A Century of Presentations

The tools have changed, the enthusiasm is still the same. The visual aid has developed into a universal medium for communication. Today, as then, we develop tools for lively and interactive presentations for your audience. When the classroom pointer became too short, we developed the first light arrow. When cosmic excursions became possible, we developed UNIVIEW. ZEISS UNIVIEW is recognized as the most user friendly interface for virtual journeys through the universe.

zeiss.com/planetariums
The Archenhold-Sternwarte is the oldest and largest public observatory in Germany. Photo by Frank Michael Arndt.

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!
LATIN AMERICA
Milagros Varguez
Director
Planetario de Cancún en Consejo
Cancun, Mexico

NORTH AMERICA
Patty Seaton
Howard B. Owens Science Center
9601 Greenbelt Road
Lanham, MD 20706
+1 301-918-8750
michelew@gmail.com

OCEANIA
Oana Jones
Christchurch
Canterbury, New Zealand
+64 212362962

AFRICA
Susan Murabana Owen
The Travelling Telescope’s
Nairobi Planetarium
105 Riverside Lane off Riverside Drive
Nairobi, Kenya
+254 722 218 267
smurabanaotravellingtelescope.co.uk

ASIA
Sumito Hirota
Kawasaki Science Museum
7-1-2 Masugata, Tama-ku
Kawasaki, Kanagawa
214-0032 Japan
hirota@a23.jp
planetarium.jp

Jin Zhu
Honorary Director
Beijing Planetarium
138 Xiwadajie Street
Xicheng District
Beijing 100044 China
+86-10-51583002
+86-13-60136961
+86-10-51583312 fax
jinzh@bjp.org.cn

EUROPE
Anna Green
Stiftung Planetarium Berlin (Berlin Planetarium Foundation)
Berlin, Germany

BJORN Voss
LWL-Museum für Naturkunde
Westphalian State Museum of Natural History
Sentrupfer Str. 285
48161 Münster Germany
+49-251-591-6026
+49-251-591-6098 fax
bjorn.voss@GWLw.de
www.gdp-planetarium.org

CURRENT OFFICERS
EXECUTIVE SECRETARY
Derek Demeter
Emil Buehler Planetarium
100 Weldon Blvd.
Sanford, FL 32773
Phone: +1 407-708-2360
secretary@ips-planetarium.org

TREASURER
Mike Small
Adler Planetarium
1300 S. Lake Shore Drive
Chicago, Illinois USA 60605
Phone: +1.312.294.0365
treasurer@ips-planetarium.org

DIRECTOR OF OPERATIONS
Pamela Hicks
Managing Matters
411 Richmond Street East, Suite 200
Toronto, Ontario Canada M5A35S
operations@ips-planetarium.org

BOARD
LATIN AMERICA
Milagros Varguez
Director
Planetario de Cancún en Consejo
Cancun, Mexico

NORTH AMERICA
Patty Seaton
Howard B. Owens Science Center
9601 Greenbelt Road
Lanham, MD 20706
+1 301-918-8750
michelew@gmail.com

OCEANIA
Oana Jones
Christchurch
Canterbury, New Zealand
+64 212362962

AFRICA
Susan Murabana Owen
The Travelling Telescope’s
Nairobi Planetarium
105 Riverside Lane off Riverside Drive
Nairobi, Kenya
+254 722 218 267
smurabanaotravellingtelescope.co.uk

ASIA
Sumito Hirota
Kawasaki Science Museum
7-1-2 Masugata, Tama-ku
Kawasaki, Kanagawa
214-0032 Japan
hirota@a23.jp
planetarium.jp

Jin Zhu
Honorary Director
Beijing Planetarium
138 Xiwadajie Street
Xicheng District
Beijing 100044 China
+86-10-51583002
+86-13-60136961
+86-10-51583312 fax
jinzh@bjp.org.cn

EUROPE
Anna Green
Stiftung Planetarium Berlin (Berlin Planetarium Foundation)
Berlin, Germany

BJORN Voss
LWL-Museum für Naturkunde
Westphalian State Museum of Natural History
Sentrupfer Str. 285
48161 Münster Germany
+49-251-591-6026
+49-251-591-6098 fax
bjorn.voss@GWLw.de
www.gdp-planetarium.org

CURRENT OFFICERS
EXECUTIVE SECRETARY
Derek Demeter
Emil Buehler Planetarium
100 Weldon Blvd.
Sanford, FL 32773
Phone: +1 407-708-2360
secretary@ips-planetarium.org

TREASURER
Mike Small
Adler Planetarium
1300 S. Lake Shore Drive
Chicago, Illinois USA 60605
Phone: +1.312.294.0365
treasurer@ips-planetarium.org

DIRECTOR OF OPERATIONS
Pamela Hicks
Managing Matters
411 Richmond Street East, Suite 200
Toronto, Ontario Canada M5A35S
operations@ips-planetarium.org

BOARD
LATIN AMERICA
Milagros Varguez
Director
Planetario de Cancún en Consejo
Cancun, Mexico

NORTH AMERICA
Patty Seaton
Howard B. Owens Science Center
9601 Greenbelt Road
Lanham, MD 20706
+1 301-918-8750
michelew@gmail.com

OCEANIA
Oana Jones
Christchurch
Canterbury, New Zealand
+64 212362962

AFRICA
Susan Murabana Owen
The Travelling Telescope’s
Nairobi Planetarium
105 Riverside Lane off Riverside Drive
Nairobi, Kenya
+254 722 218 267
smurabanaotravellingtelescope.co.uk

ASIA
Sumito Hirota
Kawasaki Science Museum
7-1-2 Masugata, Tama-ku
Kawasaki, Kanagawa
214-0032 Japan
hirota@a23.jp
planetarium.jp

Jin Zhu
Honorary Director
Beijing Planetarium
138 Xiwadajie Street
Xicheng District
Beijing 100044 China
+86-10-51583002
+86-13-60136961
+86-10-51583312 fax
jinzh@bjp.org.cn

EUROPE
Anna Green
Stiftung Planetarium Berlin (Berlin Planetarium Foundation)
Berlin, Germany

BJORN Voss
LWL-Museum für Naturkunde
Westphalian State Museum of Natural History
Sentrupfer Str. 285
48161 Münster Germany
+49-251-591-6026
+49-251-591-6098 fax
bjorn.voss@GWLw.de
www.gdp-planetarium.org
AD HOCS COMMITTEES/TASK FORCES/WORKING GROUPS

Armand Spitz  
Planetarium Education Fund  
Finance Committee

COVID-19 Task Force  
Thomas Krause and Mark SubbaRao, Co-Chairs

Education  
Shannon Schmoll, Chair  
Abrams Planetarium  
Michigan State University  
East Lansing, Michigan 48824 USA  
+1-517-355-0039  
schmoll@msu.edu

History  
John Hare, IPS Historian  
Ash Enterprises  
29 Riverside Drive, Apt 402  
Cocoa, Florida 32922 USA  
+1 941 730 3434  
john hare @ earthlink.net

History of the Planetarium Working Group  
Pedro Raposo, Chair  
Adler Planetarium  
Chicago, Illinois 60605 USA  
praposo@adlerplanetarium.org

Indigenous Astronomy Working Group  
Annette Lee, Co-Chair  
St. Cloud State University  
St. Cloud, Minnesota 56301-4498 USA  
anelle@stcloudstate.edu

Ka’u Kimura, Co-Chair  
Imiloa Astronomy Center  
Hilo, Hawaii 96720 USA  
kilke@imiloa.org

Milagros Vazquez-Ortiz, Co-Chair  
Chu’um’ Ka’an Planetario de Cozumel  
Cozumel, Quintana Roo Mexico  
milagrosva@gmail.com

Immersive Audio  
Charles Morrow, Chair  
1961 Roaring Brook Road  
Barton, Vermont 05822 USA  
Phone: +1 212 989 2400  
cm @ cmorrow.com

International Development  
Martin George, Chair  
Ulverstone Planetarium  
50 Main Street, How  
Ulverstone, Tasmania 7315  
Australia  
Martin George@qvmag.tas.gov.au

Planetarium Centennial Task Force  
Bjorn Voss, Chair  
LWL-Museum für Naturkunde  
Westfälisches Staatliches Museum Am Naunhof  
48161 Munster, Germany  
+49 251-591-6098 fax  
bjorn.voss@lwl.org

Guidelines for contributors

- Planetarium welcomes submissions of interest to the planetarium community. Preference is given to articles that closely relate to the philosophy, management, technical aspects, educational aspects, or history of planetariums, and ideas that can readily be incorporated into planetarium shows. Authors are responsible for obtaining all necessary copyright clearances, especially for illustrations and photographs.
- Research articles dealing with educational aspects of the planetarium and other topics are highly desirable and will be refereed if applicable and requested.
- Contributors agree that their submission is their own original work and has not appeared elsewhere in print or electronically, nor is not being submitted simultaneously elsewhere in print or electronically. If the submission has appeared elsewhere in print or electronically, permission to re-print must be obtained and a copy of this permission emailed to the Editor with the article.
- Once accepted for publication, the contributor also agrees that the copyright of original works not appearing elsewhere is held by the International Planetarium Society (but not before the print version has been received by members), contributors may post the submission on a personal website, blog, or a website of general interest as long as the following appears: Copyright 2013 (or appropriate year) International Planetarium Society; used with permission; and are not necessarily the opinions of the International Planetarium Society, Inc., all rights reserved.
- Note that photos may be enhanced digitally for printability only, never for content.
- The Guidelines for Contributors on the IPS website should be consulted before submitting an article.
- Potential advertisers are invited to check the Advertising Guidelines and Rate Sheet on the IPS website.
- We are gathered together from all corners of this globe, inspired by the world and the universe we inhabit. Our society draws its strength from our predecessors and from the wide diversity of our present membership. Building on our past heritage, we are inspired to dream of future accomplishments, working together as a worldwide society.

PROFESSIONAL PARTNERS

IPS Permanent Mailing Address

International Planetarium Society  
c/o Mike Small, Treasurer  
Adler Planetarium  
1300 S. Lake Shore Drive  
Chicago, Illinois 60605 USA

IPS web site:  
www.ips-planetarium.org

Please notify the Editor and Secretary of any changes on these two pages.

Contact the Treasurer/Membership Chair for individual member address changes and general circulation and billing questions. Addresses also may be changed online on the IPS Web Site.

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

Planetarium (ISSN 0090-3213) is published quarterly by the International Planetarium Society, Inc., all rights reserved.

Also known as The Planetarium from Vol. 1 No. 1 through Vol. 6 No. 4. Titled Planetarian starting with Vol. 7 No. 1 forward.

Opinions expressed by authors are personal opinions and are not necessarily the opinions of the International Planetarium Society, Inc., officers, or agents.

Acceptance of advertisements, announcements, or other material does not imply endorsement by the International Planetarium Society, Inc., officers, or agents.

Note that photos may be enhanced digitally for printability only, never for content.

The editor welcomes Letters to the Editor and items for consideration for publication. The editor reserves the right to edit any manuscript to suit this publication’s needs.

The online PDF version holds t
MISSION:
REACH SPACE
ENGINEER A ROCKET THAT CAN REACH THE EDGE OF SPACE

REACH ORBIT
MAINTAIN A LOW-EARTH ORBIT

REACH MARS
CONDUCT A TRANSFER BURN TO MARS FROM LOW-EARTH ORBIT
NO DOME IS AN ISLAND

PRESIDENT’S MESSAGE

The beginning months of my presidency have been both eye-opening and affirming. I find myself surrounded by incredibly competent and driven people, whose passion for building our planetarium community is only matched by the passion they have for their domes and audiences. Every day, I have access to different perspectives, strong opinions, and a remarkable wealth of institutional and community memory – invaluable resources to effectively grow our organization.

I feel very fortunate to have the opportunities to work with other planetarians that come from my position, and two interactions at the beginning of 2023 have stood out to me in particular. The first was the chance to sit in on this year’s first meeting of the Portable Planetarium Committee, and the second was a request from the African Planetarium Association (APA) to speak at their meeting last March. I must extend my sincere thanks to the premier “Susans” of our planetarium world – Susan Button and Susan Murabana Owen – for giving me unique insight into these integral facets of our community.

In both cases, the group serves parts of our planetarium field that I believe have oftentimes been marginalized, minimized, or ignored. Portable planetariums make up a considerable number of the world’s domes, and for a substantial percentage of the global population, these facilities might be the only science gateway readily available to them. The work is tireless, the hours are long, and with financial and personnel resources stretched to their limits, professional development and ongoing education can often be set aside.

Similarly, it has been deeply inspiring to watch the growth of the African planetarium network. From Kenya to Ghana to South Africa, the successes, and obstacles these domes face also help to illuminate the issues that face other emerging planetarium communities. There are parts of the world that have been, and continue to be, woefully underrepresented and underserved by IPS, and, while the accomplishments that result from proper support and fruitful collaborations are deeply deserving of our celebration, there is so much more left for us to do.

This was the backdrop to my preparation for the APA’s keynote address. Regardless of whether a dome is in Nairobi, Nagoya, or New York City, there must be actionable responsibilities and obligations that we at IPS have to our planetarium friends and colleagues. It means asking myself a simple question: what does it truly mean to be part of this community in 2023?

I find myself drawn to the words of John Donne, the seventeenth-century English poet and philosopher. To paraphrase him a bit: no dome is an island, but more importantly, it is that every dome in the world – every single one – is a piece of the community, a part of the main. If we are to be an organization that truly represents educators, technicians, directors, content creators, vendors, the old and the young, then we must be honest with ourselves as to how we can best serve those interests, and to empower the right people in the right places to make it so.

It is often easy to grow complacent when things are going well. Times of crisis require urgency and action, and those are times that can help us to grow as an organization. There’s often a false equivalency between success and the health of an organization. In so many different ways, I believe that our planetarium community is thriving. But it is also essential for this planetarium collective to turn a mirror on itself once in a while and be willing to identify the ways that we can better ourselves, and in my case, this organization in particular.

What can we do as an organization to be better? How can we make ourselves more relevant and useful? How do we better live up to the “international” in our name, and to better support the parts of our community that have felt marginalized or minimized? These questions are at the heart of a better IPS and a more welcoming and inclusive planetarium community – one built on a foundation of authentic and deliberate actions, policies, and support. Let’s answer these questions together, so that we can continue to empower, uplift, and inspire.

The “Susans” of the IPS world, Susan Button and Susan Murabana Owen.
LEADING INNOVATION

Congratuations
Fort Worth Museum of Science and History

The 23-meter Jane & John Justin Foundation Omni Theater powered by Cosm technology will continue its legacy of transformational education and entertainment.
To be honest, I fell into the planetarium industry. A story I believe I’ve told before, but it’s true nonetheless. Thankfully, it has turned out to be the place where I have been the happiest and where I have learned the most.

Had you asked me when I came to work at Flandrau Science Center & Planetarium if I’d ever wanted to work in the theater, I would have said that it was something I was interested in - but I was hired as a designer. It was what I was trained in and what I was good at.

My first time behind the console changed all of that, reminding me of the awe I felt back in 2nd grade when I came on a field trip, seeing Hector Vector - our Minolta star projector - come out of the floor and showcase the night sky. That analog console was extremely intimidating, but I knew I had to know how to run it.

I am not sure what Michael Magee, the planetarium director, thought of me when I first came in - but as my previous bosses could tell you, I am a bit of a mess. Much of it can be attributed to my ADHD — I always want to do all of the things, learn all of the things, be involved in everything (for better or worse). However, the flipside of this is I can also be fairly disorganized for that same reason (I’m constantly working on a better way to organize myself). I was the squeaky wheel though: I wanted to learn all about the theater, while continuing to work in video and design. All of the things.

Michael moved to and started at the University of Arizona in 1980. It was at a star party hosted by Tucson Amateur Astronomy Association on the mall that introduced Michael to Flandrau; David Levy was both president of TAAA and the Floor Manager at Flandrau. He learned how to operate the telescope at Flandrau whilst learning more about the staff there, and he continued to stay involved with TAAA. Always being one eager to help, he jumped in to run the telescope one night in 1981 when one of the student staff, Suzy Burton, had an emergency. A chance encounter with the then Director of Flandrau later that evening turned into a proper meeting a few days later where it was recommended that Michael be hired to run the telescope, give tours for school groups, and be trained on the console.

It seems that regardless of where we start, we end up where we’re supposed to be. Michael notes that it was then he knew that Flandrau was the place for him.

