and sellers. Begin at 14:00 Universal Time UTC. · The yearly calendar for the mobile planetariums online meeting, setting it every first Saturday of January, May and September. · Contact: Susan Button, sbuttonq2c@gmail.com; Marco Avalos Dittel, info@planetarioaventura.com · http://www.ips-planetarium.org/
- **6-9 September.** Association of Science and Technologies Centers, ASTC Annual Conference, San Francisco, California, USA. The Conference will be hosted by a consortium of ASTC members: Bay Area Discovery Museum, California Academy of Sciences, Chabot Space & Science Center, Children's Creativity Museum, Computer History Museum, Exploratorium, Lawrence Hall of Science, The Tech Interactive · https://www.astc.org/
- **10 September.** Deadline for applications to the 14th International Festival of Science Visualization (IIFSV), fulldome short films (15min or shorter). Both science films and non-science films are welcomed. · Contact: info@ifsv.org · https://ifsv.org/wp-content/uploads/2025/The14thDomeFest_ShortFilm_GUIDELINES-EN.pdf
- **10-14 September.** 4th Festival FullDome. Different French planetariums are involved in the initiative. · Contact: Fabien FM. MARQUET, f.marquet@centre-astro.fr
- **10-12 September.** Nordic Planetarium Association, NPA meeting, AHHAA Science Centre, Tartu, Estonia. · Contact: Üllar Kivila, NPA President, ullar.kivila@ahhaa.ee · https://www.npa-planetarium.org/
- **13 September.** European Small & Mobile Planetariums Day, Nordic Planetarium Association, NPA meeting, AHHAA Science Centre, Tartu, Estonia. · Contact: Anna Arnadottir, anna.arnadottir@fysik.lu.se · https://www.npa-planetarium.org/npa2025/esmod-day
- **15-17 September.** Live Interactive Planetarium Symposium, European LIPS Conference 2025 (E-LIPS), Planetarium Wien, Wien, Austria. · https://lipsymposium.org/ · https://www.vhs.at/de/e/planetarium
- **15-19 September.** Association of Brazilian Planetariums, ABP Conference, São Paulo, Brazil.
- **15-19 September.** Digistar User Group, DUG 2025, Thinktank Science Museum, Birmingham Museums, United Kingdom. · https://digistarusersgroup.wildapricot.org/
- **16 September.** 18:00 UTC, International Planetarium Society Community Chat (Centered for Africa/Europe IPS zones)
- **20 September.** GSCA 2025 Innovations Spotlight, Where the Future of Giant Screen Comes to Life, Fort Worth Museum of Science and History, Fort Worth, Texas (USA). · https://www.giantscreencinema.com/innovations-spotlight/
- **24-26 September.** Association of French Speaking Planetariums, APLF Annual Conference, Cosmodrome, Genk, Belgium. From 22-23 September workshop about education. Coordinator Olivier Moreau. · Contact: nicolas fiolet. nfiolet@lacoupole.com (APLF); seppe.canonaco@genk.be (Cosmodrome) · www.aplf-planetariums.org
- **7-11 October.** Great Lakes Planetarium Association, GLPA/WAC Conference, Bell Museum, St. Paul, Minnesota, USA. · https://glpa.org/annual-conference/ · GLPA conference is organized with the four regional associations that make up the Western Alliance Conferences. WAC make connections with planetariums west of the Mississippi. The alliance include more than 20 states and the following planetarium organizations: Southwestern Association of Planetariums (SWAP) · Pacific Planetarium Association (PPA) · Rocky Mountain Planetarium Association (RMPA) · Great Plains Planetarium Association (GPPA) https://www.wacsite.org/
- **28 October.** 14th International Festival of Science Visualization (IIFSV), Tokyo, Japan. · Contact: info@ifsv.org
- **19 November.** 05:30 UTC, International Planetarium Society Community Chat (Centered for Asia/Oceania IPS zones)
- **1-4 December.** South American Meeting, APAS Conference, Planetarium USACH, University of Santiago do Chile. In the following days (4-6 December) telescope tour. · Contact: apas@planetariochile.cl · https://www.youtube.com/watch?v=Sbqv62xXGKQ
- **19-21 December.** Workshop of Planétariums Interactif Associés francophones (PIAf), Marseille, France. Inscriptions: lionel.ruiz@live.fr Each month, all the year, PIAf Meeting online. Free inscription: https://groups.io/g/lss-plane https://planetariums-interactifs.org/
- **31 December.** Deadline for the contest "A week in the United States" For information and application requirements go to https://www.ips-planetarium.org/?page=WeekinUS

