SEA-PEO

2024

Southeast Asia Planetarium, Education and Outreach Conference



25–28 November 2024

Princess Sirindhorn AstroPark, Chiang Mai, Thailand

Southeast Asia Planetarium, Education and Outreach Conference 2024 (SEA-PEO 2024)

Overview

The Southeast Asia Planetarium, Education and Outreach 2024 (SEA-PEO 2024) is the first conference in the Southeast Asia region that aims to bring together planetarium operators, educators, and astronomy outreach personnel to exchange and share their experience and advancement in improving how we can better interact with the public.

Date: 25-28 November 2024
Format: In-person
Venue: Princess Sirindhorn AstroPark, Chiang Mai, Thailand
Participants: Planetarium and Science center operators, astronomy educators, science communicators, outreach personnels, as well as professional and amateur astronomers who enjoy engagement with the public.

Venues

Princess Sirindhorn AstroPark



Figure 1: Princess Sirindhorn AstroPark

Princess Sirindhorn AstroPark is located in Chiang Mai, Thailand. It functions as both the headquarters for the National Astronomical Research Institute of Thailand (NARIT) and is also home to the largest planetarium and astronomy exhibition complex in Thailand.

AstroPark is the center of Thailand's only astronomy research institute where many researchers and engineers work tirelessly to improve upon the country's astronomy, optics, atmospheric science, and space program. Many state-of-the-art facilities are situated within AstroPark complex, such as the

control center over the thai robotic telescope network, spacecraft monitoring station, engineering and fabrication laboratories, clean room for development of new optics, radio receivers, spacecraft assembly, a mirror coating machine for upcoming Cherenkov Telescope Array Observatory, high performance computing, and many more.

The exhibition and planetarium building of AstroPark serves as the home of NARIT's public outreach program. AstroPark, along with its four regional observatories for the public, receives over 250,000 visitors for the planetariums, 450,000 for the exhibits and 55,000 for the public night observing sessions combined annually. These outreach infrastructures serve as the main anchor point for NARIT's even larger and more comprehensive outreach program which services 1.6 million participants.

Thai National Observatory (TNO)

Thai National Observatory is home to the largest and second largest optical telescopes in Southeast Asia, at 2.4 meters and 1.0 meter in diameter. It is located at 2,457 meters above sea level on the highest peak of Thailand, Doi Inthanon National Park. Atop this cloud forest, high above the cloud and light pollution, is one of the most pristine skies in Thailand. The TNO also plays a crucial role in the history of astronomy development in Thailand. It was here, atop Doi Inthanon, back in 1997 during Hale-Bopp comet observation that the idea of building a national observatory in Thailand began to take place. With the construction of Thailand's first national observatory, the birth of a National Astronomical Research Institute of Thailand began to take place.

Thai National Radio Observatory (TNRO)

Deep within Huai Hong Khrai Royal Development Study Centre in Doi Saket, shielded from any radio interference by the surrounding hills, sits the largest single eye in Southeast Asia's radio sky. Spanning over 40 meters across, the Thai National Radio Telescope opens a new era in radio astronomy for the region. The 239-ton main reflecting dish was tuned to such precision that the shape deviates from the perfect parabola by no more than the thickness of a few human hairs. It allows for the observation of the sky at 300 MHz – 115 GHz range, day and night, rain or shine. The TNRO is a technological marvel with many of its receivers and backends developed in-house by NARIT's own engineering team. Situated within the same complex lies 13-m VLBI Global Observing System (VGOS) radio telescope, designed specifically to simultaneously observe distant flickers of light in the sky along with other VGOS radio telescope in the network to monitor minute movements along the Earth's crust at precisions unmatched by other Earthbound observations.

Optics and Photonics Laboratory

Astronomy is a unique field of science that tries to understand the universe only through tiny specks of light. As such, it becomes a main drive at pushing human technology and innovation forward in order to see better, clearer, and obtaining more information. This is happening at NARIT's optics laboratory where new optical systems are being designed to be used with our national observatory, our spacecraft payload, our atmospheric research, or even our public outreach initiatives. State-of-the-art

systems are constantly being tested within the clean room such as the adaptive optics (AO) system, telescope design and development, or the first-of-its-kind an evanescent wave coronagraph, a new type of coronagraph never before conceived anywhere in the world.

Advanced Innovation Center

This new addition to the AstroPark is equipped with a novel clean room facility. Within this building, Thailand's first steps towards space exploration begins to take place. This clean room serves as a testing bed and assembly area for Thai Space Consortium (TSC) new probes to be sent around the Earth, or even towards the Moon. Also sharing the same clean room is where sophisticated detectors for Thai National Radio Observatory are being developed and tested before final implementation.

Advanced Mechanical Manufacturing Center

Innovation of new technology and research instruments often requires fabrication of specialized parts. Whether it's a new part for radio telescope receivers, adapter for optical instruments, or specialized part for space probe, they can all be fabricated to specifications here. Some applications require precisions unparalleled to any that the local industry can produce, which is why NARIT holds many manufacturing machines including the 5 axis CNC milling machine, EDM wire cutting machine, water jets cutter, 3D printer, among other fabrication systems ready to respond to any researchers or engineers' need.

Prototype and Technology Incubation Center

With over four robotics observatories around the world, its engineers work tirelessly to develop systems to control, monitor, and maintain our robotics telescopes around the world. In this lab is where the control systems are being developed. As the team and its engineering capabilities grew, we now look into not only servicing telescopes made by others, but to develop new telescope mounts and sky camera systems of our own as well.

Thin-Film Technology Laboratory

Operating the largest mirror in Southeast Asia comes with its own challenges in operations and maintenance. TNO requires recoating of its primary 2.4m telescope every few years. The largest mirror also means the largest mirror coating machine which needed to be developed from scratch. The gigantic chamber uses vacuum sputtering technology to coat mirrors with various metals and silica up to the diameter of 2.4m. The development of this technology was Thailand's ticket into becoming an official partner of international collaboration such as Cherenkov Telescope Array Observatory (CTAO), in which the machine that is going to coat all 6,000 mirrors of CTAO now rests in this lab waiting for deployment.

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Participants

- Planetarium & Science Center operators
- Astronomy Educators
- Science Communicators
- Outreach Personnels
- Professional & Amateur Astronomers who enjoy engaging with the public

Scientific Organization Committee (SOC)

(Chair) Matipon Tangmatitham
Martin George
Avivah Yamani
Li Hui
Thanakrit Santikunaporn
Khomsan Thuree
Suparerk Karuehanon

Local Organization Committee (LOC)

(Chair) Jullada Kaosaard
Matipon Tangmatitham
Krittapas Chanchaiworawit
Supaluck Chanthawan
Natthida Yarangsri
Piriyaporn Sabhasri
Suparerk Karuehanon

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<tr><th></th><th>Planetarium</th><th>Andromeda</th><th>Planetarium</th><th>Andromeda</th><th>TNO</th><th>TNRO</th><th>Planetarium</th><th>Andromeda</th></tr>
<tr><td>07:00 - 08:30</td><td colspan="2">Registration</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>08:30 - 09:00</td><td colspan="2">Opening ceremony</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>09:00- 09:20</td><td colspan="2">Plenary 1</td><td colspan="2">Plenary 3</td><td rowspan="11">NARIT Facilities Tour</td><td rowspan="11">TNRO Visit</td><td colspan="2">Plenary 6</td></tr>
<tr><td>09:20 - 09:40</td><td colspan="2">Plenary 2</td><td colspan="2">Plenary 4</td><td colspan="2">Plenary 7</td></tr>
<tr><td>09:40 - 10:00</td><td colspan="2">Group Photo</td><td colspan="2">Plenary 5</td><td colspan="2">Plenary 8</td></tr>
<tr><td>10:00 - 10:30</td><td colspan="2">Coffee Break</td><td colspan="2">Coffee Break</td><td colspan="2">Coffee Break</td></tr>
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<tr><td>12:00 - 13:00</td><td colspan="2">Lunch</td><td colspan="2">Lunch</td><td colspan="2">Lunch</td><td colspan="2">Lunch</td></tr>
<tr><td>13:00 - 13:30</td><td colspan="2" rowspan="2">Poster Session</td><td colspan="2" rowspan="2">Exhibitor Showcase</td><td rowspan="12">TNO Visit</td><td rowspan="12">NARIT Facilities Tour</td><td colspan="2">Plenary Lecture 9</td></tr>
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<tr><td>14:45 - 15:00</td><td>O08</td><td>O26</td><td>O42</td></tr>
<tr><td>15:00 - 15:30</td><td colspan="2">Coffee Break</td><td colspan="2">Coffee Break</td><td colspan="2">Coffee Break</td></tr>
<tr><td>15:30 - 15:45</td><td>O09</td><td rowspan="4">W02</td><td>O27</td><td rowspan="4">W05</td><td>O43</td><td rowspan="4">W08</td></tr>
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<tr><td>17:00 - 17:30</td><td colspan="2">Break</td><td colspan="2">Break</td><td colspan="2">Closing Ceremony</td></tr>
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<tr><td>18:30 - 20:30</td><td colspan="2">Welcome Reception</td><td colspan="2">Dinner & Cultural Show</td><td></td><td></td><td></td><td></td></tr>
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Public Lecture 2. Astronomy is for Everyone, Martin George