In 2000, Michael became the Planetarium Director. One of the first things he did was upgrade the planetarium audio system from an analog reel-to-reel system to a digital system. He knew that it would provide a better quality sound for years to come, but that was not where he stopped.

He knew there was more to do. The theater needed to grow, needed to modernize. Even as early as 1999, Michael understood that digital systems were the future after attending the IPS Conference at Arizona Science Center and seeing a demonstration at the Dorrence Planetarium. After seeing
UYUNI
Volcanic Twilights & Milky Way

www.KWONOCCHUL.com/fulldome

KWONOCCHUL
ASTROPHOTOGRAPHY
In 2022, the planetarium in Mannheim, Germany, presented its show, “Galaxis - Reise durch die Milchstraße” (Galaxy - Voyage through the Milky Way). The show incorporates a breath-taking sequence from a scientific, hydrodynamic simulation of a star-forming region. The simulation, appropriately called “Starforge,” not only recreates the formation of stars, but even the emergence and spectacular piercing of jets through the local environment. The astrophysical results from the simulation were published in a series of research papers lead by Michael Grudić (Grudić et al., 2021). The jets stir up the gas, and sometimes even collide with each other. The visualization of this simulation is what some of us astrophysicists have been waiting for our whole lives to watch. It is like interstellar fireworks — a must-see.

The Starforge-Simulation is a particle-based, hydrodynamic simulation. This allows a very large range of spatial scales to be simulated, which is essential for this type of physical recreation of star formation. However, the visualization of the Starforge-Simulation is volumetric and conveys an impressive sense of realism.

3D-models such as The Starforge-Simulation cannot, unfortunately, be handled as a 3D model in live, interactive shows. Currently in planetariums, such detailed, high-resolution animations can only be presented in the form of a pre-rendered movie. While watching the video, one feels the urge to ask the presenter several times to rewind.

Figure 1: A time sequence from an animated volumetric 3D model with shocks propagating along the supersonic jets that emerge from the inner disk of a young stellar object (YSO) (Image: ilumbra).
a few seconds and fly right into it to get a close-up view of some of the jets that come out of some dense cloud. Not being able to ask for a change in the flight-plan to get close-up is a bit frustrating. That frustration doesn’t take anything away from the joy one gets from this dynamic spectacle of star formation. It did, however, induce the need to get back to the seeds of interactive volumetric motion in our volumetric 3D-models that we sowed earlier.

At ilumbrā, we celebrated the New Year in 2021 with a short video clip of the Sun. We posted a frame from that sequence on social media on January 7, 2021. The original video, captured from an interactive volumetric visualization in the iluvia software, featured gas filaments moving along prominences on the solar surface, some of which were twisted into the number “2021.”

With new inspiration, we got back to watering this seed. We hope to break open a new frontier for live, interactive planetarium shows (LIPS): time evolution and motion in volumetric 3D-models.

While there is probably still a long road ahead to practical applications in the planetarium, we couldn’t wait to share the prospects of showing audiences at interactive, live shows that interstellar space is a very dynamic place. It noticeably changes on timescales of millions of years, and down to only a few years.

We thought that a beautiful starting point would be the dynamics of young stellar objects (YSOs). With the Hubble Space Telescope (HST), some of the YSO-jets have been shown to expand in movie sequences that cover only a few years. Stars that have recently formed still have rotating disks of gas around them from which new planets form. They also transport gas and dust towards the new star, which then adds most of it to its own mass. A small fraction of the in-falling gas is, however, funneled into supersonic jets by the action of magnetic fields around the inner region of the disk.

Instabilities in the disk, or the presence of a companion star or large planet, can affect the mass ejection on a regular basis, thereby provoking a slight wobbling and the formation of a sequence of bright shock waves in the jets.

We have simulated these phenomena in a new volumetric model of a YSO. It now has motion within its structure. User interaction is possible at the same time with the virtual camera in ilumbrā’s software iluvia and soon, hopefully, in planetariums. The model incorporates Keplerian rotation of the inner accretion disk, and an orbiting companion star that might be the cause of the regular formation of shocks.

Figure 1 shows a sequence of images that are equally spaced in time. This YSO was modeled after part of the inner region of Herbig-Haro III (HH III) in the north-eastern region of the Orion-Complex. On the ilumbrā website, you can find a video of an interactive iluvia session with the structural evolution in the model.

Technically, such a 3D-sequence is similar to a 2D-movie. Instead of showing a sequence of images, it shows a time series of 3D-models that have been pre-computed earlier. For the planetarium presenter, the great leap in freedom will be that, instead of having a fixed camera flight path in a pre-rendered movie, the space traveler can freely decide how to move in or out of the scene while the object evolves in time. Playing the sequence backwards, stopping, or slowing down at particular times will, of course, also be options.

With conventional workstation-grade graphics cards (GPU), the frame rate for a model with 256^3 voxels is currently impractically low, but with 512^3 voxels the result is quite decent at around ten frames per second (fps). While this frame rate is still too low for planetarium use, there is a lot of room for optimization. We are only at the beginning of this development. With the advances in GPU technology that we can expect in the next few years, things look promising for motion in the volumetric models.

It is now absolutely legitimate to dream of evolving planetary nebulae, expanding supernova remnants and, maybe, even the fireworks of star-forming regions right in your live, interactive planetarium show.

Reference:

* * *

NOW AVAILABLE!
Touch the Solar System digital book by Noreen Grice and Dr. Heidi Hammel.

Braille/Print colorful tactile solar system images designed for the T3 (Talking Tactile Tablet).

www.YouCanDoAstronomy.com
It is hard to believe, but we are just one year away from our first in-person IPS conference in six years! The teams in Jena and Berlin are hard at work to create the best experience possible for you during your time in Germany, and we cannot wait to greet you!

The 26th International Planetarium Society conference is destined to be very special as it lies in the middle of the centennial celebration of the first projection planetarium. Our theme, “United Under the Sky,” really focuses on how we are all in this together, while recognizing Germany and Berlin’s history, as well as the separation we have experienced over the last five years and our joyful reunion. Berlin, a truly special city of reunification, along with Jena, the city where the projection planetarium was born, are excited to be collaborating for this once in a lifetime event.

We believe that the conference will be a wonderful opportunity for all delegates to learn, network and grow as planetarians. Participants will also discover where our profession was born, and work together to guide us forward into the next 100 years.

Pre-Conference Activities will take place July 17-21, 2024. Experience the Jena Fulldome Festival (held especially for IPS in 2024) and enjoy a fascinating and historic pre-conference tour in Jena, Germany – where the projection planetarium was born! Immerse yourself on July 20 in a day of workshops with IMERSA, also in Jena, and expand your repertoire on July 21 with the Live Interactive Planetarium Symposium (LIPS) Day in Berlin.

The IPS 2024 Conference will be July 21-25, 2024, in Berlin, Germany. The event will open with a lovely welcome reception and activities to start the week off with a bang! Over the course of the week, delegates will have the opportunity to attend both traditional style sessions as well as new collaborative-format sessions to learn best practices and work together for the next 100 years of the planetarium! See the newest and greatest technology from our sponsors and spend time in the conference center at the Arena Berlin and Zeiss-Großplanetarium. The mid-conference tours will give visitors the opportunity to explore the greater Berlin area, which includes a behind the scenes tour of the renovations of the Planetarium am Insulaner and Wilhelm-Foerster-Observatory!

We also know that one of the most valuable opportunities at an IPS Conference is networking. There will be ample opportunity for networking with your colleagues both throughout each day, as well as during a few exciting casual evening social activities!

(Continued on pg. 23)
Join us in celebrating the Planetarium’s Centennial.

On October 21, 2023 we will celebrate the Planetarium’s Centennial together with numerous partners simultaneously in Munich and Jena, Germany. There are also plans to stream the event. Join Frank-Walter Steinmeier, Federal President of the Federal Republic of Germany, the Official Patron of the Planetarium Centennial. Learn what activities are planned for the anniversary period ending May 7, 2025. We cordially invite you and ask you to save the date.

We will send out the programme with registration information in June 2023.

Network with representatives of the planetarium community, science, politics, and industry. Together, we are committed to the planetarium as an educational, cultural and entertaining institution. For a hundred years, planetariums have been building bridges between the heart of each individual and the seeming infinity of the universe.

Visit the Centennial website for more information: planetarium100.org
LEADING INNOVATION:
FORT WORTH MUSEUM OF SCIENCE & HISTORY TRAILBLAZES NEXT-GENERATION IMMERSIVE EXPERIENCES IN MUSEUMS

By Tammy McKinney, Vice President of Development and Marketing, Fort Worth Museum of Science & History

Fort Worth Museum of Science & History is proud to introduce the Jane & John Justin Foundation Omni Theater, the world’s first LED dome of its size in a museum. The Museum has selected Cosm’s immersive technology, CX System, to transform its 23-meter Omni IMAX Theater into a cutting-edge, digital dome capable of 8K resolution with more than 30 times the brightness of traditional dome projection systems. Within the new Omni Theater, guests will be presented with an unparalleled immersive experience where they can easily suspend their disbelief and be swept away in the moment. The full-scale renovation will include a new ADA-accessible space and lobby experience to better serve and engage with audiences.

The Omni Theater has been a pillar of the Fort Worth Museum since its opening in 1983, inspiring and welcoming over 10 million visitors over 40 years. Notably, guests were taken on a “Fort Worth Flyover” journey designed to simulate flying over Fort Worth in a helicopter, which was the first IMAX film to be commissioned by a museum. This beloved experience was shown as the opening to all screenings as a way of acclimating guests to the theater experience. Future guests to the new Jane & John Justin Foundation Omni Theater will experience the same thrills through live-stream tours of the jungle, underwater diving missions, and presentations from paleontologists on the other side of the world. Powered by Cosm technology, the new Omni Theater will encourage museum and event guests of all ages to wonder and imagine about the world in their backyard and beyond.

During the COVID-19 pandemic, the Omni IMAX Theater was forced to close its doors to the public. Shortly after, Fort Worth began making plans to revive the Omni Theater and began the search for a partner that could implement advanced immersive technology capable of re-engaging with the local community and drawing tourists to the area. It was crucial to secure a technology partner that could not only continue the Museum’s legacy of delivering captivating and locally relevant content, but also offer a profound and impactful viewing experience to match the Museum’s long-term vision.

“When our team first visited Cosm’s Experience Center in Salt Lake City, we knew we had come to the right place. We found in Cosm a partner that would usher in a revolutionized, transformative guest experience not unlike when the Omni first opened its doors more than 40 years ago,” said Orlando Carvalho, museum president. “We are thrilled to continue the legacy of bringing learning to life in the Omni Theater through Cosm’s advanced immersive technology delivering a next-generation inspiring experience for decades to come.”

Powered by Cosm Technology, this first-of-its-kind renovation will usher in a new generation of Omni-goers to experience transformational content. The newly renovated Omni Theater will establish the Fort Worth Museum of Science and History as a world leader in the application of state-of-the-art visual technology, and as an educational cornerstone for the Dallas-Fort Worth community. Equipped with numerous content production tools, including Digistar 7, the world’s most advanced planetarium system, and CX Realtime, a deep integration of Unreal Engine, Cosm’s CX System will allow the Museum to easily develop content.
in-house as well as present real-time astronomy simulations and scientific visualizations for unique experiences in line with the Museum’s educational mission. The flexibility of the system, and its ability to present a wide variety of content, enables the Museum to deliver a truly rich and compelling guest experience, giving Omni-goers a reason to visit regularly.

In addition to the wide range of content capabilities and production tools Cosm Technology will bring to the Omni Theater, CX System integrates a custom-engineered, LED dome display, known as Cosm’s CX Display. The ultra-high resolution LED display is capable of outputting 30-40 times the brightness of conventional dome projection systems, and because the panels themselves are black, the overall system contrast is drastically improved while also virtually eliminating cross bounce. With more than 40 years of driving immersive experiences and meeting demanding planetarium needs, Cosm’s calibration and blending software can address each individual LED in the display, ensuring a uniform and seamless experience where the technology itself disappears and viewers are transported entirely.

“We are honored that the Fort Worth Museum of Science & History selected Cosm Technology to power its new Omni Theater to inspire and entertain guests”, said Kirk Johnson, Chief Operations Officer at Cosm. “The Museum is well-positioned to capitalize on Cosm’s advanced, immersive technology to meet the demand guests have for transformational experiences in today’s competitive experience economy.”

Renovations of the Omni Theater will take approximately 16 months, beginning in May, with a focus on the interior footprint of the building, including expanding the lobby into a larger, open space that can host private and corporate events. The refreshed lobby will additionally become one level for ADA accessibility, easily welcoming guests into the new venue. Within the new Jane & John Justin Foundation Omni Theater, there will be approximately 300 larger and more comfortable seats so guests can be leisurely transported on their next adventure. A new stage will highlight the presentation and event capabilities of the new Omni Theater. Byrne Construction Services, the builders for the original Omni IMAX Theater, have been selected as the General Contractor for the project with Bennett Partners providing architectural design services in support of the Omni Theater renovation.


***
Welcome to a new era, our post-pandemic new normal. Many of us are experiencing the effects of the profound change that has occurred over a remarkably short time.

Zoom meetings with colleagues and virtual doctor visits are now a part of life. AI is ubiquitous and I stay in touch with my children through three different messaging applications. I try my best to keep up with all of these new options to connect and communicate and collaborate.

The IMERSA team is keenly aware of these societal shifts and our organization is also adapting to a new era. How do we stay connected with our constituency? Are our actions meaningful? Are our efforts effective? Are we doing things to help others in the community?

In the last issue, Michael Daut’s insightful Planetarian article, Returning to Humanity: A Personal Perspective, expressed our innate need to connect and find companionship. We find ourselves, in the span of three years, having gone from being frequent flyers to frequent Zoomers and not only connecting with close friends, but with others that we might never have reached without this technology.

We are looking forward to welcoming IPS to our special IMERSA Day event on July 20, 2024. Where better to hold this demonstration than at the home of the Fulldome Festival: the Zeiss-Planetarium Jena? Here, attendees will immerse themselves (no pun intended) in the world of fulldome and enjoy some truly exceptional dome experiences.

In this new era, we reached out to the planetarium and giant screen community to further our mission and develop events that raise the profile of outstanding fulldome programming.

The IMERSA team celebrated fulldome film festival collaboration during our virtual IMERSA Day on April 21st, 2023. Nearly 100 fulldome fans joined the conversation, along with festival representatives from the Best of Earth Fulldome Awards, who shared their passion, processes, and perspectives from various festivals around the globe.

IMERSA Day was not only a celebration of fulldome but a celebration of the unique and evolutionary collaboration between five independent fulldome festivals. This was not just an expression of festival procedures, nor was it focused on “winners and losers.” The speakers celebrated connections with each other in spite of language barriers, culture barriers, and geographical distances. They found a way to bridge these gaps and to embrace the joy we all share under the dome screen. Be sure to check out the full discussion here: https://www.youtube.com/watch?v=Xan_EH4JMTQ.

The event was co-hosted by Michael Daut and Michaela French (above) who posed provocative questions sent in by the virtual audience.

Festival representatives shared important observations about their events and the common responsibility to run fair and transparent competitions. The following text excerpts from the Zoom recording reveal the incredible enthusiasm voiced by the festival representatives and demonstrates their inspiring dedication to the fulldome community.

Michaela:

I love that, collectively, there is a kind of shared vision, I guess. But each festival has its own identity as well, and that kind of makes it exciting. I guess, especially for those of us in the community that can attend the different festivals. You’re seeing different kinds of work and you know each one has its own kind of, I don’t know, feel and quality to it.
Warik Lawrance, represented the Dome Under Festival.

The Dome Under Film Festival is a celebration of the fulldome format and aims to promote the medium to a wider audience that includes planetarium professionals, filmmakers, and the public. Given the relatively small planetarium community in Australia, this is not an industry event; instead, it is very much a public facing festival.

Alicia Sometimes

Being on the Best of Earth judging panel was wonderful. There were so many of us with our different time zones talking together and really reflecting on what was sometimes emotional, sometimes sort of very visceral. It was such a great experience to talk about things that were quite meaningful and fresh. I remember in 2021 an incredible standout work, a student work, an audio-visual poetic moment that just came together in, you know, narrative storytelling. Just that evocative sense of displacement as well. That’s the incredible thing about the dome, as you know, just to [be] completely surrounded by not only the visuals but the sound and cocooned and in a new environment and just that sort of liminal experience [It] was just so incredible. Then to be able to watch a snippet from Berlin or Africa, or South America, it’s just, just amazing that all these little communities are creating beautiful work.