- **31 December.** Deadline for the contest "A week with the GDP". Gesellschaft Deutschsprachiger Planetarien e.V., (GDP) is the Society of German-Speaking Planetaria. For information and application requirements go to https://www.ips-planetarium.org/page/WeekwithGDP
- **31 December.** Deadline of the prize "Page of stars" organized by IPS Portable Planetarium Committee in collaboration with Serafino Zani Astronomical Observatory. · Contact: Susan Reynolds Button. sbuttonq2c@gmail.com · http://www.ips-planetarium.org/?page=pagesofstars

2026

- **11 February.** International Day of Women and Girls in Science. There are also planetariums among the institutions that organize public events about the purposes of the Day. · https://www.un.org/en/observances/women-and-girls-in-science-day
- **31 March.** Deadline of 14th PLANit Prize for an original video production, organized each year by Italian Association of Planetaria (PLANit), Italy. rize is open to everyone. First prize 500 euro. · Contact: segreteria@planetari.org; www.planetari.org
- **22-26 April.** Dome Fest West 2026, Boulder, Colorado, USA. · Contact: Ryan Moore, ryan@domefestwest.com · https://www.domefestwest.com/
- **April.** Gesellschaft Deutschsprachiger Planetarien e.V., (GDP), Annual Conference of the Society of German-Speaking Planetaria. · Contact: Voss, Björn Dr., bjoern.voss@bkm.hamburg.de · www.gdp-planetarium.org
- **April.** Italian Association of Planetaria (PLANit), 41th National Conference of Associazione dei Planetari Italiani. · Contact: segreteria@planetari.org; Dario Tiveron, dario@fddb.org · www.planetari.org
- **7 May.** International Day of Planetariums. · ips-planetarium.site-ym.com/?page=IDP
- **7 May.** Astronomy Day. Astronomy Day is a world-wide event designed to celebrate all facets of astronomy · https://www.astroleague.org/astronomyday/news
- **13-16 May.** Middle Atlantic Planetarium Society, MAPS Conference, Howard B. Owens Science Center, Maryland, USA. · Contact: Patty Seaton, pxts13@yahoo.com · https://www.sepadomes.org/annual-conference/
- **18 May.** International Museums Day,
- **26-28 May.** 11th Fulldome Festival Brno, Brno Observatory and Planetarium, Brno, Czech Republic. · Contact: director@fulldomefestivalbrno.com · https://www.fulldomefestivalbrno.com/
- **2-4 June.** European Network Science Centres & Museums (ECSITE), Annual Conference, Universeum, Gothenburg, Sweden. · https://www.ecsite.eu/conference
- 28th International Planetarium Society Conference, Fukuoka City Science Museum, Fukuoka, Japan.
  18-19 June. Fulldome Festival. @ Fukuoka City Science Museum.
  20-21 June. IPS Board Meeting.
  21 June. Welcome (Social Event).
  22-23 June. Open Ceremony, Sponsor Promotion, Sessions and workshops.
  24-26 June. Sponsor Exhibition, Concurrent Sessions, General Meeting, Keynote
  27 June. Post Conference Tour.
  Contact: ips-fukuoka@fukuokacity-kagakukan.jp · https://www.ips2026fukuoka.com/
- **30 June.** Asteroid Day · https://asteroidday.org/
- **13-19 July.** Fulldome Festival Jena, Jena, Germany. · https://fulldome-festival.de/info
- **31 July.** Deadline for the applicants of "A Week in Italy for an American Planetarium Operator", in collaboration with IPS Portable Planetarium Committee. · ips-planetarium.site-ym.com/?page=Italy
- **12 August.** Total solar eclipse (Artic, Greenland, Iceland, Atlantic Ocean, northern Spain and very extreme north eastern Portugal). · https://nso.edu/for-public/eclipse-map-2026/

2027

- **20 March.** The Best of Earth Fulldome Awards 2027. The Best of Earth Awards Show is a coalition of fulldome film festivals around the world (Jena, Los Angeles, Plymouth, Melbourne, Canada, Brno) to celebrate the innovation and magnificence that fulldome provides. The event will be streamed. · http://bestof.earth/
- **2 August.** Total solar eclipse (Europe, Africa and the Middle East). · https://en.wikipedia.org/wiki/Solar_eclipse_of_August_2,_2027
- **10-19 August.** XXXIII IAU General Assembly, International Astronomical Union, Rome, Italy. https://www.iau.org/science/meetings/future/general_assemblies/2760/ Access to virtual platform available.