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Plenary 2. Engaging with the Public in Planetariums, Martin George
Plenary 3. Shanghai Astronomy Museum's Exploration on Digitalization Enhancing Science Education, Shi Wei
Plenary 4. Top-Down and Comprehensive Approach to Astronomy Outreach, Matipon Tangmatitham
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W05. Beyond Visible Light: Astronomy in Multiwavelength, Thanakorn Aungkawattana
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W08. Fun with Dry Ice: Make a Comet + Cosmic Ray Detector, Pranita Sappankum

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P22. Sirindhorn Planetarium: Nurturing Young Minds, Inspiring Passion, and Fostering a Love for Astronomy, Sittikon Sampankhan
P23. Astro Chat Masala (Interdisciplinary Communication in Astronomy), Chrisphin Karthick
P24. Demonstrating Einstein’s Time Dilation Using Simple Muon Detectors, Jyh Harng Tan

SEA-PEO2024 Detailed Schedule

Monday, November 25th 2024

	MON - NOV 25th	
	Planetarium	Andromeda
07:00 - 08:30	Registration	
08:30 - 09:00	Opening Ceremony	
09:00- 09:20	Plenary 1. Astronomy: A challenge that drives human capacity and technology developments through public outreach, Saran Poshyachinda	
09:20 - 09:40	Plenary 2. Engaging with the Public in Planetariums, Martin George	
09:40 - 10:00	Group Photo	
10:00 - 10:30	Coffee Break	
10:30 - 10:45	O01. Physics-based space flight simulation game competition to promote space enthusiasm in classroom, Matipon Tangmatitham	O13. Implementation of Learner-Centered Education in University Courses through Collaborative Project on Light Pollution, Kiki Vierdayanti
10:45 - 11:00	O02. Galaxy Cruise Workshop: Community Involvement in Identifying Galaxies Through Citizen Science Project in Indonesia, ika Srikandi	O14. Strategies to conduct stargazing programmes in Singapore's challenging environment, Meng Hwee Lim
11:00 - 11:15	O03. The NARIT Astronomical Teacher Training and Workshop, Thanakrit Santikunaporn	O15. Raising Dark Sky tourism and Light pollution awareness : The Amazing Dark Sky in Thailand, Jessada Keeratibharat
11:15 - 11:30	O04. The Telescope-in-a-box - A collapsible open-frame Dobsonian Telescope, Abel Yang	O16. Light Pollution Effect: Analysis of Streetlamps Spectra Around the Bosscha Observatory, Lembang, Indonesia, Aprilia Aprilia
11:30 - 12:00	Flash Poster Talk	
12:00 - 13:00	Lunch	
13:00 - 14:00	Poster Session	
14:00 - 14:15	O05. CAAS : the Conference on Astronomical Activities in School, Jessada Keeratibharat	W01. Planetary Imaging with Color Sensor Cameras, Christopher Go
14:15 - 14:30	O06. Research-based learning as an alternative to	

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	MON - NOV 25th	
	Planetarium	Andromeda
	classroom education, Sawatkamol Pichadee	
14:30 - 14:45	O07. Our Baby Step in Bridging The Heaven and Earth Through Astronomy, Amirul Hazim Kamarulzaman	
14:45 - 15:00	O08. Development of an Exoplanet Learning Assessment, Pranita Sappankum	
15:00 - 15:30	Coffee Break	
15:30 - 15:45	O09. NARIT Youth Camp: Entry-level astronomy camp for young adults, Farprakay Jiarakoopt	W02. Powers of Ten: From Atoms to the Universe, Matipon Tangmatitham
15:45 - 16:00	O10. NARIT 10" Dobsonian Telescope Distribution Project, Khomsan Thuree	
16:00 - 16:15	O11. Prepare a foundation to attract the interest of the Timorese students to learn astronomy and prepare for future astronomers and scientists., Luis Nivio	
16:15 - 16:30	O12. Bridging Ancient wisdom and Modern Science: Insights from Historical Practices, Teresinha Soares	
16:30 - 16:45	Movie Showcase:	
16:45 - 17:00	The Radio Sky	
17:00 - 17:30	Break	
17:30 - 18:30	Public Lecture 1. Citizen Science in Astronomy, Christopher Go	
18:30 - 20:30	Welcome Reception	

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Tuesday, November 26th 2024

	TUE - NOV 26th	
	Planetarium	Andromeda
09:00- 09:20	Plenary 3. Shanghai Astronomy Museum's Exploration on Digitalization Enhancing Science Education, Shi Wei	
09:20 - 09:40	Plenary 4. Top-Down and Comprehensive Approach to Astronomy Outreach, Matipon Tangmatitham	
09:40 - 10:00	Plenary 5. A very high-energy planetarium. The planetarium as a tool to describe the future of high-energy astronomy, Federico Di Giacomo	
10:00 - 10:30	Coffee Break	
10:30 - 10:45	O17. Using The Story Circle To Develop Flexible and Engaging Live Planetarium Shows, Pecier Paul Decierdo	W03. Astronomy activities on a cloudy night, Farprakay Jiarakoopt
10:45 - 11:00	O18. The Dome as a Creative Space, David Ault	
11:00 - 11:15	O19. Planetariums as Celestial spheres for education, Alexander Adli	
11:15 - 11:30	O20. Planetariums in Korea, Soonchang Park	
11:30 - 11:45	O21. PAGASA Planetarium Then and Now, Ma. Rosario Ramos	O31. Utilizing Radio Telescope at Bosscha Observatory for a Multidisciplinary Research: Developing Astronomy and Public Engagement, Martha Kurniasari
11:45 - 12:00	O22. The BCIS Planetarium: A Hub for Cross-Disciplinary Learning and STEAM Integration, Marco Capriz	O32. The Economic Impact of Astronomy Rally Activities., Ananpol Sudsap
12:00 - 13:00	Lunch	
13:00 - 14:00	Exhibitor Showcase	
14:00 - 14:15	O23. Observatory Visit Program for Public: Bosscha Observatory Experience Post-pandemic, Ajeng Tri Handini	W04. DIY Planetarium, Jessada Keeratibharat
14:15 - 14:30	O24. Celebrating 50 Years of the Philippine Astronomical Society: A Review of the Challenges and Best Practices for Astronomy Outreach in the Philippines, Martine Joy Irog	

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	TUE - NOV 26th	
	Planetarium	Andromeda
14:30 - 14:45	O25. A Closer Look at the Philippines' National Astronomy Week: Challenges, Impacts, and Future Directions, Mar Emmanuel Velasco	
14:45 - 15:00	O26. Communicating Astronomy with the Public through Zero Waste Camping Activity in Thailand, Nareemas Chehlaeh	
15:00 - 15:30	Coffee Break	
15:30 - 15:45	O27. Space journalism in Thailand: Making space relevant with the public., Kornthong Wiriyasawetkul	W05. Beyond Visible Light: Astronomy in Multiwavelength, Thanakorn Aungkawattana
15:45 - 16:00	O28. Communicating Astronomy with the Public: Communicating through Networking in Vietnam, Tan Vu Nguyen	
16:00 - 16:15	O29. The Path to 700K: Navigating Social Media Growth Strategies, Piriyaporn Sabhasri	
16:15 - 16:30	O30. Starry Night Over Bangkok: The largest stargazing event in the recorded history, Suparerk Karuehanon	
16:30 - 16:45	Movie Showcase:	
16:45 - 17:00	CTAO Planetarium	
17:00 - 17:30	Break	
17:30 - 18:30	Public Lecture 2. Astronomy is for Everyone, Martin George	
18:30 - 20:30	Dinner & Cultural Show	

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Wednesday, November 27th 2024

	WED - NOV 27th	
	TNO	TNRO
09:00 - 09:30	NARIT Facilities Tour	Assembly at Astropark & Depart for TNRO
09:30 - 10:00		Thai National Radio Observatory Visit
10:30 - 11:00		
11:00 - 11:30		
11:30 - 12:00	Lunch	
12:00 - 12:30		Return to Astropark
12:30 - 13:00	Depart for Doi Inthanon	Lunch
13:00 - 13:30		
13:30 - 14:00		NARIT Facilities Tour
14:00 - 14:30		
14:30 - 15:00	Wachirathan Waterfall, Summit of Doi Inthanon, and Thai National Observatory Visit	
15:00 - 15:30		
15:30 - 16:00		
16:00 - 16:30		Return to hotel
16:30 - 17:00	Return to hotel	
17:00 - 17:30		
17:30 - 18:00		

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Thursday, November 28th 2024

	THU - NOV 28th	
	Planetarium	Andromeda
09:00- 09:20	Plenary 6. Science Centre Singapore – Nurturing Scientific Literacy through Informal Education in Singapore, Li Hui Mok	
09:20 - 09:40	Plenary 7. 60 Years of Bangkok Planetarium: Challenges and Solutions, Parin Tanawong	
09:40 - 10:00	Plenary 8. Fostering Curiosity: Museums and Planetariums as Catalysts for Lifelong Learning, Rawin Raviwongse	
10:00 - 10:30	Coffee Break	
10:30 - 10:45	O33. Touch the sky. A multisensory planetarium to discover the Universe, Federico Di Giacomo	W06. Phases of the Moon Workshop, Thressapong Siriboon
10:45 - 11:00	O34. Accessible Astronomy Outreach for Blind and Low Vision Youth with the Zenith Mentorship Program, Bailee Wolfe	
11:00 - 11:15	O35. Planetarium program for the visually impaired students in Thailand, Sawitri Datesrimontri	
11:15 - 11:30	O36. Astronomy for students with autism and hearing-impaired, Nattaya Siriwanasakul	
11:30 - 11:45	O37. One Touch at a Time: Learning about Spiral Galaxies through Tactile Models, Rika Mei Reventar	O49. Integrating astronomy at the 2024 Ubonratchathani Candle Festival, Paniwad Senked
11:45 - 12:00	O38. The Role of NARIT in Islamic Astronomy Outreach in Thailand, Sukanya matcha	O50. Astro Challenge: Astronomy trivia competition as an alternative to classroom learning, Jitraporn Junpeng
12:00 - 13:20	Lunch	
13:20 - 13:40	Plenary 9. Cosmos to Classroom - Astronomy Outreach Practice & It's Impact in Pakistan, Yumna Majeed	
13:40 - 14:00	Plenary 10. The Roles of Independent Media in Astronomy Communication, Avivah Yamani	
14:00 - 14:15	O39. From Ayutthaya to the Voyager: The Journey of Space Journalism in Thailand, Nattanon Dungsunenarn	W07. Maximising Impact: Social Media Strategies and Outreach Integration, Diana Haikal
14:15 - 14:30	O40. Cultural Cosmos: Interactive Map of Lakota Archaeoastronomical Sites in the Black Hills, Piramon	