Micky Remann represented FullDome Festival-Jena, and shared that his festival’s primary focus is exploring immersive media, electronic arts, science, business, and fun!

We are five festivals from three continents with no money and no bureaucracy, but up the creators that have done that.” We definitely love storytelling here in Los Angeles, the heart of Hollywood, and we’re really focused on that. We’ll probably focus more on music as well and live experiences as that space really heats up.

Fulldome UK Representative Phil Mayer shared:

Our festival was inspired by visiting the immersive Cinema Symposium in 2007 which happened in Plymouth, UK. That was very much an industry event, but it was an epiphany for me because I saw a fulldome plug-in for After Effects. That meant we could all make fulldome! That is, it is not in an ivory tower anymore and I think that’s probably our common theme. It’s about access to domes. It’s about providing a platform to allow artists to use these amazing immersive spaces that almost went slightly undetected outside of a specific science education community for many years.

Of course, it’s the digitization of domes that was the transformation. Once you were no longer using an opto-
any means, but we come from a sort of ‘how can we enable visual artists to expand their practice into fulldome immersive environments.’

Michaela:

I do think as a community it’s also really important that we start to kind of make it easy for organizations to access the content and I think if you’re a science museum and you’re thinking about doing a Friday night public show with more cultural content there’s currently nowhere really to go to find that content.

There actually are these precedents, and I think one thing that we’ve talked about a lot in fulldome creative network is actually starting to collect data on that, to show, that it is financially viable and that it is a kind of actual numbers audience, numbers and people in seats and there is actually value in it. So, I think providing that evidence is also potentially supporting science museums to show to their management teams that it actually is a possible and productive and useful thing.

Very often, the individuals running the planetariums will be up for it but the management system more broadly in the museums are like, ‘we don’t understand how that actually ticks our boxes.’ How do we start to communicate that and provide that research?

Phil:

The impetus for starting FulldomeUK was actually fulldome artists saying, ‘where is our platform? If I create a film, where can it be seen?’ And really, the festival was a response to that. But it’s just a small part; we need to be thinking about how people can be seeing things every week of the year, in planetariums all over the world.

What’s fascinating, however, is that we are beginning to see the emergence of purpose-built performance-art dome venues where we’re not trying to necessarily shoehorn into a planetarium. The venues themselves are built for arts and I think that’s a fascinating development.

The challenge of having a ‘best live performance event’ award is difficult because each festival generally might have one or two per day or something, so it’s a bit hard to say who won and who didn’t. Often, the performances are so unique and diverse it’s kind of a bit impossible to compare and say which one was better.

FulldomeUK Rep Janjire Najera added:

Wouldn’t it be amazing if we had the ability to be able to present selected live performances in one space and do this at the Best of Earth Awards in the future? I guess we need a massive sponsor, right?

CULTVR, Society for Arts and Technology and Market Hall, might be the only three places currently that don’t have any seat restriction and they give access to artists to tour and present their work. It’s clear that all the festivals have an intention to work together and continue exploring ways of not only supporting artists and the community, but bringing in this live performance element and expanding everything that we do.

I think that’s why this community is so beautiful, because we really share everything that we learn, and we learn from each other, and I think that’s quite unique.

Maurod Bennacer, representing the SAT Festival:

We are a festival that is built upon being an art center dedicated to creation for artists, so we do have the dome available all year long. Dome films are only one component of what artists can do when they explore the dome. This is a good way to help artists try the medium, in maybe a short film format, and have the opportunity to experiment.

Having a dome dedicated to arts, for now 11 years, the local audience is getting pretty used to it. It’s really about creating a space for collective immersion where artists and the audience can meet.

The performance aspect of a festival also brings the artists and the humans who actually are behind the creation to the audience. Obviously, you can do that with film as well.

I’ll say Best of Earth is kind of an effort that is somehow desynchronized from the reality of the festivals themselves in a way; there is also a celebration of the culture.

The possibility not only to have access to the content but also to have access to the artists and the people that are actually involved, that’s a very important aspect for us.

Co-host Michael Daut concluded:

I think that the important thing to remember in this whole thing is the awards are great, but the most important thing is visibility to an audience and getting more people to see this work and to experience what is possible in this space. To build the kind of excitement that will contribute towards budgets ultimately in the future so that more people will be able to consume this content in a way that isn’t really super possible now.
There’s a lot of this artistic stuff, quite honestly, that I’ve only seen at festivals. I’ve almost never seen it played in a local planetarium. So, I’m hoping that, through this process, that visibility will create an audience demand that they’ll even go to these theaters and say - ‘hey, why can’t I see this one thing?’ or, ‘can you do these types of events at this space?’ - and let a grassroots movement build up to help transform these things.

Thanks so much to Michael, Michaela, and all the festival representatives for sharing their time and insights with us all. Be sure to watch the original event video on YouTube here, https://www.imersa.org/item/celebrating-fulldome.

Congratulations to Carolyn Collins Petersen, IMERSA Director Emeritus

Carolyn Collins Petersen has worked tirelessly to support the vision of IMERSA for over a decade. She gladly took on the unenviable role of editor for 33 quarterly Immersive Matters articles for the Planetarian journal. She consistently strove to maintain a high bar of quality, making sure that our articles were interesting, relevant, and submitted on time. She also helped select topics for the IMERSA Summits and helped shape these into the finished sessions, often serving as session producer. She helped plan the flow of the schedules, contacted speakers, coordinated technical requirements for sessions, hosted and moderated sessions, and presented many of her own sessions. She was never afraid to get her hands dirty with the hard work of keeping IMERSA, the organization and the Summits we produced, innovative and running smoothly.

Carolyn’s frank and assertive demeanor is one of the best collaborative assets to any endeavor. As technologies keep emerging, making us revisit and explore the nature and structure of immersion, the way we communicate with each other also advances thanks to people like Carolyn, both direct and open and always willing to try new shoes and walk the walk.

Carolyn’s influence and contribution to IMERSA is immeasurable. On behalf of the Board and myself, we are phenomenally grateful for your service and honored to have you continue to work with us as a board member emeritus.

Sound Experience Survey: Fulldome and Planetariums

An important reminder from the IPS Immersive Sound Committee:

To accelerate the flow of ideas and advance our field, we need the voices of all those in the planetarium and fulldome communities to be heard. For these reasons, establishing current audio literacy and standards are vital to the mission and success of the International Planetarium Society, IMERSA, and to all communities that use sound.

The IPS Immersive Sound Committee, in collaboration with IMERSA, is conducting a sound experience survey to help the fulldome and planetarium communities grow better awareness of the current state of audio production workflow, presentation, and distribution in domes.

With these surveys, we hope to better understand peoples’ sonic, creative experience within the fulldome and planetarium communities to guide new initiatives within the International Planetarium Society (IPS), IMERSA, and beyond.

We will use the answers of the survey to build a state of the industry report that we hope will help guide future conversations and developments.


Links to resources mentioned in this article:

CULT VR: https://www.cultvr.cymru/
DOME FEST WEST: https://www.domefestwest.com/
Fulldome Festival, Jena: https://fulldome-festival.de/info
FULLDOME UK: https://www.fulldome.org.uk/
IMERSA Day video: https://www.imersa.org/item/celebrating-fulldome
Market Hall immersive dome: https://realideas.org/our-spaces/market-hall/
SAT – SOCIETY FOR ARTS AND TECHNOLOGY: https://sat.qc.ca/en

* * *
I hope that you are enjoying your summer as you read this. This time around, I asked our cadre of planetarian teachers to share what they will be up to over the summer of 2023. One of our contributors is new to this column. James Bauman is a new friend that teaches in the North Penn Planetarium in Pennsylvania. Thank you to all of our contributors for sharing their stories! I know I want to try the “young planetarian” activity in my dome.

James Bauman - North Penn Planetarium, Lansdale, PA, USA

School might be out for the summer, but the learning never ends in the planetarium. While I might not have students in the seats every day, I will see a few summer camps from local daycare centers. These programs are a nice change of pace from the planetarium programs during the school year because there are no real curricular requirements. I have the freedom to see where the children want the program to go.

During the school year, I will see every elementary school class in my school district at least once and the program is based on a specific curriculum. At that age there are so many questions that are running through, I feel like with some groups I could spend the entire time just answering their questions. However, because I have a specific curriculum to cover and since I only see these classes once for the entire year, I can not spend as much time on their questions as I would like.

Since the summer programs are field trips, the curricular expectations are different. As a result, when the weather is nice, I will meet the groups outside and we will safely view the sun using solar eclipse viewers and our solar telescope. For many attendees, this is the first time that they have ever used a telescope. This is something I am not able to provide them access to during the school year due to time constraints.

Once in the planetarium, we will take a journey through the sky, learning the basics of how things change in the sky, finding constellations and looking for any planets we might be able to see at that time of year. It is when the questions start that we take a detour through the universe that exists in the minds of those present. It is a great time to explore the wonders of space, and at the same time correct any misconceptions that the younger minds have about the universe.

Lisa Swaney - Horwitz-DeRemer Planetarium, Waukesha, WI, USA

Over the last few years, this conversation has come up in a multitude of ways and times: Do you offer outreach? Can you come to our school for a program? What type of outreach do you offer?

Community outreach programming seems like a logical solution to offer as school district budgets are dwindling and a shortage of bus drivers to bring kids to the planetarium seems to be an ongoing challenge. Over the past few years, we developed a handful of programs to take “on the road”. We include them in our school guide, promote them through the Waukesha County Library System, and pass along to anyone else who inquires. Some of these started out as “expanded programming”, and fit nicely into our more formal outreach program. Here are our offerings:

**This program is exclusively offered as a bilingual learning experience**

*Tales and Tails of the Night Sky (Pre-K through 6th grade)*

Join us as we explore the tales of the tailored constellations in our night sky. Each animal will be highlighted during the season they are visible within the calendar year.

*Private Star Party (All ages)*

Under the evening sky, with just your eyes or through a telescope, come to learn the basics of how to navigate the sky using the stars and view the skies. Planetarium educators will help you become an expert of the cosmos yourself! Telescopes will be available for viewing. However, we do encourage participants to bring their own telescopes and/or binoculars. (This is an outdoor event that requires clear skies.)

**This program can be offered in English, Spanish, or as a bilingual learning experience**

*Telescope Clinic (6th grade and up)*

During a telescope clinic, participants will learn about the different types of telescopes, how to operate a telescope and focus it at certain celestial objects, and learn about telescopes you can purchase and which may work best for your stargazing needs. Planetarium experts will share the basics of the night sky, how to navigate using the stars, view the cosmos with the naked eye, or through a telescope. (This program can be offered indoors or outdoors and at your location or at the planetarium.)

I am excited to say that we’ve had our first few “victims”, I mean takers, of our outreach programs. Starting in January, we visited all 12 Waukesha School District elementary schools for their after school program and served approximately 600 students. At each school, we taught “Tales & Tales of the Night Sky.” In February, we took the same outreach program to a New Berlin first grade class for the first time, teaching about 75 students. We have
our first library system visit scheduled for “Tales and Tails of the Night Sky” in July. This program seems to be a popular option, as it is excellent for teaching a wide age range of students. We look forward to more opportunities to educate the community at these programs with our enthusiastic and knowledgeable staff.

Guilherme Frederico Marranghello - Planetário da Unipampa, Rio Grande do Sul, Brazil

As you know, I’m in the southern hemisphere so we already had our summer activities during the northern hemisphere winter. This was our first year of doing summer activities. Because it was our first time, we focused on kids from 9 to 12 years old and limited the group to 20 kids. It was a wonderful experience. Some of the kids have never been in the planetarium before. We had a week full of activities with different activities each day. Kids learned how to operate the system on the first day. On the following days they built their own constellations and stories, programmed our small rovers and built water rockets.

For the first day’s “young planetarian” activity, we waited for the kids with everything turned off so they did exactly what we do when we arrive at the planetarium. They started turning on the computers, projector and sound system. We explained how to point and select a constellation, how to fly to a planet and how to play a pre-recorded fulldome show. Most importantly, they did it all. We just coached them through the process. The kids also did the same in the exhibition area. They turned everything on as we were explaining the science behind each experiment.

The second day they explored their creativity learning more about constellations and creating their own figures in the sky with their own stories. The third day was about computer coding. We have small robots like rovers and we can control using block programming (similar to Scratch). After short lessons they faced small
challenges like going through a track. They built and launched water rockets on the fourth day. It is always a lot of fun and the water rockets also helped with the hot weather. Of course, the kids wanted to find out which rocket went the farthest. Finally, on the last day we staged a final competition with a series of board games and games on the dome identifying planets and constellations in the sky. It was our first experience and certainly we’ll repeat it. It was great! As we are in the university campus, we intend to include more people in the activities next year.

Mark Percy - Williamsville Space Lab Planetarium, Williamsville, NY, USA

My summer homework is to assemble resources for the total solar eclipse that is headed our way. Over and over, folks have talked about lessons across the grades and subject areas. It is time to get into the specifics...what lessons? What topics? Here are some resources that I will be diving into over the summer so that I can give our teachers a specific list of lessons to use with their students. I plan to share a more specific framework of lessons by grade level and curricular area after I get all my summer reading done.

The National Science Teachers Association (NSTA) has some great resources. They have an in-depth guide for educators, a brief guide for administrators, and handouts for family and friends. Those and the following are all available at [https://www.nsta.org/eclipse](https://www.nsta.org/eclipse)

- When *The Sun Goes Dark* by Andrew Fraknoi and Dennis Schatz This illustrated book for younger kids has an engaging story and hands-on activities.

- *Solar Science: Exploring Sunspots, Seasons, Eclipses, and More* by Dennis Schatz and Andrew Fraknoi is a more in-depth book about solar astronomy with dozens of hands-on activities.

- NSTA’s journal *Science & Children* for elementary level teachers had an article entitled “Preparing for the Eclipse: How to safely observe the Sun with young children” in the March 2017 issue. This fairly
brief article has several interactive activities to investigate shadows as well as suggestions for things for kids to do during the partial phases and totality. It has a nice table correlating the activities to the Next Generation Science Standards.

- Science Scope for middle school level included an article in March of 2017 about the eclipse. “The August 2017 Total Solar Eclipse: The Perfect Opportunity to Highlight Three-Dimensional Science Learning” is mostly about 3-D learning and moon phases. It also discusses eclipses and has a helpful table of standards.

- NSTA’s high school level journal The Science Teacher also featured solar eclipses in March of 2017 with a fairly brief article entitled “Total_Eclipse: The solar eclipse this August is an ideal opportunity to practice three-dimensional science learning.”

Steve Fentress, Director of the Strassenburgh Planetarium in Rochester, NY is also an author and an artist. Sky to Space: Astronomy Beyond the Basics is a fascinating book with hand drawn illustrations of a plethora of concepts including solar and lunar eclipses. There are some fairly deep science and mathematical concepts in the book, but each is explained in an easily understandable manner. Planetarians who work in cross-curricular situations will find great ways to work with math teachers to explain astronomical phenomena. Everything from simple concepts like how we see things to complex topics like determining the length of a saros is in this book.

Our local astronomy club, the Buffalo Astronomical Association hosted a talk by Gordon Telepun in December or 2022. Gordon shared two amazing resources that he has developed. Eclipse Day 2024, How to Observe, Enjoy and Photograph a Solar Eclipse is an e-book that has a treasure trove of ideas. For teachers, hands-on activities are explained in correlation with each stage of a solar eclipse. This is a must-read if you want to try to photograph the event. He is an experienced astrophotographer, and he shares countless tips and tricks for success. He also created an app that I will definitely be using on E-day called “Solar Eclipse Timer” which announces the arrival of each stage of the eclipse so that you won’t miss a second of totality.

I will also be doing my best to train as many local folks as possible how to conduct safe solar observation this summer. Solar Eclipse Deputy Training classes are filling up as I write this article!

✶ ✶ ✶

The week will officially wrap up with two evening events. The first, the traditional IPS Gala Dinner at ZENNER. The second, a farewell after party across the street at the historic Archenhold-Sternwarte (Archenhold Observatory) where attendees can celebrate and dance the night away where Albert Einstein gave his first public speech on his general theory of relativity!

We know you are going to fall in love with Germany, we are therefore also arranging a few post conference tours so you can stay a little longer! The Post-Conference Tours will be July 26-28 and will focus on astronomy in the past, present and future. Pick an era and travel through Germany to explore the subject that has brought us all together.