2025 PLANETARIUM ANNIVERSARIES

75 YEARS

- **Planetario Agrimensor German Barbato**, Montevideo, Uruguay.

50 YEARS

- **Morelia Planetarium**, Mexico.
- **Fiske Planetarium,** Boulder, CO., USA
- **Flandrau Science Center & Planetarium,** Tucson, AZ., USA

40 YEARS

- Planetario USACH, University of Santiago do Chile.

LAST LIGHT
CHATTING WITH FRIENDS

April S. Whitt
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Zoom chats are still useful for catching up without catching a plane, and Jon Bell ended his recent SEPA meeting with, "May all the prime numbers greater than two be ever in your favor. And "QplaH!" goes without saying."

The Middle Atlantic Planetarium Society (MAPS) and the Southeastern Planetarium Association (SEPA) held a joint annual meeting in Woodbridge, Virginia in June this year. Host Tony Kilgore's "East Coast Planetarium Conference" was a rousing success, full of excellent speakers, new and renewed friendships, amazing swag, and even a major league baseball game.

Well, okay. Part of a major league baseball game. The bad news: Weather delayed the game's start so long that we all had to leave before the third inning finished. The good news: we saw multiple rainbows!

One of our speakers, Dr. Kathy Lamont, described connecting audiences with the International Space Station through amateur radio. She had met our host on a bus trip during a National Science Teachers conference, and her children had been to his planetarium for school field trips.

"Hey," she said on the bus trip, "aren't you Tony the Space Guy?"

All over the bus, cell phones whipped out to Google "Who's Tony the Space Guy?"

One of the conference highlights was visiting the Udvar-Hazy museum, part of the Smithsonian, housing aircraft and spacecraft from all over the world. We spent a day there touring and holding business meetings. One of the day's speakers, Dr. Jennifer Levasseur, noted the space shuttle Discovery, "sitting right outside this window – not something you can say every day." We were treated to an even closer view for the conference's final gala dinner, served right around Discovery herself.

Pat McQuillan mentioned that when his family moved to Virginia from New Jersey in the late 1970s, he remembered watching the drop tests of the space shuttle Enterprise on television.

If his future self could have traveled back to tell him that in 2025, he would be under the shuttle Discovery, that hadn't been built yet, dancing to a song about a strip club, he "wouldn't have bet on it."

Among the excellent presentations, Pranvera Hyseni offered "The Meteorite Mystery Game," to help visitors learn how to identify a space rock. She had a number of specimens for us to examine, some meteorites and a few "meteor-wrongs." Of one of the small, sharp rocks, she said, "You know where I got this one? At the brewery last night!"

Astronaut Jose M. Hernandez shared his story of multiple applications and multiple rejections to the astronaut corps. It was literally years between his first "Dear Applicant" rejection letter (he framed it) and serving as flight engineer on the Discovery shuttle. From migrant farm work in California to space travel ("turns out moving seven tons of equipment in zero gee is pretty easy"), he reminded us that, "It's great to have big goals. Be sure to enjoy the journey."

Mystic Seaport's Brian Koehler has taken over editing the MAPS "Constellation" newsletter sent quarterly to members. During the business meeting, he asked for suggestions and was offered

"How about a secret message?" "How about cash prizes?"

Part of the fun at conferences is hearing stories from fellow planetarians. Bill Moser described an encounter with a women absolutely convinced that she had seen a UFO.

"It's a UFO!"

"Ma'am, that's the planet Venus."

"But it's MOVING!"

"That's because of Earth's rotation. Objects in the sky seem to move."

"But –" and on and on, with him patiently and politely answering, until she finally burst out, "Well, you're just using FACTS."

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