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	THU - NOV 28th	
	Planetarium	Andromeda
	Kumnurdmanee	
14:30 - 14:45	O41. Joining Hands with Science Teachers for a Transformed Astronomy Classroom, Rabina Maharjan	
14:45 - 15:00	O42. Space Pedagogy: Forging Interplanetary Citizens, Guadalupe Zapata Castro	
15:00 - 15:30	Coffee Break	
15:30 - 15:45	O43. Promoting diversity and inclusivity in astronomy outreach: Lessons from Malaysia's multiracial communities through service-learning activities, Othman Zainon	W08. Fun with Dry Ice: Make a Comet + Cosmic Ray Detector, Pranita Sappankum
15:45 - 16:00	O44. Empowering Regional and Rural Schools: Building Long-term Collaborations in Astrophysics and Dark Matter Education, Jackie Bondell	
16:00 - 16:15	O45. Astronomical Activities Inside and Outside the Classroom to Enhance Astronomy Learning Skills Through a STEM Approach, Boonyarit Choonhkit	
16:15 - 16:30	O46. NARIT Astronomical Society (NAS), Astronomy club network for High school student in Thailand, Jessada Keeratibharat	
16:30 - 16:45	O47. Improving School Astronomy Education Program at Bosscha Observatory: Innovative Strategies and Engaging Experiences, Luthfiandari Luthfiandari	O51. Astronomy in an International School in Phuket, Thailand, Derrick Lim
16:45 - 17:00	O48. Designing process of astronomy exhibits for planetariums and science centers, Suparerk Karuehanon	O52. Astronomy Education at Khon Kaen University, Chaiyapong Ruangsuwan
17:00 - 17:30	Closing Ceremony	

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SEA-PEO2024 Full Abstracts

Public Lectures

Public Lecture 1. Citizen Science in Astronomy

Christopher Go, University of San Carlos

With the advent of new imaging technologies, amateur astronomers have been capturing data with unprecedented quality. This is especially true with amateur planetary imaging where images are approaching the quality made by spacecrafts a few decades ago. Contributions by different amateur imagers will be discussed along with how one can contribute to professional astronomical research.

Public Lecture 2. Astronomy is for Everyone

Martin George, International Planetarium Society

We all share the night sky, and for so many people an interest in astronomy comes from their first look up from their back yard, a first look through a telescope, or a visit to a planetarium. Astronomy is a topic that embraces all of the sciences, and mathematics. In particular, even a basic understanding of what we see in the night sky can impart a great appreciation of our place in the Universe and how small we, and even our planet, are. The speaker will discuss such topics as how observations combined with basic school mathematics can reveal the distance to the stars, and how our science and our telescopes have developed to the extent that we can observe amazingly distant objects and even learn about their composition. Importantly, everyone can become involved in research, simply by counting meteors or measuring light pollution. There are even opportunities to send your name to another planet, or to name asteroids!

Plenary Talks

Plenary 1. Astronomy: A challenge that drives human capacity and technology developments through public outreach

Saran Poshyachinda, National Astronomical Research Institute of Thailand (NARIT)

This talk shares the story of Thailand's National Astronomical Research Institute (NARIT) and its fifteen-year dedication to making astronomy accessible to all. With the motto "Leave no one behind," NARIT has built a robust public outreach model, bringing astronomy to diverse communities through observatories, public events, and social media, reaching over a million people annually.

Beyond outreach, NARIT has advanced in deep technologies—developing instruments for astronomy, creating lunar and satellite missions, and supporting Thailand's tech industry. Our teacher-training programs, telescope loans, and DIY planetariums empower educators across the country to sustain these efforts. As we look to the future, we hope NARIT's journey can inspire others to make astronomy part of their cultural landscape.

Plenary 2. Engaging with the Public in Planetariums

Martin George, International Planetarium Society

Since the 1920s, planetariums have been key tools in entertaining and educating people of all ages about astronomy, in particular helping audiences interpret what is seen in the night sky. Planetariums are now in use in very many countries, and we are about to celebrate the 100th anniversary of the world's first public planetarium, which opened on 1925 May 7. The International Planetarium Society (IPS), the world's major professional planetarium organisation, has members from around 50 countries and most recently met at a major conference in Germany. The speaker will discuss the history of planetariums and how they have developed over the decades, and the work and structure of the IPS.

Plenary 3. Shanghai Astronomy Museum's Exploration on Digitalization Enhancing Science Education

Shi Wei, Shanghai Astronomy Museum

Shanghai Astronomy Museum opened in 2021. At 420,000 square feet, it currently holds the title as the world's largest planetarium in terms of building scale. It is capable of hosting 7,000 visitors per day. In this plenary talk we will discuss how it applies digital technology to science education, helping to transform scientific innovation thinking and improve the level of science education.

Plenary 4. Top-Down and Comprehensive Approach to Astronomy Outreach

Matipon Tangmatitham, National Astronomical Research Institute of Thailand (NARIT)

The challenges in expanding existing outreach infrastructures and starting astronomy outreach in a country where none currently exists are fundamentally different. Outreach activities in developed countries tend to come from independent groups that can contribute independently towards the overall outreach initiatives in multiple aspects. However, reaching this "bottoms-up" stage from the ground up can take a long time and can often lead to power vacuum stage. Recognizing the lack of

most outreach infrastructures in Thailand 15 years ago, the National Astronomical Research Institute of Thailand (NARIT) has set outreach as one of its primary goals since its inception. Currently, NARIT operates a chain of five planetariums and about sixty full-time outreach staffs, both of which are among the largest in the world. Last year, NARIT has reached nearly 700,000 public in Thailand This rapid rise in interests and enthusiasms in astronomy from the public not only is a testament to how effect this top-down and comprehensive approach to astronomy outreach can be in jump-starting a developing country, but the overwhelming public support and interest is also a good example of how astronomy outreach can be used in both human capacity development and funding research infrastructure that allow NARIT to grow and becoming home to many world-class research infrastructure at such a rapid rate.

Plenary 5. A very high-energy planetarium. The planetarium as a tool to describe the future of high-energy astronomy

Federico Di Giacomo, INAF - Istituto Nazionale di Astrofisica

Imagine finding yourself in the Atacama Desert, in Chile, one of the driest and most isolated regions on the planet, and being able to walk among the dozens of telescopes that make up the southern site of the future Cherenkov Telescope Array Observatory (CTAO), the largest ground-based gamma-ray observatory. And then, almost magically, having the opportunity to "teleport" yourself to the Canary Islands and wander among the four Large Size Telescopes, 36-meter diameter telescopes, which constitute the heart of the northern site of this great international observatory. This is clearly not possible, not only because teleportation is science fiction, but also because these next-generation instruments are still under development. However, thanks to the use of emerging digital technologies, it is possible to immerse yourself in the details of this international project, in which Italy is heavily involved.

Within the framework of the PNRR CTA+ project (PNRR M4C2 IR0000012 CTA+), funded by the European Union and led by the Italian National Institute of Astrophysics (INAF), a public engagement project has been funded to use virtual reality, 3D videos, interactive infographics etc. to describe the scientific and technological goals of the CTAO. Among the various multimedia products, currently being developed by a professional company in the field of new technology, there is the creation of a virtual reality exhibit and a planetarium show. Through these two products, users will be able to immerse themselves in the future of gamma-ray astronomy, explore the CTAO observatories, climb onto the telescopes to explore and discover the characteristics of Cherenkov cameras, and uncover the secrets and peculiarities of the main celestial sources that these telescopes will observe. In particular, for the planetarium shows, we are realising a series of scripts, thanks to which the planetarist will be able to both adapt the show to the type of audience and focus on particular themes in order to engage the public and describe the future of astrophysics at the very high-energies.

In this talk I will describe the genesis, the different approaches (VR vs film Planetarium vs other digital techniques) in terms of use by the public, the problems encountered, the solutions applied and the educational potential of this activity, which is not just a window on the future of very high energy astrophysics, but a truly engaging journey accessible to all.

Plenary 6. Science Centre Singapore – Nurturing Scientific Literacy through Informal Education in Singapore

Li Hui Mok, Science Centre Singapore

Science Centre Singapore (SCS) had played a key role in Singapore's nation-building journey, evolving with the city-state's changing priorities over the past decades. In this presentation, we will examine SCS' contributions to promoting interest in fundamental science in the 1970s as the country underwent rapid industrialisation. As Singapore transited from a labour-intensive economy to a capital-based economy, SCS expanded facilities and refreshed programmes to encourage greater focus on science, technology, and research and development. Through the knowledge-based economy of the 90s to today's backdrop of optimising the potential of every human resource, acknowledging all individual's unique abilities and aspirations, and preserving core Singaporean values in the face of globalisation, SCS has undergone further transformation with more specialised interest-based programmes. In 2027, SCS will move to a new premise. Along with the upgrades in technology and new programming, SCS is poised to deepen its relevance to the world stage as the centre engages local and international guests on contemporary STEM issues. Journey with us to learn more.