Not sure about coming alone? Bring the whole family! Germany is a great place for families to explore, and the conference is family friendly. We will be providing the Space Explorer’s Day Camp for children of conference attendees during the day so your kids can learn and play while you attend sessions. Our team will provide childcare and themed activities to keep kids of all ages entertained and active. Accessibility is important to us, and we want this conference to be as accessible as possible. The teams in Jena and Berlin are planning a conference that is inclusive, safe, and welcoming for everyone. We understand that part of this is financial accessibility, so we are working to keep the costs for participants as low as possible, including a special student discount. There will also be a limited number of scholarships available for those in need.

Information can be found at www.planetarium.berlin/ips2024, which will be updated with new information as it is available. You can also follow and keep an eye on the IPS website and social media channels for updates and information!

We look forward to being “United Under the Sky” with you all in 2024!

✶ ✶ ✶
Dear fellow planetarians,

The total solar eclipse of April 2024 will cross the North American continent, and preparations are already well underway. In Berlin, some important milestones have been reached for IPS 2024. Other special events have been planned and carried out on a diversity of topics, and new planetarium shows are being produced in staggering numbers across our society. You’ll find many good examples of this below.

For this section, I am indebted to contributions from Keith Davis, Amie Gallagher, Andrew Kerr, Andreas Schmidt, Alexis Delivorias and Loris Ramponi.

Let’s start this tour around the World by the Great Lakes.

**GREAT LAKES PLANETARIUM ASSOCIATION**

Planetariums in the GLPA report a return to pre-pandemic levels of activity and several planetariums announced new shows and new programs. Among the most significant events in the region was a successful conference in October of 2022, masterfully hosted in Buffalo, New York by the Whitworth Ferguson Planetarium and the Williamsville Space Lab Planetarium. GLPA’s 58th annual conference featured Dave Weinrich’s Spitz Lecture which reviewed his lifelong career of international collaboration with other planetarians and caught some luck with a last-minute shift to perfect weather for the post-conference tours of Niagara. The 2023 conference will be at an unusual time for GLPA. Instead of the usual meeting in the fall, GLPA will join other regional associations in the United States at the Stars for All conference in June. Co-host, Adam Thanz, reports that the conference will be hosted at Bays Mountain Planetarium in Tennessee, which is at the Bays Mountain nature preserve. The preserve is 3,750 acres and has a 44-acre lake with over 30+ miles of hiking. Themes for the conference are exemplified by the title of the conference, Stars for All. There is much news coming from the region; below is a selection of highlights.

Planetariums in the region have made the news in an exciting way lately. In Illinois, Chicago’s Adler Planetarium marks one full year of normal operation since their post-pandemic reopening and reports being the site of a CNN segment highlighting Dr. Katya Echazarreta as the first Mexican-born woman in space. In Rochester, Minnesota, Director, Ben Joslin, of the Mayo Planetarium was featured in the Post Bulletin for his weekly evening community education classes and is pleased to see so many people in his planetarium.

Dr. Jean Creighton of the Manfred Olson Planetarium at the University of Wisconsin-Milwaukee also reports good numbers with nearly 400 people attending their annual Open House. She is also proud to report the creation of a weekly series called Under African Skies in which an undergraduate from Tanzania and a graduate student from Algeria share their cultures, and a faculty member and musician will talk about Senegal. More than one GLPA planetarium is reporting presentations highlighting visions of the skies from beyond the midwestern US. University of Michigan’s Argus Planetarium has partnered with their University’s Center for Chinese Studies to celebrate the Chinese Lunar New Year with local people of Chinese heritage presenting Chinese stories and mythology. And in a note about non-English language presentations, the Stearkal Planetarium in Champaign, Illinois reports that their Spanish-language and sensory-friendly shows are reaching wider audiences thanks to increased promotional efforts.

Less happily, two of the region’s planetariums report damage to their facilities. The Elgin School District’s U-46 Planetarium experienced a water pipe burst, but fortunately there was minimal damage, and they did not need to stop classes. Sadly, damage was more serious at Youngstown State University’s Ward Beecher Planetarium when a fire occurred. Roofers using torches on the flat roof adjacent to the planetarium’s dome inadvertently caught the rafters above the dome on fire. There were 90 students in the planetarium at the time and everyone exited safely. The fire department quickly extinguished the fire, but the dome was opened to the outside and a significant amount of water entered the planetarium in the process. The staff (Patrick Durrell, Curt Spivey, Jill Mogg, and John Feldmeier) reports that Ward Beecher’s video system and optomechanical projector were undamaged, but the dome, speakers, and interior will need repair or replacement before presentations can resume.

In other sad reports, longtime GLPA member, David E. Parker (1944-2022), died on 28 December 2022 at the age of 78. David was GLPA’s secretary-treasurer from 1984 to 1997 and was the longest serving secretary-treasurer in GLPA’s history.

Returning to planetariums in the news, Mitch Luman, from the Evansville Museum’s Koch Immersive Theater and Planetarium, brought attention to the 8 April 2024 total eclipse at the Indiana State house by promoting a resolution that was read on the Indiana Senate Floor. Since Indiana is inside the path of totality, planning is underway throughout the planetariums in the state, preparing the public to experience the eclipse safely. Buffalo, New York will also enjoy totality as the April 8th eclipse goes right through downtown. Director of the Williamsville Space Lab Planetarium, Mark Percy, is leading monthly meetings of the Buffalo Eclipse Consortium to help local institutions make the most of the natural event. Mark will be leading a Solar Eclipse Deputy Training series (see below) to
create a corps of volunteers to help with multiple events across the region.

MIDDLE ATLANTIC PLANETARIUM SOCIETY

The centerline of the 8 April 2024 total solar eclipse goes right through downtown Buffalo, New York and the Williamsville Space Lab Planetarium is doing its best to get people ready for it. Director, Mark Percy, has been leading monthly meetings of the Buffalo Eclipse Consortium. Educators, museums, government representatives, and tourism agencies have been joining the group and learning about how to make the most of this incredible opportunity. Check out buffaloeclipse.org to learn more.

Mark will be leading sessions of his Solar Eclipse Deputy Training through the spring and summer. The class teaches participants safety guidelines and how to set up the various observation techniques. Each participant gets to aim a telescope, look through each of the types of solar filters, and set up devices like the sun funnel and the Sun Spotter. Simulations of the eclipse in the planetarium show folks what to expect and how the day will unfold. As this eclipse will create a demand for experts far beyond anything in the past, Mark hopes to train as many deputies as possible so that Western New York will have a corps of volunteers available for the many events that will be taking place on “E-day.”

Some good news to share is that most schools in Western New York have decided to give students the day off, including the Williamsville Central School District. The WCSD has also committed to a large purchase of eclipse glasses. Mark is hoping to have community viewing events at all three WCSD high schools. The eclipse occurs during afternoon dismissal time from school, so it is good to know that at least we won’t have the kids stuck on a school bus in the middle of a traffic jam during this once in a lifetime event!

PACIFIC PLANETARIUM ASSOCIATION

Andrew Fraknoi has revised and updated the guide to where educators can access astronomical images on the web. The new version includes 26 different sites where you can find high-quality photos or figures to show, including major observatories, on the ground and in space, and such consolidator sites as the NASA Photojournal, Astronomy Picture of the Day, and the relatively new AstroPix. The guide can be downloaded at: bit.ly/astroimage.

If you are looking for information and material to update your presentations with JWST milestones and results, you might want to view the recent public talk, First Results from JWST, that Alex Filippenko (U of California, Berkeley; winner of the 2022 AAS Education Prize) gave in the Silicon Valley Astronomy Lectures. He discusses the goals of the telescope, recounts its deployment, and talks about first results and ongoing projects. See: www.youtube.com/SVAstronomyLectures for the video.

An updated guide to plays about astronomers (with links to more details about each one), as well as a few films that are specifically about astronomers, can be found at bit.ly/astronomyplays. A detailed 2022 guide to scientifically reasonable science fiction stories and novels, organized by astronomy topic, can be consulted at bit.ly/astromyscifi. A number of the stories can now be found free on the web and links are given.

SOCIETY OF GERMAN SPEAKING PLANETARIA

In spite of restrictions related to the pandemic, the Berlin planetariums and observatories achieved higher attendance at their events in 2022 than ever before! A total of 411,335 guests visited the four facilities at the three locations of the Stiftung Planetarium Berlin. With 288,054 guests, the Zeiss-Großplanetarium achieved the highest number of visitors since the building opened in 1987, making it the most visited planetarium in the German-speaking world. The foundation also fascinated numerous people with astronomical topics outside of the three locations. In August, more than 4,500 people came to the Long Night of Astronomy at the former Tempelhof city airport, and the foundation team visited 4,003 kindergarten, elementary, and secondary school pupils across Berlin with the foundation’s own mobile planetarium dome, INTENSE, and inspired them on site.

Another milestone was announced in February of this year: the two millionth guest since the foundation was established. The Stiftung Planetarium Berlin was founded in 2016 to unite the capital’s astronomical institutions under one roof: the Archenhold-Sternwarte, the Planetarium am Insulaner, the Wilhelm-Foerster-Sternwarte, and the Zeiss-Großplanetarium.

The Wilhelm-Foerster-Sternwarte celebrates its 60th anniversary and looks back on more than 1.5 million visitors. Opened in the middle of divided Berlin, the Wilhelm-Foerster-
Sternwarte looks back on six decades of observing the night sky with more than 1.5 million visitors. It was opened on 30 January 1963 on the Insulaner rubble heap and, like the neighboring Planetarium am Insulaner, has belonged to the Stiftung Planetarium Berlin since 2016. Together, the two locations offer a combination of planetarium and public observatory in one place that is unique in Europe. The mediation of astronomical content and the offering of public guided tours for anyone interested, especially for school classes, has always been one of the observatory’s main goals.

The Wilhelm-Foerster-Institut began shortly after the end of the Second World War, was transferred to the association Wilhelm-Foerster-Sternwarte e. V. a short time later, and in 1955 received the refracting telescope, the 12-inch Bamberg refractor, on permanent loan. The refractor is still the main instrument of the observatory on the Insulaner. In the years that followed, it became apparent that the ruins were not suitable for the permanent operation of an observatory and, above all, for the large number of visitors. So, in 1961 the foundation stone was laid for a new observatory in Berlin-Schöneberg, which was officially opened in 1963. To this day, it inspires tens of thousands of visitors every year.

Legendary rock stars are to be found in the Zeiss-Großplanetarium sky. On 18 February, the Stiftung Planetarium Berlin, in cooperation with the radio station STAR FM, celebrated a particularly rocking premiere: Cosmic Rock, with the most emotional rock songs under the starry sky of the Zeiss-Großplanetarium. In Cosmic Rock, the audience experiences a combination of fascinating 360-degree, fulldome visuals, spatial surround sound, and a dynamic laser show. Crossing the dark side of the moon, in a matter of seconds the path leads to Mars, past massive black holes, and explosive supernovae. Rock classics from different decades, by Def Leppard to the Foo Fighters to Muse, make it impossible to sit still – and of course, Pink Floyd and David Bowie cannot be left out. Cosmic Rock is part of the successful Cosmic series by the Stiftung Planetarium Berlin, which takes its visitors through the spheres of space with different musical styles and impressive visuals. Other events in the popular series include Cosmic Movie Melodies, Cosmic Chillout, and Cosmic Jazz.

**EUROPEAN/MEDITERRANEAN PLANETARIUM ASSOCIATION**

**Greece**

The Eugenides planetarium in Athens has started the production of a brand-new digital planetarium show that was envisaged by its late director, Dennis Simopoulos, to honor legendary composer, Vangelis. The intention is that the show will be narrated by Dennis Simopoulos (using parts of some of his numerous public talks), whereas its soundtrack will be original and never-before-published compositions by Vangelis himself, offered to the Eugenides Foundation for this very purpose. The Eugenides Planetarium is also preparing to embark on another production on climate change and is currently putting the final touches on yet another digital fulldome production, Beyond Earth, which can be seen as a fascinating journey among the planets and satellites of the Solar system.

The Space Series sequence of short videos on various astronomy topics has been further expanded with the addition of Galactic Collisions, The James Webb Space Telescope, and Windows to the Universe.

Finally, it is worth mentioning that the Eugenides Planetarium will temporarily shut down in June for a major upgrade of its hardware and software, including the installation of new projectors, which will be detailed in the next Planetarian issue.

**Croatia**

In February, the Astronomical Centre Rijeka (ACR) organised a thematic, week-long program dedicated to the comet C/2022 E3 (ZTF) with two live planetarium shows, Small Bodies of the Solar System and Watch Out Comet!, as well as night sky observations in collaboration with the Rijeka Academic Astronomy Society. For the Carnival festive season, the ACR planetarium offered free entrance to the show, Stellar Game, for all kids wearing a costume. On Valentine’s Day, it screened GDP. Zeiss-Grossplanetarium: Pillars of Creation in the Eagle Nebula. Courtesy of SPB, Natalie Toczek.

the Romance Under the Stars live show, focusing on the ancient Greek myth of Perseus and Andromeda, an adventurous love story that is also a great opportunity to introduce the audience to these two great constellations. Also in February, and for the winter school holidays, the ACR prepared the thematic program, Humans in Space, which included the show Life in Orbit combined with a workshop for children on the various activities conducted by astronauts in space.

In February, the ACR organised a special program dedicated to asteroids and comets in collaboration with the Italian Association of Planetariums (PLANit) and the Observatory Serafino Zani. The program included an online presentation by astronomer Marco Micheli (ESA Near-Earth Object Coordination Centre) on the Dangers from Space and Stones from the Sky. Another presentation that was decided due to the 5.3 magnitude earthquake, which occurred on 16 February with an epicentre just 36 km southeast of Rijeka, focused on Civil Protection Actions in case of Earthquake in Croatia and How to evacuate from the ACR. The event was organised in collaboration with the Public City Fire Department and the Civil Protection Unit of Rijeka, the Italian Consulate General of Italy in Rijeka, the Rijeka Italian High School, and other bilingual students from Rijeka University.

With the aim of promoting nature preservation for the spring equinox and the International Day of Forests, the ACR organised the second clean-up of the park and forest around the planetarium in March, once again involving the local school, Gornja Vezica, and the City of Rijeka, along with cleaning and maintenance services. Also in March, and for the first time, the ACR organised a series of events honouring the World Water Day in collaboration with Rijeka water maintenance services, VIK. The events included public presentations of Croatian astronomer Korado Korlević on “Water in the Universe,” and astrophysicist Tomislav Jurkić (Rijeka University) on “Water on Mars.”

At the time of writing, the Astronomical Centre Rijeka is preparing its April special programs for the Dark Sky Week, the Earth Day, Gagarin’s Night, and The International Day of Human Space Flight. Regarding the upcoming Science Festival, the centre is currently preparing a new planetarium program on nature and society, highlighting the interaction between humans and the environment. For the same event, the ACR will prepare various planetarium shows for all ages, a quiz for children ages 11-14, a workshop in nature for 7-10 years old kids, a public debate on light pollution, and a public lecture by Croatian seismologist Krešimir Kuk. Finally for May, the Rijeka Astronomy Centre plans to participate in the activities for the International Day of Planetariums (6 May), the Pint of Science (22-24 May), and the Fiumare Sea Festival (25-31 May).

ITALIAN ASSOCIATION OF PLANETARIA

The Two Weeks in Italy competition was conceived in 1995 on the initiative of the Serafino Zani Observatory and the Itinerant Planetary Committee of the International Planetarium Society directed by Susan Button Reynolds. Since then, it has been held annually, except in the last three years due to the pandemic. Beginning in 2023, the Two Weeks in Italy is open to collaboration not only from the traditional cities involved in the initiative, like Perugia, Assisi, and Brescia, but also in other Italian sites associated with PLANit (Association of Italian Planetariums) which, together with Starlight, Un planetario tra le dita (A Planetarium between the Fingers) of Perugia, supports the project. The American teacher who is selected every year takes part in a trip to Italy, during which they carry out astronomy lessons in English in various places across the country.

The stops on the 2023 tour were as follows: Perugia and Assisi (Starlight, A Planetarium between the Fingers), Amelia Planetarium (Terni), Ravenna Planetarium, Serafino Zani Observatory in Lumezzane, and Torre del Sole (Brembate di Sotto, Bergamo). The American teacher featured in this year’s edition was Andy Kreyche (Santa Cruz, California), of the Santa Cruz Chapter - International Dark-Sky Association who promotes the Dark Sky Parks, an activity for which the Serafino Zani Observatory has particular interest. Thirty years ago, in the year of its foundation, the Lumezzanese Observatory created the Parks of the Stars, which promote astronomy observation activities in protected natural areas of Italy. These are territories that protect not only fauna, flora, and landscape but also the dark at night, thus guaranteeing future generations - especially in densely populated countries - suitable sites for discovering what the starry sky really looks like.

The photos below depict the event that took place at the Odeon Theater in Lumezzane. Several students from the second, fourth, and fifth grades of the Liceo Moretti in Gardone Val Trompia were present with their teachers, whom Andy Kreyche involved in the interactive lesson entitled Human Orrery. The children, who represented the main bodies of the Solar System and their movements as “actors,” are the ones who have been following the monthly webinars of interactive

(Continued on pg. 38)
THE COMPREHENSIVE SHARED REALITY SOLUTION

CX SYSTEM

CX DISPLAY
CX Display is the world’s first and only Software Defined Display. It brings content to life like never before by wrapping guests in an immersive LED dome with best-in-class resolution, brightness, contrast, and lifespan.

CX ENGINE
CX Engine is part of a suite of software applications for producing and presenting immersive experiences and Shared Reality Events. Equipped with unmatched content creation and image processing capabilities, CX Engine is the most versatile immersive experience engine in the market.

CX REALTIME
CX Realtime is an additional 3D production utility that fully integrates Unreal Engine for optimized playback and synchronization across any immersive display geometry. Built on CX Engine, CX Realtime allows users to generate custom interactive content relevant to their audience and access a robust developer ecosystem.

DIGISTAR 7
Digistar, the world’s most advanced planetarium system, is built on top of CX Engine and places an entire universe of content at your fingertips. From free-flowing live, interactive, and scripted presentations to realtime astronomy simulations, Digistar’s intuitive user interface and production environment will fit any organization’s needs.
See the difference yourself, and visit the Experience Center in Salt Lake City.

COSM.COM
@EXPERIENCECOSM
One often doesn’t know where the idea for a column article will come from, and this one was no exception. Actually, it started out after a chance encounter on the main street, Hamngatan, of our island town of Vaxholm.

I was heading away from the southern harbor area toward the center of town, on my way to one of two local grocery stores. There was someone else on the opposite side of the street going in the opposite direction from me. We both stopped, looked across the street at one another, no doubt thinking we were seeing someone we knew. Our winter attire was probably, in part, what made for the uncertainty. In fact, he was a former colleague I had known for over three decades: Ulf Hultberg.

Ulf crossed the street and came up to me, we shook hands, and exchanged greetings with one another. I hadn’t seen him around town since probably last autumn. He, as it turned out, was on his way to the sports clothing store directly behind where I was standing. By now some of you are probably thinking, “That’s nice,” or even “So?” Fact of the matter, this person was one of those who played a major part in the building of Cosmonova. Known then only as the Stockholm Omnitheater project, it’s the largest domed theater in Sweden, and at one time, one of the most modern planetariums in Europe.

Our construction project, like others they managed, had two main teams. One was responsible for the building itself, while the other answered for what went into it. In this case, Håkan Håkansson headed up the former, and Ulf Hultberg, my friend I met on the street, headed up the latter.

The very first meeting I officially participated in after my arrival was in the medium-sized construction trailer serving as the project office located on the Museum grounds. The construction team had received a very detailed list from the dome-manufacturer, Spitz, of both tools and supplies to be on hand for their part in the installation. While it wasn’t scheduled to take place for a while, the SFV crew wanted to be sure they had everything on hand well in advance. We—SFV personnel, Håkan, Ulf and I—sat around a long table inside the trailer going over Spitz’s list together. Everything seemed to be well in hand, but there was one thing that they couldn’t figure out. Included on the list was that we were to provide a supply of “lint-free cloths.” This was something unfamiliar to them. Once I realized what it was and what it was for (rags that wouldn’t shed lint fibers when used to wipe down the installed panels of our 23m powder-coated dome), everyone was both relieved and glad it was such a trivial item. They went and bought some luddfria dukar; the last thing missing from the list.
The restored Vasa inside of its climate-controlled museum in Stockholm. [Source: Wikipedia, photo by L-BBE, with usage under CC BY 3.0]

If you grew up in the 1960s, you have no doubt heard about the recovery of the 17th century warship Vasa in the waters of downtown Stockholm. Downtown Stockholm. Unlike most world capital cities, Stockholm was built on a group of 14 islands, so there are extensive bodies of water everywhere. One of the nicknames for the city is “Venice of the North.” There are all manner of ferries, yes, but Venetian gondolas, no.

The Vasa sank on its maiden voyage on August 10, 1628, in front of a large crowd of hundreds, if not thousands, who had assembled to watch the spectacle of it leaving port. They got a spectacle of a completely different kind instead. As it was extremely top heavy and had multiple rows of gun ports open (some dangerously close to the waterline), it became unstable. Strong winds caused it to tip. Those small openings in the sides of the hull, and it being top heavy, didn’t help matters. Water streaming through the lower gun ports made it even more tipsy as the ship’s center of balance shifted. The brand-new warship fell over and went to the bottom after only sailing some 1,300m (1,400yd) from its mooring.

The loss today would be the equivalent of a modern nuclear-powered aircraft carrier, with its complement of aircraft onboard, sinking on its shakeout cruise before it even cleared its harbor. In 17th century terms, it was a tremendous loss financially, militarily, and politically. Crewed by 145 sailors and 400 soldiers, at least 30 perished in the waters of what’s known as Tegelviken. Its valuable bronze cannons were recovered at the time, but the wreck lay there in 32m (105ft) of water mostly forgotten. That is, until it was rediscovered in the 1950s.

Long story short, the ship was raised in 1961 and put into a temporary shelter where it started to undergo preservation and archaeological recovery. Thousands of 17th century items were brought up as well as the skeletal remains of 15 crew members. You can “meet” some of them face-to-face in modern forensic reconstructions based on their skulls at the Vasa Museum, which opened to great acclaim in 1990.

Which brings us back to Håkan and Ulf. The former was responsible for the building of the Vasa Museum building, and Ulf was responsible for what went inside. This was particularly important, as this 17th century ship is the best-preserved example of its kind in the world. One reason is because of the special environment it is housed in. Not only is there controlled lighting, which would be expected, but the humidity (53%) and temperature (18-20 °C/64-68 °F) of the air is constantly monitored and adjusted to keep both at the optimal range for the good of the ship. This includes taking into account the moisture added to the air from the exhaled breath of the visitors inside. To enter the exhibit area of this Museum, the most popular in Scandinavia, you have to go through a set of double doors, which help keep the interior environment isolated from the outside world.

Cosmonova’s Head Technician, Björn Hedén, and I were talking with Ulf Hultberg one day on our site and he told us about some things from the Vasa Museum installation. One of the things he mentioned was a certain place you could go in the building. From this place, one can actually crawl underneath the Vasa’s keel, which runs bow-to-stern along the centerline of its hull. We were going to go do it with him once our project was complete, but we were so busy after opening that the chance never materialized. Who knows, maybe one day. The ship is, after all, still there.

Håkan Håkansson and his team finished the construction of the Omnitheater building and they moved on to their next scheduled project. This was the restoration of Drottningholm slott, the royal palace outside of Stockholm, where the royal family currently lives. Contrary to popular belief, they do not reside at the large one in the Gamla stan (Old Town) part of the city. Nowadays, that one is used more often for special, ceremonial events. Following Drottningholm, after achieving the crown jewel of his career, Håkansson was to retire.

While Håkan went there, Ulf’s team dug in and started doing all the installation work on the interior of the Omnitheater building. Their task was to bring the empty shell to fruition as a finished, operational theater.

Fortunately, our environmental requirements were not as strict as those of the Vasa Museum, but they are out of the ordinary. Temperature and humidity are controlled in order to minimize the appearance of the
beams of light from the projectors and the ventilation system was designed to ensure positive air pressure inside the theater. This is an integral part of the building’s design to keep light-reflecting dust and other airborne particles out of the air. When you come through the double doors into the theater, a slight breeze blows past you (caused by the positive pressure) and flicks any such particles you might have on your clothing off. If a visitor isn’t paying attention, they might not even notice it’s happening. The air intake vents for the theater’s ventilation system are located on the vertical front surfaces of the carpeted wooden risers that hold the rows of stadium-style seating, because the dome is tilted 30° for Omnimax (now called Imax Dome) films. After going through the central ventilation system’s filters, the air is blown down from vents high over the audience, and through the usual perforations in the aluminum dome. This, in turn, pushes any particles still remaining in the air down to the carpeted floor below, which is vacuumed daily.

The SFV installation crew were fanatical about these details because it was a national building project. I will recount just one thing that surprised me after having been on some other planetarium construction sites in the States. The Fiberglas insulation on the interior walls behind the dome had been installed before the speakers for our 6.1 channel Sonics Associates sound system had been installed. As they were being mounted on the dome’s own framework, there were some places on these insulation panels that got dinged in the process. Normally black, there were now parts lighter-colored from where the surface had been scored, or completely gouged away in places. Prior to coming to Stockholm, it had been my experience that someone usually went up behind the dome and “hit” those damaged spots with a can of black spray paint. Problem solved. This would not do for Ulf’s crew. They literally came in, removed entire panels of Fiberglas insulation, and replaced them. That interior wall at the front of the theater where the speakers were behind the dome was as pristine as when it was first installed before the audio system went in.

After the now-named Cosmonova opened, Ulf went on to another project, though I never heard what it was. We, the staff, had a brand-new theater to figure out how to run to its best abilities (i.e., busy, busy, busy). Ulf and I eventually retired, but he did so some years before I did. We continue to run into one another from time to time in our little island town, just like we did the other day. As it turns out, we also bumped into one another in the grocery store just minutes later that same day. He had gone to the sports store to see his grandson and ended up needing to buy a few things where I was. I had been in the sports store the
We take pride in having recently installed the first observatory in Bangladesh at Rajshahi Novo Theatre. The complex, which includes a planetarium, observatory, 4D theatre, and large science exhibition, is scheduled to officially open later this year.
Spotlighting One of Our Own:

I asked Jack Northrup, a longtime friend and colleague, to tell me a little bit about how he weathered the pandemic and where things stand now with his mobile planetarium business. Here is how he managed to survive.

Jack wrote, “In the spring of 2021, I was struggling to find places where I could set up my portable planetarium system and still meet the local Covid procedure expectations. I wasn’t having a problem with cutting my group size to 6 from a single family as, at that time, most families were happiest booking a show with just their family, but the struggle was finding a place to set up. I was using a local veteran’s hall that was mostly shut down because they were set up for large groups and didn’t really have a plan for small groups and many of their members were couples with adult children who did not live at home. In February they told me they were cleared to start having activities again and I wouldn’t be able to set up there anymore. I started looking at commercial sites to rent on a year to year basis and found that of the 25 small spaces that would fit the footprint of the dome only 2 had ceilings over 8 feet. I had been really hoping for a stall in the mall but the ceilings were just too low. The two buildings with taller ceilings were in buildings from 1870 and 1905 respectively. The building from 1905 was in lovely condition but unfortunately had chandeliers that would have done some damage to the dome. The building from 1870 was originally a general store with high ceilings, for the storing of hay, that would work great with the dome. It only had 2 parking spaces in front and a small lot down the block, but with such small audience sizes I wasn’t concerned.

I signed the lease and started to move in. I knew I wouldn’t be there forever, but I was thinking I might be there for a while until protocols, or the health climate, changed. I had space for the dome, a small production area, and exhibit space. When I first moved in, I continued to use the video intercom from my small groups at the veteran’s hall. I would sit in the production area and monitor the family or couple in the dome. I wore a microphone so the audience in the dome could hear me. Slowly, protocols changed so I was able to be in the dome with the audience if they wanted and later my audience size grew from 6 to 12 people. These larger groups were nice as it increased the number of shows at the storefront, so while it wasn’t turning much of a profit it was paying its own rent. Tickets were purchased for shows ahead of time and there were some groups that liked to bring snacks to their bookings. A personal favorite of mine was a grandmother, who is a professional storyteller, asked for the planetarium to show the night sky from a forest with a digital bonfire. Her son and daughter-in-law were running a *s’mores station in the exhibit space for the grand kids. (*A s’more is a confection consisting of toasted marshmallow and chocolate sandwiched between two pieces of graham cracker. S’mores are popular in the United States and Canada, and traditionally cooked over a campfire.)

In October of 2022, I noticed a shift in the bookings for the planetarium. I was able to have 18 people in the dome at one time and was starting to get more bookings on the road than at the storefront. During November and December, the shift became larger as I was more easily getting back into my old setup locations, and when I was balancing the books. I found that the on-the-road shows paid the rent for the storefront. In my mind, if the storefront wasn’t pulling its weight, then it was time to let it go. I notified my landlord of the plan to move out at the start of March. It was quick packing things back up, as that is the way of life for a portable planetarium system, and I switched back to 100% mobile again.”

Science Dome:

Neil Carrington (founder of Science Dome UK and Science Zone UK) wrote on LinkedIn, “Our Science Dome has an amazing workshop called “Rock and Fossils” which covers plate tectonics in a planetarium dome and handling different rock types in a typical school session. They travel around the U.K. with an educational workshop on Earth science with real fossils and dinosaurs’ bones to hold and then show a visual rock/volcano or dinosaur show in an inflatable 360 dome.”

Email: neil.carrington1@ntlworld.com

Planetarium on the Go:

In Greece, a team of 4 professionals (Nicolas T. Matsopoulos, Theofanis Matsopoulos, Konstantinos Sakkas, and Christos Sakkas) offer experiences with a mobile planetarium called “Planetarium on the Go.” They provide planetarium shows inside the dome and telescope observations outside the dome. Their website explains, “Planetarium on the Go is a 6m, semi-permanent, fixed dome structure with chairs for the spectators. Its main feature is the high-quality, 57 square meters projection area. It can be set up both indoors or outdoors and it is air conditioned, with heating during the winter and cooling during the summer.”

Planetarium On the Go: [Visit Website](https://www.astrotours.gr/)

Touch the Stars:

The staff at the Orion Planetarium, located in Northeast Florida, recently announced that they are successfully using the tactile images in the book Touch the Stars as part of their accessibility programs for Blind and Visually Impaired visitors. (Touch the Stars is available through National Braille Press! [Visit Website](https://www.nbp.org/ic/nbp/TOUCH.html)).
The team is currently testing a planetarium show for blind, visually impaired, and low vision guests. On their Facebook page they explained that the show uses tactile sky guides, sonification (the art and science of converting data into sound), smells of space, and more. They are excited to report, “Best of all it will be FREE for any planetarium who wants to use it. We are working with a team of over a dozen members of our community who are blind or partially sighted to make sure this works and that their needs are addressed. In addition, our team is collaborating with two fixed planetariums to create a show that is usable across different planetarium styles. To learn more, send an email to jlutin@SpaceTravelDome.com

The UCLA Planetarium (University of California in Los Angeles) also makes Touch the Stars part of their accessible planetarium program. For more information, read this article: https://astrobites.org/2023/01/24/touch-the-universe-hear-the-universe/”

Fulldome Content:

After receiving inquiries about low cost, fulldome content, Mario Di Maggio, director of 360° Digital Planetarium Experiences, let me know that although his company, Immersive Experiences, does not create fulldome content, it has compiled a comprehensive list of all the free fulldome content currently available. This is provided for small dome operators like us all (with tiny budgets, struggling to survive after the pandemic school closures) can find free, quality content to show our audiences. The British Fulldome Institute (BFI) list includes FREE Educational Content Available, FREE Artistic Content Available, FREE Fulldome Content Available Directly from Producers, AFFORDABLE 4K Solar System Educational Animations, and AFFORDABLE Image Sequence Scanner for Windows and macOS. Email: mario.dimaggio@gmail.com

Derek Demeter, planetarium director and content creator at the Emil Buehler Planetarium in Florida, also shared, “I will always share my fulldome videos and photos for free to all planetarians to use. I am actually investing into some new camera gear and tech that will allow me to do more.” Email: demeterd@seminolesstate.edu

If you still want more content, you can rent and stream fulldome movies using your web browser through Fulldome OnDemand (it might save you some money).
https://www.fulldomeondemand.com/

The portable planetarium webpage is a great place to post information about what the industry has to offer to us. I encourage vendors to email me about their ideas and/or current offers. I am compiling a list of the distributors who are willing to help us form consortiums that can afford their films (like the content producer Hubblo https://hubblo.ca/en/) or can provide some other way to help (like Creative Planet’s Magic Globe free assets https://creativeplanet.pl/en/magic-globe-free-fulldome-assets/). I will also post a link to Mario’s list on the webpage.