Plenary 7. 60 Years of Bangkok Planetarium: Challenges and Solutions

Parin Tanawong, Bangkok Planetarium

Bangkok Planetarium, Southeast Asia's pioneering planetarium and Thailand's first, recently marked its 60th anniversary in August 2024. Despite its prestigious status and prime location, the planetarium has been facing severe challenges for over a decade, including financial instability, high staff turnover, and a lack of adequate academic qualifications among its team. This presentation outlines the proposed solutions to address these issues and ensure the planetarium's continued operation and success.

Plenary 8. Fostering Curiosity: Museums and Planetariums as Catalysts for Lifelong Learning

Rawin Raviwongse, National Science Museum

Museums and planetariums play a vital role in fostering a lifelong passion for learning by sparking curiosity and imagination. They transform complex scientific concepts into accessible and memorable experiences for children, families, and visitors of all ages. This presentation showcases the collaboration between the National Science Museum Thailand (NSM) and its planetarium partners in bridging the gap between academic knowledge and public understanding. Through their partnership with the National Astronomical Research Institute of Thailand (NARIT), NSM leverages cutting-edge technology in its exhibitions, complemented by basic science displays and maker workshops. NARIT enhances this collaborative effort with its own astronomical exhibitions, planetarium shows, and evening observation events. Together, they create a comprehensive bridge between academic concepts and public engagement. Moreover, NSM and NARIT serve as community hubs, promoting inclusivity and accessibility through strategic collaborations with educational institutions, science and technology agencies, and cultural groups. Their efforts highlight the power of partnerships in creating spaces where people can explore and connect with science.

In summary, as catalysts for curiosity and continuous learning, NSM and NARIT demonstrate that museums and planetariums empower individuals to engage deeply with science and the wider world. This presentation aims to inspire thought and discussion on how these vital institutions can continue to adapt and innovate to meet the educational needs of future generations, while encouraging further collaborations among similar organizations.

Plenary 9. Cosmos to Classroom - Astronomy Outreach Practice & It's Impact in Pakistan

Yumna Majeed, Exploration - Cosmos to Classroom

In Pakistan's Space Sciences field, a lack of awareness was observed in educational institutions and among the public, from outdated curricula in schools that made science uninteresting for students to the militarization of space agencies that led to no jobs in the country’s space sector. Furthermore, there were no public observatories, planetariums or science museums to visit, nor role models or space-career counselling centres where students could progress their professional space careers.

In 2016, a space outreach and awareness campaign was initiated which turned into a space-education organisation two years later. Exploration was created as a volunteer-run organisation with Ms Yumna Majeed as an Ambassador/NOC for global space NGO’s. The mission was to raise awareness about Astronomy among Pakistan's public and promote Astronomy as a subject and career among students. The target audience was narrowed down to primary and secondary schools.

Since Astronomy is an observational science, using art mediums to engage students in themed activities proved to be a good technique. Teaching methods included presentation-based STEM lectures, observation sessions via telescope, hands-on activities, and space-art and storytelling sessions. To build a sustainable model for the organisation and keep the outreach inclusive and diverse, private schools were charged to cover the material cost, subsequent funding enabling the same sessions to be conducted free of cost at low-income schools, trusts and orphanages.

Currently, there's high demand for Space Science workshops, and Exploration reached over 235 schools and more than 18,0000 children. Schools started to celebrate World Space Week, universities initiated Space Clubs and authorities and the national space agency started to address space as part of the course curriculum.

Plenary 10. The Roles of Independent Media in Astronomy Communication

Avivah Yamani, langitselatan; PSI

Independent media or lets say personal media has been increasingly growing during the social media era. And it has become increasingly influential in the field of astronomy communication and public outreach, offering an alternative for the public to look for astronomy information and resources. These platforms, including blogs, podcasts, social media, and community-driven initiatives, provide accessible and engaging content to reach a wider audience. By utilizing diverse formats, independent media have successfully sparked public interest in astronomy, particularly among younger generations. Moreover, these media outlets empower amateur astronomers and enthusiasts to contribute to public discourse, fostering a more inclusive and participatory approach to science communication.

The role of independent media in this domain is not only to educate but also to inspire, creating a more scientifically literate society and encouraging the next generation of astronomers. This talk will highlight the contribution of independent media in astronomy communication and public outreach in the case of Indonesia.

Oral Presentations

O01. Physics-based space flight simulation game competition to promote space enthusiasm in classroom

Matipon Tangmatitham, National Astronomical Research Institute of Thailand (NARIT)

"Space Youth Challenge" is a competition in which teams of 5 students use the game "Kerbal Space Program" to dream up their space missions and then execute them, according to the real laws of physics. Participants get to put the knowledge they learn in schools from physics, celestial mechanics, newton's law of motions, vectors, torque, aerodynamics, etc. into practice. Over the 3 seasons of Space Youth Challenge we have received nearly 1,997 participants from 472 teams. The responses to the competition are overwhelmingly positive and have proven that video game can also be a powerful alternative to conventional formal education in schools on top of allowing artistic freedom and teaching basic video editing skills which is arguable one of the most important skills in this era.

O02. Galaxy Cruise Workshop: Community Involvement in Identifying Galaxies Through Citizen Science Project in Indonesia

ika Srikandi, Institut Technology of Bandung

The "Galaxy Cruise Workshop" at several institution and community in Indonesia such as Institute Tecnology Bandung (ITB), HAAJ, and also Langit Selatan are citizen science initiative designed to engage the community in astronomical research. This workshop provides participants with the opportunity to contribute to the identification and classification of galaxies using images captured by space telescopes. The primary objective of this study is to explore the extent and impact of community involvement in the Galaxy Cruise project, as well as to assess the effectiveness of this approach in enhancing public understanding of astronomy. Through a combination of practical sessions and guided analysis, participants were able to actively participate in scientific processes and gain hands-on experience in data analysis. The study employed both qualitative and quantitative methods to assess participants' experiences and knowledge gains. The findings indicate that the workshop not only a greater appreciation for scientific research but also provided a platform for bridging the gap between scientists and the general public. This paper concludes that community-based initiatives like the Galaxy Cruise Workshop can promote science education and encourage public participation in scientific discovery.

O03. The NARIT Astronomical Teacher Training and Workshop

Thanakrit Santikunaporn, National Astronomical Research Institute of Thailand (NARIT)

NARIT has organised “The Astronomical Teacher Training and Workshop” to train teachers teaching in school, especially those who teach in science and astronomy. Astronomy is the subject included in Thai Basic Education Core Curriculum in 2008. The ultimate goal of this particular training is teachers are able to use astronomy to inspire students on their interests in science, as well as to have good scientific procedures, and search for more knowledge. The training is divided into three levels with various objectives. The Basic level; inspiring teachers to acquire the fundamental knowledge, use astronomical activities to teach students in astronomy and science. The Intermediate level; teachers can gain more skills for astronomical observing and some ideas to produce projects and basic research in astronomy. The Advance level; teachers try creating the astronomical projects with their students, with NARIT direct supervision to completion. These workshop series has been ongoing since 2010 and has trained over 8,000 teachers over the years

O04. The Telescope-in-a-box - A collapsible open-frame Dobsonian Telescope

Abel Yang, National University of Singapore

The telescope-in-a-box is a small objective ultralight Dobsonian telescope that can be packed into a compact travel case, facilitating travel to a dark site. This provides a rich set of opportunities for teaching astronomy, physics and engineering. Our first two prototypes demonstrate that it can be constructed at low cost The third model builds on these designs to provide a fully functional demonstration telescope that is capable on the sky and at the same time highlights key concepts in telescope instrumentation.

O05. CAAS : the Conference on Astronomical Activities in School

Jessada Keeratibharat, National Astronomical Research Institute of Thailand (NARIT)

Thailand is one of the few countries with astronomy as part of the required curriculum in secondary schools. As a result, there are many astronomy teachers in Thailand. With increasing interest in astronomy, there are now more than ever many astronomical activities, both formal and informal in schools. In order to support the growing interest, the Conference on Astronomical Activities in School (CAAS) was established. In this annual conference, teachers can gather to share the activities they have accomplished with their peers. This is aimed to be a venue in which best practices in astronomy education are shared, reinvigorate their passion, provide incentives and inspiration for now and upcoming teachers, and teachers can learn new activities via workshops. Moreover, by awarding outstanding achievements made by the teachers in this conference, this allows for ways in which teachers are recognized and awarded for their arduous work.