Worldwide Mobile Dome Zoom Meetings:

On March 31, eleven colleagues from six different countries met, via zoom, to discuss our concerns and ideas. After introducing ourselves, we discussed the myriad of resources and opportunities that are available on the IPS website, https://www.ips-planetarium.org/, especially portable planetarium news, resources, and even how to build your own planetarium, at https://www.ips-planetarium.org/page/portablecom. Under the tab “Get Involved,” folks were encouraged to learn about the many IPS Global Projects with opportunities for travel, contests, and content that can be used for programming. Under “Publications,” Planetarian archives can be accessed and, beginning with the December 1990 issue, the “Mobile News Network” column can be found with many tips, tricks, and news.

Next, we discussed the many opportunities to celebrate the centennial of the planetarium, which can be found at https://planetarium100.org/. For the 2024 IPS conference, we would like to present the history of portable planetariums; any information that you can supply would be greatly appreciated.

We will have another zoom meeting on Saturday, May 13 when we will discuss, among other topics:

• Available resources for mobile domes
• Ways in which the International Planetarium Society, other organizations, and companies can support mobile planetariums
• Ideas for mobile operators to integrate the Centennial of Planetariums celebration into their presentations
• Analyze the need for better fulldome content when applicable, and feasible ways to get it
• Best practices: what has worked (and what has not)
• Plans for regular updates and meetings among mobile dome operators around the world

Note: You don’t need to be an active member of IPS to attend our meetings. We will provide a Zoom meeting link for everyone who is interested. We will post more meetings through social media and the IPS Communicator.

✶ ✶ ✶
I don’t know about the rest of you, but 2023 is passing by in a blur for me. As I type this in late April, I can hardly believe that LIPS (Live Interactive Planetarium Symposium) 2023 is not even five months away! In this column I will share with you the general plans for LIPS 2023.

First, the basic information:

LIPS 2023 will be hosted by the Michigan Science Center (MiSci) in Detroit, Michigan USA.

It will take place Tuesday through Thursday, September 12 through 14. Tuesday and Wednesday will run from about 9am to 6pm, and Thursday will run from about 9am to 3pm.

The registration fee will be a very affordable $175 US for members of the International Planetarium Society (IPS) and $190 US for non-IPS members. Registration includes lunch and morning and afternoon break food and beverages.

We will do an opening event the evening of Monday, September 11, with heavy hors d’oeuvres and non-alcoholic beverages.

The attendance cap will be set at 60 people. The cap allows us to have just a single session track, meaning that everyone attends all sessions together. This results in a cohesive group dynamic by the end of the symposium, one of the key aspects that separate LIPS from other planetarium conferences.

If you’ve ever met Paulette Epstein, our main MiSci contact, you know she’s always working on many things at once. When I asked why she agreed to take on hosting LIPS 2023, Paulette told me, “The Michigan Science Center is excited to host LIPS 2023 because live and interactive programming is integral to the things we do at the museum. Time and time again, we get comments from guests about the interactions they have with staff in the museum and how it sets us apart from others. We are looking forward to sharing ideas and learning more about having our live, interactive programs pop!”

Another huge thank you to Paulette for her past, current, and future work
as LIPS 2023 host! We will have other MiSci staff joining us throughout LIPS. I hope the LIPS experience will be a beneficial professional development opportunity for MiSci staff.

**What’s on the agenda for LIPS 2023? Here are some of the highlights:**

We’ll have the whole museum to ourselves since MiSci is closed to the public during the week of LIPS 2023. We won’t be able to do shows for public audiences as we’ve done at the past two in-person LIPS, but it also means that we can use any of MiSci’s many fantastic meeting spaces at any time—no scheduling conflicts to worry about. This is a level of freedom we’ve not had since Digitalis hosted the first LIPS in 2011, and I’m looking forward to it!

As noted above, there will be an opening event the evening of Monday, September 11, with heavy hors d’oeuvres and non-alcoholic beverages. We did an evening event at LIPS 2022, the first in-person LIPS since 2019, and it was so much fun that we’re doing it again this year.

We’ll kick things off the first morning with an improv workshop from one of Detroit’s several improv troops. This particular improv troop has done workshops in the past at MiSci, so they understand the skills science educators need and the exercises that will help us develop/refine those skills. I know we’re going to have a lot of fun during this workshop as well as learn strategies for being comfortable going where the audience wants us to go.

Those of you who attended the first two LIPS (2011 and 2012) may recall that we had improv workshops at those symposia led by John Kaufmann, a former supervisor of Pacific Science Center’s Willard Smith Planetarium and an improv performer with Seattle’s Jet City Improv. I’m glad we are, again, offering this type of performance skills experience at LIPS 2023.

Once again, we’ll have sponsor participation at LIPS 2023. The role of sponsors at LIPS is quite different from other planetarium conferences. In case you’ve not (yet) attended a LIPS, let me spell out the main sponsorship differences.

There is no exhibit hall. This allows sponsor representatives to fully participate in all LIPS sessions. Sponsor representatives can even propose to lead sessions if they desire.

We limit the number of LIPS sponsors to 10. This ensures that the conference schedule has enough time for a high number of sessions presented by non-sponsor attendees.

There is only one level of sponsorship, so all sponsors get the same benefits. For LIPS 2023, the sponsorship fee will be $450, which includes one registration.

LIPS sponsor demonstrations emphasize how their product(s) can be used for live, interactive programs.

You can learn more about LIPS sponsorship at: [https://sites.google.com/view/lipsymposium/sponsors](https://sites.google.com/view/lipsymposium/sponsors)

I’ll be keeping the LIPS website as up to date as I can with new information and plans: [https://sites.google.com/view/lipsymposium/home](https://sites.google.com/view/lipsymposium/home)

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 ✶ ✶ ✶.
International News (con’t.)

Astronomy lessons in English for a couple of years by another American teacher, Professor Kevin Milani, who in turn took part in the educational project of the Serafino Zani Observatory in 2018. “The activity, Human Orrery,” describes Andy Kreyche, “uses individual students to portray the Sun, Earth, and the three other planets of the inner Solar System, demonstrating their orbital motion, but also going into greater detail to show the Earth’s daily motion, thereby emphasizing our perspective within the broader model.” Planetarians who wish to be involved in the 2024 edition of the Two Weeks in Italy are invited to forward their request by writing to segreteria@planetari.org.

The end of March, as is every year, was the deadline to participate in the 2023 Planit Prize devoted to video production, in particular a fulldome show. The competition is open not only to the Italian community, but the participants must be members of Planit. The association is open to anyone in any country. The target audience for the videos are students from II to 14 years. The subject is open to all astronomical topics, of course. The first prize is 500 euros. Subscriptions are always open (50 euros). For information, write to walter.riva@gmail.com.

The videos and the authors of the 2023 issue were The Space Regata by Emanuele Balboni, Infinito Planetarium (Turin). The commentary of the fulldome show described the competition between three spaceships that had to reach 7 stages, each of which offered the opportunity for an insight into a different celestial body or area of the sky. Santa Klaus is coming to plan by Michelangelo Rocchetti, Museo del Balì (Pesaro and Urbino) is a video dedicated to the celestial myths of Lapland and to astronomical contents concerning the position of Polaris at the North Pole, the circumpolar stars, the long nights of the Arctic, and the northern lights. At the beginning of the show, it is easy to recognize that the narrator is Santa Klaus, even when the speaker gives this information at the end of the projection. The Fundamental Building Blocks of the Universe - The Galaxies by Paolo Calcidese, Valle d’Aosta Astronomical Observatory, is the third film presented in the competition, also suitable for a demanding public who expects insights of astronomical interest above all. In fact, it was the one richest in astronomical information among the three videos. At the time of writing, the winner and motivations for that choice are not known but will be announced at the National Meeting of Italian Planetariums in Ravenna (late April) and published on www.planetari.org.

14 October will be the first National Day about light pollution organized in Italy since 1993. Planetariums are involved through special events, public projections, and astronomical evenings. National Day takes place each October on a Saturday close to new moon.

✶ ✶ ✶

IAP. Andy Kreyche’s Human Orrery lesson in the Odeon Theater in Lumezzane, Brescia. Courtesy of Luigi Cocca.
week before but had no idea that the
tall, blonde teenager behind the counter
was related to Ulf. Which makes me
think that I must have met that kid’s
own father back in early October 1992.
We hosted a special sneak preview for all
the construction and installation crews,
along with their families, who had
worked on the project. This took place
about a week before the official grand
opening on the 13th. But that, and the
premier, are stories for another day.

Postscript: In December 2021, the
wreck of a 17th century warship was
found on a survey dive off the tip of
Rindö, the island we live on. The Vasa
had three sister ships: Äpplet (the Apple),
Kronan (the Crown), and Scepter. None
of them had been built by the time the
Vasa sank, but they certainly learned
from the mistakes made in its design
when they were.

As it turns out, the marine
archaeologists from Vrakmuseet (the
Wreck Museum) found the first of
these, which they confirmed in October
2022. This came about partly through
dendrochronology by studying the
growth rings in some of its wooden
beams and comparing them to those of
the Vasa to figure out when and where
the trees were originally cut down in
the 1620s.

Launched in 1629, Äpplet had better
luck than Vasa. It served at sea during
the Thirty Years’ War, which lasted from
1618 to 1648. One of the operations it
was involved in was the 1630 ferrying of
Swedish troops to Germany, an ally, in
this war against Roman Catholic forces
in continental Europe. In 1658, this
ship sustained sufficient damage. It was
considered to be too expensive to repair
and was declared a write-off. After three
decades of maritime service, Äpplet
was purposely scuttled close to Rindö.

The intention might have been to use
her as a submerged barrier to prevent
enemy ships from passing through the
Oxjudupet strait between our island, and
neighboring Värmdö to the east.

Outside of Vrakmuseet, no other
plans are known to be in the works
for continuing to study what remains
underwater of Äpplet besides for
protecting it as an archaeological site
with restricted access to divers.

✶ ✶ ✶

Tales from Dome Under (con’t.)

As it turns out, the marine
archaeologists from Vrakmuseet (the
Wreck Museum) found the first of
these, which they confirmed in October
2022. This came about partly through
dendrochronology by studying the
growth rings in some of its wooden
beams and comparing them to those of
the Vasa to figure out when and where
the trees were originally cut down in
the 1620s.

Launched in 1629, Äpplet had better
luck than Vasa. It served at sea during
the Thirty Years’ War, which lasted from
1618 to 1648. One of the operations it
was involved in was the 1630 ferrying of
Swedish troops to Germany, an ally, in
this war against Roman Catholic forces
in continental Europe. In 1658, this
ship sustained sufficient damage. It was
considered to be too expensive to repair
and was declared a write-off. After three
decades of maritime service, Äpplet
was purposely scuttled close to Rindö.

Launched in 1629, Äpplet had better
luck than Vasa. It served at sea during
the Thirty Years’ War, which lasted from
1618 to 1648. One of the operations it
was involved in was the 1630 ferrying of
Swedish troops to Germany, an ally, in
this war against Roman Catholic forces
in continental Europe. In 1658, this
ship sustained sufficient damage. It was
considered to be too expensive to repair
and was declared a write-off. After three
decades of maritime service, Äpplet
was purposely scuttled close to Rindö.

The intention might have been to use
her as a submerged barrier to prevent
enemy ships from passing through the
Oxjudupet strait between our island, and
neighboring Värmdö to the east.

Outside of Vrakmuseet, no other
plans are known to be in the works
for continuing to study what remains
underwater of Äpplet besides for
protecting it as an archaeological site
with restricted access to divers.

✶ ✶ ✶
A DIFFERENT POINT OF VIEW

A LITTLE BIT OF EVERYTHING

So, what is a planetarium?

I guess we all have our particular answer to this one. From my warped perspective, it is that zenith of clock-making that sits in the center of the room and silently turns its projectors and gears to project the night sky. Certainly, it deserves a circle of seats around it for people to fill and pay their respects to the machine god/ant/Mars artifact. THEY are the real planetariums.

Now, I’m not about to resurrect the age-old disagreement between the classic planetarium and the newer digital dome: they both do what they do and do it to expectation. My love of the classic dumbbell projector goes back to my youth growing up in Chicago and seeing that giant Zeiss II/III machine for the first time in the center of the room with all the seats around so all could pay homage.

Yes, my love for the night sky started with a love for that strange collection of projectors in the center of the room. The love for what they projected came later. So much of the over-three-quarters-of-a-century that I have spent on this globe has been spent lusting over pictures of this most unique device. Most of you know where I ended up.

But I can’t help but wonder what the average person considers a planetarium to be. I have had a fair number of comments from visitors to my shows that it is, “A real planetarium.” This thought is probably generated by remembering their first program when the device in the center of the room was more prevalent. Obviously, I have my own bias and am happy with this fifty-year-old technology as I am confident it will probably last another fifty years, which means it will probably outlast me. What I find interesting is that my visitors are happy as well. I know this because they come back and bring friends.

Another thing that I find interesting is that the projector that has been rented from Owen Phairis’s Planetarium Projector and Science Museum (http://planetariummuseum.org/) virtually exclusively to the film and TV industry is a Minolta IIB projector. To most people, it looks exactly like the Zeiss II - VI, the design of which says “planetarium.” Since I am running a machine of like design, I can tell you that it is indeed literally a half scale model of the famous Zeiss. Perhaps these movies and TV shows will help extend the myth of the dumbbell projector as a true planetarium and, who knows, perhaps more and more will come back. After all, it happened with vinyl records.

Keith’s Captured Quips ~ Chapter Twenty-Three
• “P.S. I like space now.”
• “Will you teach me more?”
• “P.S. I believe some guy named Isaac Newton was a gravity scientist.”
• “P.S. The reason my card has a blue stripe on it is because my friend did that.”
• “I loved your presentation. But I still believe in Aliens!”

10 years ago (June 2013):
Are Planetariums Driven by Their Technology or by Ideas? A guest editorial penned by Philip Groce gets to the core of the planetarium dilemma. “From the very beginning, when Zeiss made the first optical-mechanical planetarium, what we taught and showed our public audiences was determined by the technology or the tools that were made available to us.” He goes on to say, “The unwritten rule was, if we couldn’t show it, we didn’t present it.” When we added some of the simpler special effect projectors, like slide and movie projectors, it added ways for us to present more information. It was “the golden age of planetariums,” a time when ideas were supported by the technology we had. With the new full dome shows, “too many of these fulldome shows are being produced by vendors and too few by end-users. In reality, we have not really advanced much since the days of Spitz projectors. We still only present the ideas that we can illustrate or, sadly, the fulldome shows we can afford. Unfortunately, many of those ideas presented in fulldome movies are not your ideas but those of production houses.”

The one-hundredth anniversary of the Atwood Sphere was ten years ago. Dr. Marvin Bolt of the Adler Planetarium tells the story of the resurrection of the device. Now, ten years later, I would like to see the rebuilding of the original Zeiss II/III projector that was found a few years ago. But rather than just putting it on display in some dark hallway, let’s get it working like the old Atwood Sphere. It could be rolled into the main dome on its railroad-type wheels and actually give a show once a week or so. One can dream, can one not?

25 years ago (June 1998):
For those of us who still use slide projectors, Richard McColman provides us with an in-depth report on how to fix circular slide trays and when they are beyond redemption. I’m sure there are many out there who could use this refresher course on these workhorses.

Jane’s Corner offers us the following question, “How many ears has Mr. Spock?” Are you really ready for this... OK, you asked for it... “Three! A left ear, a right ear, and a final front ear!”

Let’s move on. Oh, one more, why not. “Why do space men like Mars Bars?” “They are getting sick of Milky Ways.”

45 years ago (June 1978):
Jeanne Bishop gives us, “Bird Orientation from Celestial Clues: Some Suggestions for a Planetarium Program.” You must take the time to read this, who knows, you might just want to perform in your planetarium.

(Continued on pg. 50)
We Are Storytellers, Curators, and Innovators

Cosm fosters the art of fulldome filmmaking and the immersive creator ecosystem.