O06. Research-based learning as an alternative to classroom education

Sawatkamol Pichadee, National Astronomical Research Institute of Thailand (NARIT)

Astronomy is a globally recognized field that captivates people of all ages, fostering an enthusiasm for science and technology. The National Astronomical Research Institute of Thailand (NARIT) has a main mission to carry out, support, and promote the development of astronomy and astrophysics through research and astronomy activity. NARIT's Astronomy Research-Based Learning Workshop offers an alternative to formal education in the classroom. By conducting a research in astronomy, students not only learn relevant skills in astronomy but also get to explore scientific process and gain valuable skills in critical-thinking, both of which are severely lacking in the current learning culture in Thailand. For many students, this workshop offer them a chance to understand better about astronomy as a career as they perform research using real data from robotic telescopes, learning astronomical softwares, working under supervision of real astronomers. However, the workshop also put emphasis on them coming up with their own original questions as they strive to find answers about astronomical events in their everyday lives. Teachers are also proven to be important to this process and also offer a means in which a progress can be passed on between school years. As such, workshops aimed at training astronomy project advisors have also been crucial. To further promote and support the research-based extracurricular activities, NARIT has also established the Thai Astronomical Conference (TACs) to promote astronomy among young people via astronomical research projects. Over the last decade, TACs have facilitated the participation of over 500 research projects. In the last three years, TACs has also recognized students' potential to further their research tasks by awarding medals to excellent participants, motivating them to continue looking into and innovating in the field.

O07. Our Baby Step in Bridging The Heaven and Earth Through Astronomy

Amirul Hazim Kamarulzaman, Universiti Sultan Zainal Abidin

Astronomy has always been an eye opening experience towards many levels of the public whether they are students, teachers and even professionals. A university with an observatory can serve as a comprehensive experiential learning towards the students and as well as the local community nearby the observatory. KUSZA Observatory has been established for many years and the impact towards students and local communities are still growing even not at a high rate. Through a few challenges such as allocation to organise events and promoting the observatory as an education hub, some measures were taken to overcome these challenges. This includes leveraging astronomical phenomena and collaborating with local authorities. From this effort, the top management, whether from the university or government agencies, they have seen it as a stepping stone in promoting STEM to the students. Whereby this effort can be a way in achieving the national education policy for

60% science stream students. In conjunction to that, the importance of astronomy topics in Malaysia's science subjects to be taught is influencing the long-term of students' knowledge and understanding. The topic of astronomy has been added to every year of students learning in primary school. In conclusion, the university's observatory is actively growing in the context of being an education hub for all level of public not only in physical outreach but also through online outreach as well. This can be done by collaborating with a private agency in providing an immersive 360 degree learning and astrotourism experience about the observatory.

O08. Development of an Exoplanet Learning Assessment

Pranita Sappankum, National Astronomical Research Institute of Thailand (NARIT)

The development of an effective learning assessment tool for exoplanets is important for enhancing educational outcomes in astronomy. This research focuses on developing a comprehensive assessment tool designed to determine student's understanding of exoplanets. The assessment tool was developed through a structured process involving a literature review, expert consultations, and pilot testing. The assessment tool was carefully designed in alignment with the learning objectives of the course in multiple choice question types, aimed at measuring both foundational knowledge and critical thinking skills. A formative test with limited-trial groups of 89 students and teachers at the high school level who are interested in astronomy. The test results were then analyzed to determine item difficulty, item discrimination, and reliability, to assess the overall effectiveness of the assessment tool. The assessment result can be obtained.

O09. NARIT Youth Camp: Entry-level astronomy camp for young adults

Farprakay Jiarakoopt, National Astronomical Research Institute of Thailand (NARIT)

17 years ago, "Astronomy Camp" was a relatively new concept in Thailand, with most youth having no prior experience in astronomy. The National Astronomical Research Institute of Thailand (NARIT) recognized this gap and organized "NARIT Youth Camp" (NYC) under the theme "Play, Learn, and Stargaze." The goal is to foster a positive attitude towards learning astronomy among Thai youth by allowing them to use astronomical equipment themselves and introducing them to career paths in astronomy through professional astronomers. This helps broaden their view of astronomy as a realistic career option and provides guidance for future educational choices.

Currently, NARIT has been running the camp for over 17 years, starting alongside its establishment. To date, 3,030 participants have completed the camp out of over 20,000 applicants from across Thailand. Data from the past three years (2018-2020; 5 camps) shows that many participants have

developed a greater interest in science or engineering fields after attending the camp, often continuing to engage with NARIT activities. Some even pursue careers directly related to astronomy, indicating that the camp effectively promotes sustained interest in astronomy among the youth. Many of new NARIT employees nowadays have been alumni to the NYC, which is a testament to how effective NYC was at fostering a good impression in astronomy.

O10. NARIT 10" Dobsonian Telescope Distribution Project

Khomsan Thuree, National Astronomical Research Institute of Thailand (NARIT)

With the success of NARIT's public outreach program and teacher training workshops, there are now, more than ever, a rapid increase in the interest in astronomy. In order to expand upon this interest, we must train and provide support to those teachers who has potential to reach wider audiences. For the past 9 years, NARIT has been distributing 10" dobsonian to participating schools over all 77 provinces in Thailand. Applications from schools are selected based on the schools' past activities. These telescopes are on loan from NARIT at no additional cost. Moreover, participants must go through training workshop to be able to utilize all the equipments on the telescopes. A system of progress report not only ensure that the telescopes are in constant use, but also serve to promote updates and sense of community among our teacher network and has been proven to be effective at reinvigorating interests and keeping up activity.

O11. Prepare a foundation to attract the interest of the Timorese students to learn astronomy and prepare for future astronomers and scientists.

Luis Nivio, Timor-Leste National Commission for UNESCO

Timor-Leste has been utilizing the same high school curriculum for a decade since 2013, which includes astronomy content in subjects like physics and geology. However, both educators and students find it difficult to understand this content without the necessary methods for teaching and observing the sky. Although some supplementary materials are included in the curriculum, such as specific apps for observation, it is challenging to connect natural phenomena with people’s lives without being able to observe them directly.

In 2023, a total solar eclipse occurred in some regions of Timor-Leste, but only a few people had the opportunity to observe it with proper protective eyeglasses and telescopes led by some experts and foreign scientists. There was less information broadcast on local TV channels and social media and less training for the community and schools regarding the proper observation of the total solar

eclipse. Additionally, some influential leaders were not convinced enough to allow the community to actively participate in the observation of this rare phenomenon.

To address these issues, efforts were made by the Science division team within the Timor-Leste National Commission for UNESCO in collaboration with ITERA to provide five days of training for twenty-four (24) teachers of secondary schools around eleven municipalities. The training included hands-on materials and sophisticated equipment related to astronomy topics. The pre-test and post-test results have shown an improvement in the teacher's knowledge of utilizing particular equipment and apps for astronomy topics after training. However, educators still need more confidence and schools require more supporting materials, including a telescope to implement astronomy topics effectively. Therefore, there is a need for relevant ministries to provide municipal laboratories with at least one telescope each to support schools that participated in the training process.

O12. Bridging Ancient wisdom and Modern Science: Insights from Historical Practices

Teresinha Soares, National University of East Timor

Long before I had the opportunity to formally study the Stone Age, my family practiced a form of ancient astronomy that mirrors what we now understand about early human societies. In our daily lives, we relied on natural indicators for agricultural activities. For example, the crowing of the rooster and the shifting shadows of the day served as our time indicators. The number of times the rooster crowed helped us decide when to start our daily tasks. We planned visits to colleagues or relatives based on the sun’s position, using terms such as early morning, sunrise, noon, afternoon, late afternoon, and night to describe the time of day. This tradition became so deeply ingrained in me that during secondary school, my friends would depend on me to tell the time if they did not have a watch. This profound connection with nature and its rhythms, rooted in my family's agricultural background, sparked my interest in natural sciences. This passion eventually played a role in establishing a physics department in Timor-Leste (TL), a significant milestone for a country that lacked such a department during the Indonesian occupation (1975-1999). The department aims to nurture future scientists and astronomers, continuing the legacy of understanding nature that began in my early years.

O13. Implementation of Learner-Centered Education in University Courses through Collaborative Project on Light Pollution

Kiki Vierdayanti, ITB

Learner-Centered Education (LCE) nowadays is considered as the effective approach to maximize the benefit of formal education. Project-based study is one of the recommended methods in LCE. We designed and implemented a project assignment based on a real case of light pollution around Bosscha Observatory in Lembang, Indonesia. The project involved collaboration between students in two different courses with broad knowledge backgrounds (astronomy, mathematics, physics, chemistry, electrical engineering, informatics, biomedical engineering, geophysical engineering, and petroleum engineering). Evaluation of the effectiveness of the project-based study was done through questionnaire and peer assessment within each student group. We found that at least 60% of students think that this project-based assignment is highly beneficial to further develop their communication skills, teamwork, time and workload management, problem solving, and critical thinking. We also identified some challenges in the implementation of LCE using project-based learning, such as the large number of teaching assistants needed, the additional workload for the lecturers to design, monitor, and evaluate the project, and potential risk of overloading the students with excessive study materials

in the case of poor group dynamics.

O14. Strategies to conduct stargazing programmes in Singapore's challenging environment

Meng Hwee Lim, Science Centre Singapore

In Singapore, observatory programmes face challenges due to light pollution in urban areas and the busy lifestyles of the populace. These factors lead to challenging viewing conditions and a disconnect from the natural environment, often relegating astronomy to a niche hobby for a select few. To enhance public engagement, Science Centre Singapore has implemented strategies, such as integrating stargazing into built environments through simulation, incorporating astronomy into daily routines and culturally significant experiences, and utilising digital platforms to access night skies globally. Join us for a session to explore the impact of these strategies on astronomy education in Singapore.