See what we’ve been up to.
Jan Hendrik Oort, Master of the Galactic System


Reviewed by James Sweitzer, PhD, Oak Park, Illinois, USA

For the first half of the 20th Century, interstellar dust obscured a full view of the Milky Way Galaxy and made charting its structure a game of blind man’s bluff. Fortunately, Jan Oort was in that game for the long haul. This tireless Dutch astronomer, whose life spanned most of the century, would reveal more galactic astronomy than any of his contemporaries and possibly more than Edwin Hubble and Harlow Shapley combined.

The son of a physician, Oort was born in 1900 in Friesland, the Netherlands, mere houses away from Eise Eisinga’s dining room planetarium, the oldest working planetarium in the world. Jan, however, would never see it. By the time he was three, his family had moved to Leiden, a city that would remain his home base throughout his long life. Jan would eventually complete his education in Leiden at Groningen University where the inspiring teaching of Jacobus Kapteyn led him to change his major from physics to astronomy. Upon graduation, he worked at the Leiden Observatory and would eventually serve as its director from 1945-1970. A tireless researcher and writer, he contributed to or wrote more than 300 scientific papers, 81 published in his retirement between the ages of 70 and 92.

Jan Oort’s most significant research followed directly on the heels of that of his advisor, Kapteyn, who measured the stellar galactic system using the same method of counting stars employed by William Herschel 200 years earlier. Kapteyn’s result was a lens-shaped mega cluster less than half the size known today with the Sun positioned close to the center.

Oort’s early research efforts dramatically extended that model by showing that it depicted just the local “neighborhood.” First, he attempted to solve the problem of the Sun’s actual position and motion in the galaxy; then he measured the gravitational force perpendicular to the galactic disk. This calculation would provide an estimate of the amount of non-stellar matter in the galaxy, now known as the Oort Limit. Non-stellar or interstellar matter (IM) would eventually prove to consist of dust and gas.

But in the 1920s, as Oort’s work on galactic physics continued, astronomers still had only a “dim” understanding of interstellar dust. F. G. Wilhelm Struve had predicted it over half a century before. By 1930, Robert Trumpler, a Swiss-American astronomer, had shown that dust was obscuring distant clusters in the plane of the galaxy, dimming them by about half a magnitude per thousand light years. In other words, a star at the galactic center would appear at least 14 magnitudes fainter than if no dust were present. Rather than being a hindrance to Oort, however, IM would become the medium he would use to paint a more accurate picture of the Milky Way.

IM also proved to be a boon for Dutch astronomy in general. By the 1920s and 30s, groundbreaking, competitive optical astronomy could only be conducted using giant telescopes on mountaintops in California, Texas, or South America. For astronomers from low-elevation countries like the Netherlands, such observations were impossible without international collaborators. But for most of the 1940’s, wartime made global cooperation impossible, especially for occupied Holland.

Immediately after WWII, however, radio astronomy would come to the rescue. Radio waves, unlike visible light, which is the size of dust, passed easily through dust clouds. Oort’s early interest in the use of radio telescopes inspired his collaborator, Hendrik van de Hulst, to predict that neutral hydrogen clouds in the IM would produce radio emissions at a wavelength of 21 cm. By 1951, such hydrogen emissions were discovered at Harvard and quickly confirmed by Oort and his team. Oort then began tracing the grand design of the Milky Way by tracking the speeds of clouds of interstellar hydrogen. In this sense, radio astronomy proved the ultimate “work around” for both Dutch and galactic astronomers.

Oort and his colleagues first enlisted a 7.5-meter Würzburg-Riese radar dish left behind in Holland by German radar defenses after the war. With it, Oort’s team quickly confirmed the detection of interstellar hydrogen and began to create the first maps of the spiral structure of interstellar matter. Eventually, Oort’s passionate promotion of radio astronomy would lead to the building of the 2.7 km Westerbork Synthesis Radio Telescope Array in the
Netherlands and many other radio observatories around the world. In fact, nearly all radio astronomers can trace their scientific genealogy back to Oort and his enthusiastic collaborators.

In addition to his galaxy-shaking research, Oort became an important leader in the international astronomical community. As Secretary of the International Astronomical Union and founding member of the European Southern Observatory, he remained an active and respected presence in the professional astronomical universe, exploring new categories and methods of observing throughout his long career.

But today, an Internet search of “Oort” will likely turn up “Oort Cloud,” the name given to the theoretical region at the edges of the solar system from which comets are launched. It is not surprising that polymath Oort applied himself to the question of the origin of comets. Astronomers already knew that comets evaporate after a few spins around the Sun, so a constant source for them must exist. Some speculated that they might be rogue micro-planets from the newly discovered IM. If that were the case, then Newton’s physics predicted that they would swing by in unbound, hyperbolic orbits.

Oort, however, showed this was not the case. Few, if any, had such orbits. Most comets had extended elliptical orbits with a significant percentage showing aphelion positions (the farthest part of an elliptical orbit from the Sun) that were 20,000 to 150,000 times the size of Earth’s orbit. Although the comets were not interstellar in origin, their source must clearly be a reservoir at the outermost limits of the Solar System. This was eventually confirmed and became known as the Oort Cloud. (To comet enthusiasts reading this: get ready for C/2023 A3, fresh from the Oort Cloud, to zoom by in September 2024.)

Since Jan Oort was “galactic” in the scope of his work and influence, so too is this biography of over 700 pages. An epic tale of how the Milky Way was ultimately “discovered,” it is unquestionably authoritative and well-documented, including many photographs and an extensive appendix of important lectures and speeches as well.

But readers should also be prepared for a challenge. Although the mathematics are sequestered “behind bars,” thorny topics like galactic rotation and fundamental astrometry still require careful reading.

When Jan Oort died in 1992, Subrahmanyan Chandrasekhar, another giant in the field, reflected: “The great oak of astronomy has been felled, and we are lost without its shadow.” This reviewer suggests the reader find a welcoming shady tree, a cup of good Dutch chocolate, and prepare for lift off on a truly galactic adventure.

---

The Zoologist’s Guide to the Galaxy: What Animals on Earth Reveal about Aliens – and Ourselve  

Reviewed by Francine Jackson, Ladd Observatory, Providence, RI, USA

When I first chose to read this book, I wondered what I had gotten myself into; after all, I’m not a zoologist, and every form of animal had been drawn on its cover. But my mind was quickly changed.

The author himself is often asked if this book is only on alien skin color – green or blue – and how they reproduce: can they do so with us? But this is so much more.

Each chapter gives us a look into our humanity, and how – or if – an alien civilization could compare. He goes beyond that: Not only does he attempt to compare us with unknown life forms, but he also reminds us that we aren’t the only creatures here on Earth. Could there be any form of comparison for other kinds of life on alien worlds?

Kershenbaum breaks this book into chapters related to all the different parts of us that we consider to make us human. For example, intelligence (whatever that is) not only contributes to our thinking processes, but that of many varied animals. On the subject of language, he attempts to define it as the “single thing that makes us unique among the creatures” on Earth. But what is it? Why does it contain so many rules? And is language different from the communication skills of many other animals?

Then there’s motion, or should it be considered movement? Animals move, but mainly in different ways than we do. We move on two legs. Should we consider an alien’s motion, especially as seen in most science fiction movies, just like ours? Or will it be a totally different type of movement, like an octopus or a bird?

There are so many varied concepts to consider with regard to our first contact with a civilization from another planet that the author even wonders if there will ever be a contact. Are we the only civilization of this type that is capable of thinking, communicating, and appearing to be much more intelligent than the animals that share this planet? Also, would another civilization even share its world with other entities?

Every chapter in this book packs so much information that each could

(Continued on pg. 50)
Since at least 19831, planetarians have been discussing best practices to make the planetarium an accessible experience for visitors. ‘Accessibility’ can refer to a multitude of needs and accommodations, which likewise means there are multitudes of avenues worthy of discussion relating to planetariums. For this article, the focus will be on hearing and vision accommodations.

What brought me into the conversation? My goal in life is to allow as many people as possible to experience how fun astronomy can be. I have an education background, including teaching Biology in a high school to students from the USA in a classroom with students from Nepal - and little to no ESL resources. I have traveled to Italy to teach astronomy to high school English classes. I have also been trained to create laser light shows for the planetarium. But I think what it really came down to was a movie. If you have seen the movie Mr. Holland’s Opus, you may know where I’m going with this. In the movie, the music teacher Mr. Holland creates a visual experience for his deaf son and schoolmates with his orchestra. Along with seeing the instruments being played, flashing lights accompany the sweeping melodies. Mr. Holland also sings a song while signing the words in ASL. While at a Live Interactive Planetarium Symposium (LIPS) this past year, other planetarians and I struck up a few separate conversations about visualizations and accommodations in the planetarium. Could we make a Mr. Holland’s laser show experience? How do we do that for star talks?

So while this is certainly not the first time someone has wondered or discussed this topic, I think it is important that our community continues the discourse and advancement toward planetarium inclusivity in a way that makes astronomy easy and enjoyable for both the visitor and the planetarium professional. In this article, I will share some of the resources currently being created, shared, and implemented in planetariums around the world in an effort to spread the wealth and continue the conversation.

**Vision-Impaired Accommodations**

The World Health Organization asserts that 2.2 million people globally have a near or vision distance impairment (2022). Venues such as The Museum of Modern Art (USA) and the Louvre (France) offer audio guides for vision-impaired visitors. Vaz, Freitas & Coelho (2020) mention a limitation with this technology, which is that the visitor may be “unable to create accurate mental images of the exhibits”. What may help bridge this mental gap is being able to feel what is being heard.

NASA and ESA are a few of the space organizations worldwide that have created tactiles for supplementing space education. These tactiles range from 3-D constellation, supernova, crater, and Hubble images that can be explored with hands while listening to a planetarium professional describe the image on the dome. 3-D print files for tactile plates of images including Sagittarius A* can be downloaded for free2, while others like astronomers from the Space Telescope Science Institute (Maryland, USA) are working on making their 3-D Hubble images available for printing.

A colleague brought a program to my attention titled “Audio Universe: Tour of the Solar System. This planetarium show was created by astronomers from Newcastle and Portsmouth Universities in partnership with

---

1. This date was chosen from the first edition of the Great Lakes Planetarium Association’s Tips Booklet titled “How to make planetariums more accommodating and accessible to visitors with disabilities”.

2. The NASA Universe of Learning Accessible Learning Resources team created 6 plates; individual files can be found at https://chandra.si.edu/tactile/3d_plates.html
organizations such as the Newcastle Children’s Vision Team, and focuses on how astronomers use sound to study objects in the Universe. In the program, the soundtrack is the main driver to allow audiences to listen as objects are represented by different sounds. This show is freely available for full dome or flat screens in English, Spanish, Italian, and German (Japanese is expected soon).

**Hearing-Impaired Accommodations**

Captions and subtitles seem to be an ongoing discussion in the planetarium field, and it does appear to be generally agreed-upon that captioning can be an important accessibility option for visitors. While many programs do come with accompanying text files, there does not seem to be a universal easy or agreed-upon way to best incorporate captioning into the dome for those that do not. There are a few different ways to implement captions in the planetarium. Personally, I have transcribed shows and put the captions into a script to run at the bottom of the screen along with the show. My main thought about this: there must be an easier way. Planetariums such as the Davis Planetarium in Maryland, and the University of Washington Planetarium incorporate captions that have been pre-written to describe what is being said for different images or scenes. There is also the option to include a sign-language interpreter live in the front of the dome environment or act on the dome for those that do not. There are a few different ways to implement captions in the planetarium. 

While captioning and interpreting could be beneficial to audience members with hearing impairments, it can also be distracting to those who don’t need it. A few organizations are working to develop technology to localize the captioning to one’s person. One example of this technology that is currently being worked on is smart glasses, such as Google glass or Epson Moverio BT-350 Smart Glasses from the National Theatre (UK), that will show words or an interpreter in the top corner of the glasses while the visitor is able to still view the planetarium dome through the rest of the glasses field. The Adler Planetarium has been developing an application for visitor mobile phones that shows a low-light captioning option guests can play synced up with the show they are attending. I have also heard anecdotes from planetarians about using red flashlights to read papers or watch a personal interpreter during shows.

**The Vibrating Universe** is an astronomy workshop created by astronomers at the University of California Riverside paired with teachers from the California School for the Deaf, Riverside. The program uses vibrations played through a sound system under an interlocking wooden floor that the students sit on so they can “feel” sound and light waves from different objects such as the Sun, rockets, and even the Big Bang to further understand what is being viewed. The researchers invite anyone interested in using their presentation and materials to contact them. While this workshop is not necessarily formulated specifically for domes, this has the potential to take place in the dome environment or act as the foundation to creating a more planetarium-specific experience.

**Further Reading: Existing Organizations**

In a 2017 study, participants with hearing impairment, visual impairment, or physical disability expressed a hope for being included, accepted, and even contacted by museums (McMillen & Alter). In this section, I will share some of the resources currently available to planetarians that may help respond to that hope.

The IPS hosts an Equity, Diversity and Inclusion Committee, composed of IPS members. Among other functions, the committee “propose[s] practices to make public programming in our planetariums as welcoming and as accessible as possible to the diverse communities we all serve” (IPS website, 2023). This committee serves as a representative for the planetarium community to discuss ongoing ideas, work, and concerns.

The Great Lakes Planetarium Association (GLPA), USA, generates and disseminates reference guides for planetarium professionals in Tips Booklets. Each Booklet covers a variety of topics and back issues are available for free to GLPA members, and for a small fee if not. GLPA has also compiled a collection of resources addressing accessibility in the planetarium. One of these resources is planetarium professional, author, and entrepreneur Noreen Grice’s website You Can Do Astronomy, LLC. Since 1984, Noreen has worked toward making the planetarium a space that is accessible for all. Her company produces tactile books and models to be used in the dome during programming, as well as workshops for teachers and students, on-site programs, and exhibit consultations (youcanandoastronomy.com, 2023).

The National Informal STEM Education Network (NISENET), USA, is an organization dedicated to supporting STEM education institutions by developing and sharing materials. Each kit sent out not only contains topic materials and instructions, but also includes tips for Accessibility. Areas of accessibility covered range from Spanish language instructions, physical accessibility tips for exhibit design, and tips for implementing activities to those with vision- and hearing-impairment. Kits range in topics that include astronomy content such as exoplanet transits and star formation that can be incorporated into a planetarium program. For more information or to apply to be a NISENET partner, visit nisenet.org.

Stelle per Tutti (Stars for All) is a group in Italy dedicated to helping amateur astronomers, institutional bodies, the media, and the public disseminate astronomy content. The UAI, or Italian Amateur Astronomers Union, worked

---

2 Information on downloading files can be found at https://www.audiouniverse.org/tour-of-the-solar-system
In Front of the Console (con’t.)

this demonstration, he “could see the writing on the wall” – this was the future. It was an uphill battle, bringing up the idea to many higher-ups, not only at the science center, but at the university itself.

Of course, the road is not without bumps. In 2009, due to financial challenges, Flandrau was forced to close its doors for about 9 months. At that point in time, it became part of the College of Science, and reopened. Michael was re-hired and quickly picked up where he had left off. The Planetarium had stopped showing laser music shows about a decade prior, and he helped return those shows to the dome in 2010.

He often reminds me that sometimes you have to be a squeaky wheel. He also reminds me you have to be patient. Patience is not one of my virtues; Michael definitely has the patience of a saint.

He continued to work to get Flandrau the digital system it needed to launch us into the modern century. It was 2012 when I found my way to Flandrau, and shortly after in 2013, Sky-Skan was on their way to do demonstrations in the dome. It was just a taste of what digital systems could do - and while I still fiercely defend Hector’s sky, it was so much cooler to fly to Saturn instead of showing an image. I understood the purpose — we could reach our audiences in ways they hadn't seen before.

Like second grade me when I first saw Hector on that fateful field trip.

Michael and the team at Flandrau continued to work to push the planetarium into the modern century, inviting VIPs, deans, department heads, and professors to see the demonstrations of what a digital system could do. With the momentum going, the College of Science was able to find donors who agreed with our purpose and mission, and Flandrau was able to complete the two-phased upgrade. In 2014, we acquired our SCISS Colorspace.

(Continued on pg. 48)
BLACK HOLE
FIRST PICTURE

Cosm Studios
Radboud University

Visit Cosm.com/quote for show licensing
system, and in 2016, we closed the theater for a summer to renovate the entire theater, installing new lighting, carpet, acoustic treatments, and more. Unfortunately, it meant removing Hector Vector from the center of the room, but he did not go far. The North Star ball is on display for all our visitors to see: from where we’ve come from, to where we are, and hopefully, return to see what is next. Michael states “my dream of upgrading and modernizing our planetarium became a reality, and I felt fulfilled”.