O15. Raising Dark Sky tourism and Light pollution awareness : The Amazing Dark Sky in Thailand

Jessada Keeratibharat, National Astronomical Research Institute of Thailand (NARIT)

Since 2021, over 110 sites in Thailand have been designated as dark sky areas by the National Astronomical Research Institute of Thailand (NARIT). In addition to the focus on preserving pristine and pollution-free sky, Amazing Dark Sky in Thailand project also focus on the raising awareness on the issue of light pollution and promoting "Dark Sky tourism" as an engine for sustainable

socio-economic development. To support these goals NARIT also launches other programs aimed to compliment these effort. The "astro guide" training program seek to train, evaluate, and certify astronomy outreach personnels that will operate in these dark sky areas that is vital to the sustainability of the tourism of the dark sky preserves. In order to promote the dark sky projects and raising awareness in the public sector, "Dark Sky Star Party" are held annually receiving around 2,000-3,000 visitors. The success of this program is a testament to how public institution can play a privotal role in promotion dark sky awareness and bring economical development to rural areas via astrotourism.

O16. Light Pollution Effect: Analysis of Streetlamps Spectra Around the Bosscha Observatory, Lembang, Indonesia

Aprilia Aprilia, ITB

It has been known that light pollution has negatively contributed to several aspects of human life, including astronomy. One of the main sources of light pollution is street lighting. The light spectrum produced by these lamps can interfere with the star spectrum obtained from astronomical observations. Therefore, it is important to map the types of lamps and their spectra, as well as their distribution around the observatory. This light pollution has become one of the challenges in conducting astronomical observations, including at the Bosscha Observatory in Indonesia. Over the past two decades, light pollution around the Bosscha Observatory has increased due to the growing activities in the city of Lembang, where the observatory is located. In this study, data on the light spectrum of streetlamps around the observatory were collected. This data was then analysed to determine the types of lamps used. Observations of star brightness were also conducted as an additional analysis of the level of light pollution around the observatory, which were then compared with the Bortle scale. Both activities are also part of the international citizen-science campaign from the Globe at Night and Street Spectra projects.

O17. Using The Story Circle To Develop Flexible and Engaging Live Planetarium Shows

Pecier Paul Decierdo, The Mind Museum (Bonifacio Art Foundation, Inc.)

Planetarium films (fulldome shows) and live planetarium shows have each their own advantages and disadvantages. In addition to screening planetarium films, any planetarium would benefit to have live planetarium shows where a science communicator uses the dome to teach a lesson in front of a live audience. Among the great advantages of live planetarium shows are their flexibility and ability to engage audiences through the rapport between presenter and audience. However, frequently writing new scripts for a live planetarium show can be challenging. Finding a pool of science communicators able to facilitate a live planetarium show can also be an obstacle for a facility with only a few staff

members confident with their knowledge of astronomy. In this presentation, I will discuss how I employed the "Story Circle" developed by TV writer Dan Harmon, combined with my experience writing for the science TV show "Mind S-Cool," to develop a template for quickly writing engaging live planetarium shows. I introduced this template to a team of science communicators with backgrounds in various STEM fields not closely allied to astronomy, but who were trained in improvisational theater. Using the template, we were able to develop and successfully run a live planetarium show that engage audiences through topics and storylines that tap into topics salient to audiences' minds such as the changing of the seasons, cultural celebrations with roots in or links to astronomy, the visibility of the Milky Way or certain planets, or upcoming celestial events such as meteor showers and eclipses.

O18. The Dome as a Creative Space

David Ault, Immersive Experiences

It was at Thinktank, the Birmingham Science Museum in 2005 when I received my first experience inside a proper planetarium as an adult. The freshly-

installed Digistar 3 system was brimming with potential for opening the universe up to so many people, and in so many new ways. It was there that we used the dome to create site-specific theatre, to have concerts with music and visuals, and opened up new STEM subjects to the fulldome treatment.

In the years that have followed, we have expanded the scope of mobile, semi-permanent geodesic and permanant domes, from theatre to exhbition, religious to recreational, while still keeping the core of astronomy alive. We have also sought to push further with mobile domes to explore shopping centres, events and other places where a dome may not necessarily be the first thought for organisers, but may well be the only place the public can easily contact science.

This presentation will showcase some of those uses, and challenge the audience to think of new ways to use a planetarium.

O19. Planetariums as Celestial spheres for education

Alexander Adli, RSA Cosmos Konica Minolta

Planetariums are a small universe, the fulldome concept is a reflection of the old and fundamental concept of the celestial sphere model of the universe. The planetariums hall allows the audience to get inside this celestial sphere and observe the mechanics of the universe. The digital planetarium simulators today are so powerful that allows to control every single parameter and manipulate the observer location allowing for the first time to observe the same astronomical phenomenen from different positions and angles.

Planetariums are traditionally simulators for the geocentric model of the universe.

Today despite huge number of popular educational shows, young children are often missing the understanding of the fundamental mechanics of the universe. The huge amount of information without solid base is difficult to structure. During my numerous visits to planetariums around the world, I conducted simple questions with young children in different countries. And they were virtually difficult for most of the children to answer, for example:

- You learnt that the stars do not move, and the planets move. Then why both stars and planets move when you observe them at night?

It says the Sun real motion is from the West to the East, then why it raises in the east and goes to the west?

If Venus is closer than the Sun to Earth, how can it become further that the Sun?

Why the Moon is influenced by Earth Gravity but there is already no gravity at the ISS just 300km above the Earth.

Etc

The planetariums today with its powerful simulation means are the best tools to demonstrate visually the solar system mechanics, which are the origin of physics. and this should become one of the central missions of planetariums.

O20. Planetariums in Korea

Soonchang Park, Metaspace

Korea is home to 97 planetariums, including 16 hybrid planetariums. The first planetarium, donated by a Korean businessman in Japan, opened on April 29, 1967. The majority of these planetariums have been built in the past 20 years, following the introduction of relatively affordable digital planetarium systems. Annually, about 2 million visitors attend these planetariums. This presentation will cover comprehensive data on these facilities, including screen size, seating capacity, annual attendance, and more.

O21. PAGASA Planetarium Then and Now

Ma. Rosario Ramos, PAGASA

This presents the history of PAGASA Planetarium in the Philippines how it works and help promote the science of astronomy . The live planetarium show/ lecture is an effective way of disseminating the latest astronomical information to the students and the general public. Mobile Planetarium

together with the Fixed Planetarium can be of great help in astronomy education, outreach, and communication.

O22. The BCIS Planetarium: A Hub for Cross-Disciplinary Learning and STEAM Integration

Marco Capriz, BCIS

The BCIS Planetarium is not merely a traditional observatory but an innovative educational tool that seamlessly integrates the study of Astronomy with various other academic disciplines. At BCIS, the planetarium serves as a core element in fostering a culture of curiosity and interdisciplinary learning, essential to the school's unique STEAM (Science, Technology, Engineering, Arts, and Mathematics) approach.

In this presentation we explore how the planetarium is utilised to enhance student engagement across both STEM and Arts subjects. It demonstrates the planetarium's role in linking disciplines such as Physics, Chemistry, Mathematics, Biology, and Computer Science with Arts, Literature, and Media Studies. Through carefully designed activities, students gain practical experience by applying scientific concepts from Astronomy in both scientific and creative contexts, such as understanding orientation by observing the night sky, examining the physics and mathematics of space travel, producing full-dome movies, conducting the planetary atmosphere experiments, creating science-related art, and writing science fiction narratives.

Moreover, the planetarium is a critical tool for promoting community outreach and cross-discipline cooperation. It is used extensively in extracurricular activities like astronomy camps and astrophotography workshops, which help students develop not only scientific knowledge but also communication and presentation skills. The planetarium also supports the school's commitment to making Earth and Space sciences accessible to a broader audience, including public schools and local communities.

This presentation highlights the planetarium's role in making astronomy an integral part of the BCIS curriculum and its contribution to developing well-rounded students who are prepared to tackle complex scientific challenges through an interdisciplinary lens.

O23. Observatory Visit Program for Public: Bosscha Observatory Experience Post-pandemic

Ajeng Tri Handini, Bosscha Observatory

Following a three-year closure to the public due to the COVID-19 pandemic, Bosscha Observatory resumed its onsite public visit programs in 2023 with a strategic transformation to perform the

University Tri Dharma mission: education, research, and public service. The new programs offer more direct experiences, allowing visitors to have a direct-experience through astronomical observation sessions. To improve the learning sharing, the observatory has decreased daily visitor capacity by 70% from pre-pandemic levels with the aim of increasing the intensity of communication and engagement between the audience and astronomers. Additionally, it has focused on enhancing the skills of human resources, particularly students involved in educational activities, ensuring they can effectively operate instruments, and provide meaningful educational content. This addresses the technical skills gap created by pandemic disruptions where students do not have many opportunities to practice hands-on with astronomical instruments. The observatory has also introduced online registration to streamline visitor management, boosting operational efficiency and accessibility.

This strategy reaffirms Bosscha Observatory's role as a research-driven institution and strengthens its position in advancing astronomy and astrophysics education in Indonesia. By fostering a deeper understanding of its scientific mission among visitors and cultivating public support, the observatory aims to effectively achieve its research and educational goals. This abstract highlights Bosscha Observatory's adaptive response to global challenges, emphasizing its commitment to scientific outreach, and community engagement in the post-pandemic landscape.

O24. Celebrating 50 Years of the Philippine Astronomical Society: A Review of the Challenges and Best Practices for Astronomy Outreach in the Philippines

Martine Joy Irog, Philippine Astronomical Society, Inc.