I asked Michael what advice he had for anyone entering the planetarium field and he said: There are many opportunities for employment in the planetarium field including show production, technical/maintenance, management, graphics/art, operations/presentation, education, etc. And considering that many planetariums are part of larger science centers or universities, or middle or high schools, there are other jobs that can apply in those areas as well. I would advise anyone considering a career in planetariums, or science education in general, to visit as many science centers and planetariums as they can, and talk to the people who work there to get an idea of the possibilities for employment and how their individual skills and personality would fit. Few people who work in these fields have a narrow scope of duties and responsibilities, which means you can often tailor your skills and abilities to create the kind of job you want to have. And take the time to get to know the people you will work with to make sure that it will be a good fit with your personality."

The last decade has been such a learning experience for me, thanks to Michael - from getting be a part of the installation of our full dome system in 2014, to the full renovation of the theater into the Eos planetarium theater in 2016, to entrusting myself and my colleague Lucas Snyder with the hiring and training of our student staff operators. Beyond just the technical aspects, I have learned patience from Michael in dealing with hardships. I have learned how to accept my mistakes with grace. I have learned to embrace criticisms as learning steps.

I have learned how to have a voice when I wasn’t heard.

When Michael said he was going to retire, I won’t lie, I felt a twinge of panic. There is still so much I don’t know. What happens when I find a random cable that I don’t know where it goes? (It happens more than you’d think). Also, while I’ve got the digital system under my belt, the audio system is still murky waters. Plus, it’s Michael Magee! He has an asteroid named after him (thanks to David Levy) – 1990 OW2, better known as asteroid mikemagee, which was observed on Kitt Peak. He created countless educational programs and shows, toured thousands of students through Flandrau, and helped many experience the night sky up close through his telescope.

A sense of loss — Michael has become more than my coworker, my colleague, my superior. He has become my friend, my confidant, someone who constantly pushes me forward. I know that he’ll always be a text away (because I’m a millennial and dislike phone calls), but it’s not the same. I would not be where I am in my career without him.

And for all that, I cannot thank Michael enough.
A Seamless and Riveting Immersive Experience

Transform your audience experience with NanoSeam, the world’s premier projection solution.

Visit cosm.com/nanoseam to learn more.
be a separate class, one that could be understood even by people who aren’t versed in biological concepts. Although I was uncertain as to whether I would find this interesting at all, I was very much mistaken. This Zoologist’s Guide was written for the general audience. It can be understood, and enjoyed, by all.

The original idea of these, especially Starlink by SpaceX, was to allow Wi-Fi coverage in all parts of the world, especially where it is not available at this time, such as in developing countries; however, the number of these satellites is now into the tens of thousands, with more to be launched. In addition, other companies are contributing their share of these objects. And the final total could be impossible to imagine.

SpaceX has announced the possibility of painting their satellites dark or a grayish color, but that just doesn’t solve the problem of the numbers of objects already in low Earth orbit. There are departments charged with documenting the number of satellites circling our planet, but these are already more than can be constantly observed. And it is believed they will remain in orbit for at least a decade after their useful life is over.

Unfortunately, this problem doesn’t seem to have a solution that could be considered a compromise. Companies requesting launch time for these objects seem to be granted, with no dialogue with astronomers who fear the loss of our sky, both optically and by radio astronomy. It was always believed that light pollution was a major problem in our inability to enjoy the night sky; now, it seems, there is yet another way this is happening, and there doesn’t see

**Continued on page 52**

---

**Losing the Sky**


Reviewed by Francine Jackson, Ladd Observatory, Providence, RI, USA.

When I first received this book, I thought it was another one dedicated to light pollution, but I was totally wrong. The author’s warning is about the incredible glut of mini satellites that are already in our sky, with many more projected to be launched. The result is a high number of trails that show up in many astrophotography photos, and the radio signals of these satellites can coincide with that of radio telescopes. Sky observers are also seeing more and more of them.

---

**A Different Point of View (con’t.)**

Back in the 70s, from time to time there was a script section conducted by Ronald Hartman and, this quarter, a script by David Hurd entitled “A Matter of Time” was presented. So, if you are not inclined to do the bird orientation script, I will point you toward this one.

Herb Schwartz, in his Creative Corner, tells us of the flexibility of the TMC compact 150 slide projectors, but unless you have some gathering dust on a shelf somewhere this is just a fun look back at what planetariums worked with at one time.

**Continued on page 52**
Seeking What Works (con’t.)

with the Ministry of Labor to follow inclusion guidelines and support astronomy learning for individuals with disabilities including visual impairment and deafblind. The Stelle per Tutti website includes a multitude of resources, many of which include astronomical images with a description of what the image includes and an explanation of the image content.

Next Steps

As I shared in the beginning, this is not an all-inclusive list of the accommodations that have been created and are being used in planetariums around the world. I have also only included two potential accommodation needs, while there are many others. In general, I want to commend the planetarium community for being aware of the needs of our visitors and creating these amazing resources. Let’s keep it up!

References


Stelle per tutti. (n.d.). *Stars for all: Inclusive disclosure.* https://www.uai.it/stellepertutti/


***

OVER 50 YEARS EXPERIENCE

Specializing in installing and servicing optical-mechanical star projectors.

WARPED MEDIA 2K DIGITAL PROJECTOR—FULL DOME PROJECTION

SPITZ PROJECTOR REPLACEMENT LAMPS: LED Star, Sun, Moon and Planet

OM Star Projector Maintenance

Installation of Seating

Audio Systems

Cove Lighting

Dome Cleaning & Painting

4K, 8K and Hybrid Industry Partners with Evans & Sutherland and GOTO

* Under development for 5i2

Contact us to discuss your project or needs

ASH-ENTERPRISES.COM • 804.543.2499
2023

- **6-8 June.** Fulldome Brno Festival, Czech Republic.

- **15-17 June.** European Network Science Centres & Museums (ECSITE), Annual Conference, Esplora Science Center, Kalkara, Malta. [https://www.ecsite.eu/conference](https://www.ecsite.eu/conference)

- **20-24 June.** “Stars for All 2023”, US Planetarium Conference, Bays Mountain Park & Planetarium in Kingsport, Tennessee, USA. The event is an official gathering of all seven US planetarium regions but is open all planetarians.

  **Contact:** Adam Thanz@kingsporttn.gov

- **30 June.** Asteroid Day. [https://asteroidday.org/](https://asteroidday.org/)

- **21-25 August.** Digistar User Group Conference (DUG 2022), Edelman Planetarium, Rowan University, Glassbord, New Jersey, USA. Pre-conference workshop on 21-23 August and a post-conference tour on 26 August. [https://sites.rowan.edu/planetarium/dug-conference/](https://sites.rowan.edu/planetarium/dug-conference/)

- **12-14 September:** Live Interactive Planetarium Symposium, Michigan Science Center, Detroit, USA.

  [https://sites.google.com/view/lipsymposium/home](https://sites.google.com/view/lipsymposium/home)

- **September (date TBD).** Association of French Speaking Planetariums (APLF), Annual Conference, St. Michel l’Observatoire, France. [www.aplf-planetariums.org](http://www.aplf-planetariums.org)

  **Contact:** Milène Wendling, milene.wendling@unistra.fr

- **14 October.** Anular eclipse.


  [https://eclipse.aas.org/eclipse-america-2023](https://eclipse.aas.org/eclipse-america-2023)

- **21 October.** Opening ceremony of Centennial of the Planetarium

  [https://planetarium100.org](https://planetarium100.org)

- **31 December.** Deadline for the contest “A week in United States” For information and application requirements go to: [www.ips-planetarium.org?page=WeekinUS](http://www.ips-planetarium.org?page=WeekinUS)

- **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

- **12-14 September:** Live Interactive Planetarium Symposium, Michigan Science Center, Detroit, USA.

  [https://sites.google.com/view/lipsymposium/home](https://sites.google.com/view/lipsymposium/home)

- **7 May.** International Day of Planetariums, 99th birthday of Centennial of the Planetarium [https://planetarium100.org](https://planetarium100.org)

  [https://ips-planetarium.site-ym.com/?page=IDP](https://ips-planetarium.site-ym.com/?page=IDP)

- **8 April.** Total Solar Eclipse (Mexico, USA, and Canada). [https://eclipse.aas.org/eclipse-america-2024](https://eclipse.aas.org/eclipse-america-2024)

  **Contact:** ips2024@planetarium.berlin

2024

- **March (date TBD).** IMERSA Day. [Imersa.org](http://Imersa.org)

- **31 March.** Deadline of PLANit Prize for an original video production, organized each year by Italian Association of Planetaria (PLANit), Italy. The prize is open to everyone. First prize is 500 euro.

  [www.planetari.org](http://www.planetari.org)

  **Contact:** segreteria@planetari.org

- **8 April.** Total Solar Eclipse (Mexico, USA, and Canada).

  [https://eclipse.aas.org/eclipse-america-2024](https://eclipse.aas.org/eclipse-america-2024)

- **April (date TBD).** Gesellschaft Deutschsprachiger Planetarien e.V., (GDP), Annual Conference of the Society of German-Speaking Planetaria.

  [www.gdp-planetarium.org](http://www.gdp-planetarium.org)

  **Contact:** bjorn.voss@lwl.org

2025

- **7 May 2025.** International Day of Planetariums, 100th birthday of Centennial of the Planetarium [https://planetarium100.org](https://planetarium100.org)

  [https://ips-planetarium.site-ym.com/?page=IDP](https://ips-planetarium.site-ym.com/?page=IDP)

(Continued on pg. 56)
Built by Educators for Educators.

- Powerful new Nightshade G3 simulator.
- Uniquely intuitive interfaces.
- Standards-aligned Augmented Lessons.
- Easy live/scripted/pre-recorded shows.

New!

Digitalis

Cove Lights
by Digitalis

Serious value for serious educators.
Portable and fixed systems. Single and multi-channel.

DigitalisEducation.com
Digitarium*: The most popular digital planetarium on Earth.
LAST LIGHT
CHATTING WITH FRIENDS

Robin Byrne assigns her students to the task of creating mnemonic devices to remember their physics.

Examples from the OBAFGKM star class entries:
- Only Beans Are For Good Kids, Man.
- Only Be Around Finding Great Kale Meat.
- Obviously, Babe, A Filthy Gorilla Kicked Me.
- Oh Bam A Friendly Gorilla Killed Me.
- Our Bears Are Fighting Giant Karate Monkeys.
- Only Blake And Finley Gave Kim M&Ms.
- Odin Built Asgard From Gold Keenly Mined.
- Oddly, Beavers Are Freakishly Good Kind Mothers.
- Only Banshees Appear From Ghosts Killed Mysteriously.
- Outlaws Bribe Assassins For Gold Knitted Mittens.
- Only British Aristocrats Frequently Get Kingly Meals.
- Open Bar... A Free Gin Killed Me.
- Only Brilliant Astronauts Found Great Kryptonite and Mercury.
- Only Byrne And Family Get Kids Motivated.
- One Bad And Furious Goat Killed Ma.
- Organic Beets Are Fantastic, Good Kosher Meal.
- Oh Boy Another Freaking Giraffe Kicked Mom.

And from Keith Johnson:
- Q. What do you call a planetarian who works through lunch most days, takes two days of holiday every year, gives shows every weekend, and leaves the theater every night at 10 p.m.?
  - A. Lazy

And you have to love his e-mail signature:

Keith Johnson
Retired Celestial Wizard and Keeper of the Cosmic Keys
I'm thinking of starting a business that specializes in weighing tiny objects.
But it will only be a small-scale operation.

When spell-check turns deadly:

Hi Mike,
Can you join the zoom mtg now with the maps executed committee?
Sincerely, Noreen

And a few xkcd comics for your edification and delight.

![XKCD Comic](https://xkcd.com/2762/)

Even if a planet is lucky enough to have a stable orbit that weaves between the spikes, the seasons get weird whenever it passes close to them. ([https://xkcd.com/2762/](https://xkcd.com/2762/))

![Easily Confused Acronyms](https://xkcd.com/2759/)

“Lever” was originally an acronym for Load Amplification by the Vimulated Emission of Radiation. ([https://xkcd.com/2759/](https://xkcd.com/2759/))
Next Gen Theater Automation to Control New and Old Theater Devices
I always hate dragging around the large archipelagos, but I appreciate how the Scandinavian peninsula flexes outward to create a snug pocket for Britain and Ireland (https://xkcd.com/2742/)

**2023 PLANETARIUM ANNIVERSARIES**

**90 years**

**75 years**
- Cultural and Educational Center Valentina Tereshkova, Yaroslavl, Russia.

**60 years**
- McDonnell Planetarium, Saint Louis Science Center, Saint Louis, Missouri.

**50 years**
- Olsztynskie Planetarium, Olsztyn, Poland.
- Smolensk Planetarium, Smolensk, Russia.
- Lawrence Hall of Science Holt Planetarium, Berkeley, California.
- Ruben H. Fleet Science Center Dome Theater, San Diego, California.
- Herbert Trackman Planetarium, Joliet, Illinois.
- Merrillville Community Planetarium, Merrillville, Indiana.
- Valparaiso University Planetarium, Valparaiso, Indiana.
- Southwest Minnesota State University Planetarium, Marshall, Minnesota.
- Saint Cloud State University Planetarium, Saint Cloud, Minnesota.
- CCNY Planetarium, New York, New York.

***
New MEGASTAR-IIA
with SWING AXIS and GIGAMASK
Reminds you of our belonging to the Milky Way Galaxy

Hamagin Space Science Center / Yokohama, Japan

GIGAMASK
Ultra-precise star plate. Projects the world's largest number, approximately 1.2 billion fixed stars! Reproduces the invisible stars as they are. Find them through binoculars in the dome! Option for MEGASTAR-IIA star projector. Your MEGASTAR-IIA can be upgraded to GIGAMASK.

www.megastar.jp/en/
Chiron III Hybrid brings majestic starry skies to two planetariums in Japan

Impressive realism at the Toyama Science Museum

The Toyama City Science Museum selected the cutting-edge GOTO Chiron III Hybrid to supplement their digital planetarium, last updated in 2009. The planetarium’s mission is to inspire fascination in the audience with the impressive realism of the images on the dome. The planetarium space is now open to the public with a much more realistic and beautiful starry sky to accompany the dynamic digital images.

Tadashi Hayashi, curator of the Toyama Prefectural Science Museum, said "CHIRON III has made it possible to reproduce a beautiful starry sky that was difficult to visualize with a digital planetarium alone. We hope that many people will see it and deepen their interest in space. The dome theater provides a perfect place for enjoying detailed simulations. The museum has curators from various fields such as animals, plants, and insects, so I would like to use it as a place to explore multiple scientific topics in addition to astronomy."

In addition to the new equipment, the seating has been refreshed, including some new dual seats to increase visitor options. There is a large stage in front which can be used as a multi-purpose space or as a place to recline and be immersed in the stars.

One billion stars at “Dream 21”, Osaka

“Dream 21”, the Higashiosaka City Children’s Culture and Sports Center, opened in 1991 as facility for children and has been loved by many citizens as a “children’s plaza for science, culture, and sports”. After 30 years of operation, it reopened on April 1, 2023 with a new hybrid planetarium that combines the GOTO Chiron III optical projector with Digistar 7 and two Sony GTZ380 projectors.

The new GOTO CHIRON III star projector that was delivered to Dream21 reproduces the Milky Way with 1 billion micro-stars, creating a more realistic, and beautiful star filled sky. In addition, the Chiron III has a unique dimming function that allows control over the brilliance of stars that change depending on the season or weather, as well as the stars that begin to shine at twilight; all can now be reproduced more accurately and naturally than ever before.

The original seats have been replaced with wider reclining seats, and the theater’s interior has been re-envisioned as a space where you can experience nature. A special sheet, designed to look like you are lying on the lawn, is also attracting attention and is a feature that children love!

GOTO INC
4-16 Yazakicho, Fuchu-shi, Tokyo 183-8530 Japan
E-Mail: info2@goto.co.jp Tel:+81-42-362-5312
URL: www.goto.co.jp/english/

GOTO USA LIAISON
4044 N. LINCOLN, 204 CHICAGO, IL 60618
E-Mail: mark@goto-stars.com Tel:+1 317 537-2806
Contact : Mark Webb