The Philippine Astronomical Society, Inc. (PAS), founded in 1971, is the first astronomical organization in the country that promotes astronomy education through integrated and interdisciplinary strategies. Through the years, PAS has consistently upheld its mission by organizing regular public astronomy lectures and workshops, free telescope viewings, school outreach activities, and out-of-town stargazing camps. Initiated by the organization, the annual celebration of National Astronomy Week in the Philippines comprises astronomy activities and contests for primary and secondary school pupils around the Metropolitan Manila area. The best practices and the challenges encountered in the outreach programs were analyzed and reviewed. One of the biggest problems was the COVID-19 pandemic which resulted in the sudden transition to online outreach events, thus restricting hands-on astronomy activities and stargazing camps. The overwhelming aftermath of the pandemic pushed the boundaries in astronomy outreach programs and has changed the trajectory of astronomy education in the post-pandemic era. We have evaluated the outcome and indicators of the different outreach programs to determine some prospects for improvement in future events. Furthermore, we have given some recommendations on the strategies for conducting effective astronomy outreach programs to promote better accessibility and diversity, and enhance the quality of the programs and activities.

O25. A Closer Look at the Philippines' National Astronomy Week: Challenges, Impacts, and Future Directions

Mar Emmanuel Velasco, Philippine Astronomical Society, Inc. and Rizal Technological University

National Astronomy Week (NAW) in the Philippines, established through Presidential Proclamation No. 130 in 1993, promotes public engagement and education in Astronomy. Spearheaded by the Philippine Astronomical Society, Inc. (PAS) and the Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA), NAW unites organizations to highlight the significance of Astronomy in society, while advancing the United Nations' Sustainable Development Goals (SDGs), particularly SDG 4 (quality education) and SDG 17 (partnerships for sustainable development).

Targeting a diverse audience—including students from elementary to undergraduate levels, professionals, and amateur astronomers—NAW spans locations across Metro Manila and beyond. This research examines the history, structure, and impact of NAW, focusing on typical activities, timeline planning, stakeholder collaboration, resource management, and coordination challenges among institutions and organizations.

By identifying the risks and opportunities inherent in organizing NAW, this study provides an analysis of audience reach, inclusivity, and the event's effectiveness in advancing Astronomy education. Recommendations are offered to enhance risk management and optimize stakeholder collaboration, ensuring future NAW celebrations continue to align with the SDGs and broaden public participation in science and technology across the Philippines.

O26. Communicating Astronomy with the Public through Zero Waste Camping Activity in Thailand

Nareemas Chehlaeh, Prince of Songkla University, Thailand

Astronomy is the oldest science, crucial for human life throughout history, serving various practical purposes such as navigation, agriculture, and timekeeping. Disseminating knowledge about astronomy is essential for fostering scientific literacy and curiosity. The objective of our work is to propose an approach for communicating astronomical knowledge to the public by integrating astronomical activities into environmental conservation camps. Zero Waste Camp is an environmental conservation camp established under the concept of nature-friendly camping. It introduces the concept of zero waste, which has garnered interest from many countries, including Thailand. Zero Waste Camp is a tourism activity that fosters happiness and does not harm natural attractions. When campers return home, they can apply these principles to their daily lives. This integration fosters a deeper understanding of the natural world and promotes the practical

application of knowledge gained during the camp experience. Nowadays, the camp has reached its 11th iteration and is frequently organized in rich natural and cultural areas in the southern part of Thailand for three days and two nights. The astronomical events conducted at Zero Waste Camp include: 1) providing an overview of fundamental stargazing, 2) organizing night sky observation sessions using telescopes and binoculars, 3) exploring star narratives, 4) explaining the significance of constellations, planets, and other celestial objects, 5) engaging in discussions on the challenges of the dark sky project in Thailand, and 6) showcasing the impact of light pollution on ecosystems and nocturnal wildlife. By combining astronomy with environmental conservation in camp activities, we can create a unique and holistic learning experience that encourages participants to view the natural world through a broader lens. This interdisciplinary approach helps participants appreciate the interconnectedness of the cosmos and the Earth, fostering a deeper understanding of the natural world. Moreover, this approach can inspire a sense of wonder, curiosity, and environmental stewardship among the public.

O27. Space journalism in Thailand: Making space relevant with the public.

Kornthong Wiriyasawetkul, KornKT

This presentation discusses the work of communicating astronomy and space with the public in Thailand since 2017. As the co-founder of Spaceth.co, cross-platform content creator as KornKT, and space journalist for THE STANDARD. This presentation showcases the method that makes astronomy news and content reach nationwide audiences, along with the impact that these contents have on the Thai public. Along with discussing the difficulties and limitations which hinder the progress of conducting space journalism in Thailand.

O28. Communicating Astronomy with the Public: Communicating through Networking in Vietnam

Tan Vu Nguyen, Vietnamese Astronomical Society

The presentation sheds light on how astronomy communication, especially through effective networking and collaboration inside and outside the community of astronomers in Vietnam, has helped to maintain and strengthen the state of astronomy in the populous South-east Asian country.

In this presentation, the author showcases the mediating role of amateur astronomy, astronomy education and public outreach between different domains (the state, the society, and the science) in a less-developed country like Vietnam, as well as the impacts of communicating astronomy, and sciences in general, in promoting values and stimulating socio-economic growth. In fact, Vietnamese amateur astronomers have been playing an essential role in carrying out astronomy communication

and education, and in contributing to the development of astronomy in their home country for over two decades, against a backdrop full of barriers and challenges. Amateur astronomers as well as astronomy communicators, educators, and astronomy enthusiasts in Vietnam are also prominent determinants for the recent revival of the Vietnamese Astronomical Society (VAS) from its decade-long 'hibernation'. As a token of appreciation, VAS subsequently elected its first non-professional board member and now welcomes non-professional astronomers to join the society.

Networking, intra- and international collaboration then has been proven to become a kind of pressure for changes for established institutions as well as Vietnamese society as a whole. The presentation also attempts to explore and express these relationships, span their boundaries to make sense of both familiar and unfamiliar obstacles faced in the work of astronomy communication in Vietnam. The entanglements of (socio-political) problems, which has long hindered the work of astronomy outreach, somehow offer an insight into the problems themselves and provide a few hints about how to navigate the narrows. Besides, networking and collaboration are like the looking glass, help them to weave the thread for effective communicating astronomy with the public in Vietnam, taking into account the multi-dimension characteristics of the local context: finding more like-minded people; trying more and learning hard from failures in public and policy engagement; engaging with and mobilising more resources inside and outside the country for astronomy in Vietnam.

O29. The Path to 700K: Navigating Social Media Growth Strategies

Piriyaporn Sabhasri, National Astronomical Research Institute of Thailand (NARIT)

Explore NARIT's journey to achieve 700K followers across diverse social media platforms—an achievement that stands out for being accomplished with 100% organic posts. Uncover NARIT's key strategies, innovative initiatives, and effective practices, along with its unique approach to communicating astronomy tailored for Thai audiences through the use of the Thai language and connections to Thai cultures and festivals. Through our social media strategy, we've cultivated a robust online astronomy community in Thailand, facilitating knowledge exchange. This has significantly increased people's interest in astronomy, sparking a viral stargazing trend that draws a maximum of 12,000 individuals to our stargazing events in a single night.

The success of these strategies has led to NARIT being recognized and honored with awards in the field of social media. This includes the "Best Brand Performance on Social Media of Government and State Enterprise" at the Thailand Zocial Awards 2019 and the achievement of being one of the top 5 Best Brand Performances for three years (2020, 2021, 2023). We were also acknowledged as the "Winner of Innovation Communicator" at the National Innovation Awards 2020 and received the esteemed title of "Best Science Communicator" at the Mahidol Science Communicator Award 2020. These awards underline our success in using social media effectively. We aim to share valuable insights, including examples of successful content on our Facebook, X, Instagram, Youtube, and

TikTok, to provide practical lessons that can enhance your own social media presence. Together, we can contribute to the growth of the astronomy community worldwide.

O30. Starry Night Over Bangkok: The largest stargazing event in the recorded history

Suparerk Karuehanon, National Astronomical Research Institute of Thailand (NARIT)

On December 23rd 2023, NARIT held the first ever stargazing events held in the capital city of Thailand. This event was meant to promote astronomy awareness, dark sky tourism, and is an overdue visit to many of NARIT's fans and supporters in Bangkok for the past 15 years. However, holding stargazing events in the most light polluted city of Thailand comes with its unique challenges. With the expectation of large traffic and the limitation of the actual sky, many supplemental activities were prepared: from DIY light boxes, photo session, glow in the dark, to live music and more. We also gathered many telescopes from NARIT's network such as the teachers and school astronomy clubs. In the end, this event was proven to be widely popular as it has received more than 12,695 participants in the span of four hours. This puts this event as the most widely visited stargazing events ever recorded by mankind.

O31. Utilizing Radio Telescope at Bosscha Observatory for a Multidisciplinary Research: Developing Astronomy and Public Engagement

Martha Kurniasari, Institut Teknologi Bandung

Development of radio astronomy at Bosscha Observatory currently is entering a new phase with the construction of a VGOS (Very Long Baseline Interferometry Global Observing System) radio telescope in cooperation with Shanghai Astronomical Observatory, CAS. The project integrates expertise from astronomy, astrophysics, geodesy, electrical engineering, data science, and planetary sciences to maximize its potentials to do science project. By focusing on both targeted observations and broad sky surveys, the VGOS Station aims to join a variety of scientific endeavors related to its capability, particularly in VLBI mode. In this work, we try to explore the quest to answer the profound question, "Are we alone in the universe?" that has captivated humanity for generations. It consist of, among others, to identify non-random, narrow-band radio signals, and other electromagnetic anomalies that could signify advanced technological activities. The global network of VLBI stations allows for coordinated observations and verification of detections. This multidisciplinary approach not only advances the scientific understanding of potential extraterrestrial technologies but also encourage public engagement. The question of extraterrestrial life resonates deeply with the public, driving interest and investment in space science and technology. By involving the public through outreach

programs and transparent reporting of findings, this project aims to inspire the next generation of scientists and enthusiasts.

O32. The Economic Impact of Astronomy Rally Activities.

Ananpol Sudsap, National Astronomical Research Institute of Thailand (NARIT)

Nakhon Ratchasima Province, known for having the highest GDP in the northeastern region of Thailand, benefits from its geographical position as a gateway to the region and its numerous attractions. In order to align with the goals of the service and tourism industries, the Nakhon Ratchasima Regional Observatory organized a 2-day, 1-night astronomy-themed rally aimed towards families from other provinces. This event combined astronomical tourism with local cultural experiences, such as learning about the colors of Dan Kwian pottery, tracing the footsteps of King Narai, passing through the city gate, and engaging in activities related to animals in space. The route included famous dining spots, shopping areas, and hotels, featuring reviews and check-in points to highlight educational links to astronomy. The Astronomy Rally was successful in promoting the regional economy by bringing in tourist, increasing spending on dining and accommodations. In the long run, they have also led to the creation of new tourism routes, inspired by and based on the paths and activities established during the Astronomy Rally and also serve as a proof of concept in how astronomy-oriented activities can also be used in conjunction with tourism and service industry to promote local economy.

O33. Touch the sky. A multisensory planetarium to discover the Universe

Federico Di Giacomo, INAF - Istituto Nazionale di Astrofisica

Since the dawn of time, humans have looked at the night sky and wondered about the nature of what they were seeing. They started arguing possible explanations and eventually seeking for ways to scientifically address their questions, also by investigating the sky using instruments able to observe it beyond what they could sense. The celestial vault is the apparent surface of the sky, which many cultures and myths intend as a sort of physical cover above the observer. Though being an apparent feature, which existence has been overcome by scientific studies and modern astronomical observations, it still represents a powerful idea, historically, sociologically, and culturally grouping humanity. This concept is inaccessible to BVI users, who cannot appreciate the feeling of standing below a black dome checkered with bright points, the stars. To make the celestial vault more accessible to BVI users, the multisensory representations have proven to have great potential and effectiveness. Following this approach, we created a multisensory planetarium, asking for hints and suggestions from possible end-users.

In this contribution we will describe the idea, the design, the prototyping and the preliminary evaluation of a multisensory planetarium which uses visual, acoustic and haptic stimuli to convey both the apparent and physical features of stars in the night sky, to offer a common perceptual framework to sighted, deaf and blind or visually impaired users.

The planetarium consists of a plexiglass hemisphere on which stars from the first to the fourth magnitude are represented each by a metal bar that, when touched, activates visual, haptic and acoustic stimuli. Among the approximately 6000 stars visible in the sky, we decided to put in our multisensory planetarium only the stars up to the fourth magnitude. This means that on the surface of the planetarium the users will be able to find about a hundred stars. They are represented by metal bars that, when touched, activate visual, haptic and acoustic stimuli.

The physical characteristics of represented stars mapped onto the planetarium are:

1) Position: Information about the position of the stars on the celestial vault are provided both as tactile and visual stimuli, corresponding to the position of the bar on the plexiglass dome.

2) Magnitude: we mapped it both on acoustic, visual and haptic stimuli for each source. The visual stimulus was a light from the LED on top of the bar, proportional to the apparent intensity of the represented object. The acoustic stimulus is a note of volume increasing with magnitude.

3) Distance: The distance of the star from us is mapped on a vibration, faster/slower for smaller/greater distances.

Thanks to this project it is possible to offer a common perceptual and cognitive framework to all users, both sighted, deaf and blind or visually impaired, concerning the experience of observing the night sky, but also to provide to all equal access to scientific data regarding the observed objects, exceeding what can be sensed.

O34. Accessible Astronomy Outreach for Blind and Low Vision Youth with the Zenith Mentorship Program

Bailee Wolfe, Swinburne University of Technology

Zenith is a semester-long mentoring program supported by the Department of Astronomy at the Ohio State University, the Ohio State School for the Blind, and the SciAccess Initiative, an international organization devoted to increasing diversity and inclusion in the sciences. Our program is designed for blind and low vision students, in grades 8-12, who are interested in STEM. Zenith brings in weekly speakers from a variety of fields, but with an emphasis on engineering, and environmental, earth, and space science. In addition to weekly cohort meetings, students are paired up with university mentors who facilitate discussions about college life while also exploring each student's scientific interests. Zenith offers both individual and group mentorship in a virtual and in-person environment. Previous iterations of the program have run both virtually via Zoom and in

person, reaching students from across the United States and globally. Zenith aims to improve access and encouragement to Blind and Low Vision students to pursue education and careers in STEM and Astronomy, in particular. To teach in a BLV accessible way, we utilize tactile graphs, 3D models and sonified data to teach topics in Astronomy to our students. Students are also exposed to the inner workings of higher education and the research process and work one-on-one with a mentor to facilitate a research project on a topic of their choosing.

In this presentation, I will discuss the successes and challenges faced by the program since its start in August 2020. I will also discuss the various accessible activities and teaching methods that we have used as part of the program, along with some ideas for future projects that may be implemented as part of a variety of programs.

O35. Planetarium program for the visually impaired students in Thailand

Sawitri Datesrimontri, National Astronomical Research Institute of Thailand (NARIT)

Planetarium programs are normally strictly considered a visual experience. This study done by the National Astronomical Research Institute of Thailand (NARIT) aims to develop a suitable planetarium program that could provide visually impaired students with an experience suited to their unique requirements. The program utilizes a mixture of approaches such as auditory stimuli, tactile 3D models, spatial awareness, and size comparison to educate and entertain participants in upper elementary schools across Thailand. Activities include making a scale model of the solar system with clay, modeling the Sun's movement across the sky using a handheld object, and learning constellations through tactile planetarium model. Pre-assessment interviews have shown that most students show curiosities in experiencing a planetarium and could repeat the scientific concept behind many astronomical phenomena, but lack true understanding behind what the concept truly means. Preliminary results have shown that the implementation of interactive methodologies and integration of tactile models is successful in stimulating comprehension, understanding, and further enthusiasm from the participants. Students were able to learn that the day-night cycle is a result of the rotation of the Earth, that stars in the sky can be grouped into constellations, and were curious as to why rocky planets tend to be more similar in sizes, etc. The activity was well received by both the students and participating schools. Participants were able to focus almost entirely during the program without losing interest and even expressed their interest in their discussion during lunch after the program. The success of this program is a testament to the potential and viability of accessibility in planetarium programs suited for visually impaired individuals.

O36. Astronomy for students with autism and hearing-impaired

Nattaya Siriwanasakul, National Astronomical Research Institute of Thailand (NARIT)

There are many overalpping conditions between students with autism and hearing-impairments. These conditions can present a challenge in learning, requiring special attention or specialized learning techniques. To better design astronomical activities that are accessible to these groups, a preliminary consultation with schools is performed that eventually culimate in a astronomy camp and activities for students with autism and hearing-impairments.

O37. One Touch at a Time: Learning about Spiral Galaxies through Tactile Models

Rika Mei Reventar, New Era University

The study of Astronomy has established a reputation as one that is fundamentally visual, but the desire to give visually impaired and blind people access to astronomy has long been pursued. Limited resources have impeded our curiosity about the cosmos, especially when it comes to studying complex celestial objects like galaxies. This research integrates three types of 3D tactile models to teach students from the Northern Region School for the Blind in Chiang Mai, Thailand, about spiral galaxies.

The study assesses the effectiveness of these models in enhancing comprehension and engagement among blind students. Preliminary findings indicate that the use of tactile models significantly improves understanding of spiral galaxy structures, promoting equitable access to complex scientific concepts. This work highlights the potential for 3D tactile models to bridge educational gaps and foster a deeper appreciation of astronomy among visually impaired learners.

O38. The Role of NARIT in Islamic Astronomy Outreach in Thailand

Sukanya matcha, National Astronomical Research Institute of Thailand (NARIT)

The National Astronomical Research Institute of Thailand (NARIT) plays a significant role in promoting Islamic astronomy within the Thai community. The main goal of this initiative is to

enhance public understanding of astronomy in Muslim life. NARIT engages various audiences through educational programs, camp, and public lectures, highlighting the practical applications

of astronomy in Islamic practices. These include observations of the first crescent for the Islamic calendar, determining prayer times, and finding the direction of Qibla. Collaborative efforts with

mosques, educational institutions, and cultural organizations support a comprehensive approach to outreach, promoting community participation and awareness. NARIT aims to enrich the

cultural and scientific knowledge of the Thai community and fosters dialogue between scientific inquiry and religious beliefs through public events and digital platforms. Ultimately, NARIT's

outreach efforts aim to increase appreciation for astronomy's role in Islamic heritage and its significance in daily life, promoting a sense of pride and knowledge within the community.

O39. From Ayutthaya to the Voyager: The Journey of Space Journalism in Thailand

Nattanon Dungsunenarn, Spaceth.co

Spaceth.co is an online publisher that collaborates with world-class space and astronomy organizations like NASA, JAXA, and ESA. Our goal is to usher in the next chapter of space journalism in Thailand, applying the principles and philosophies of space journalism to our work.

We analyze the evolution of space and astronomy journalism in Thailand, starting with historical documents by Kosa Pan of Ayutthaya during his expedition to Paris, France, where he met renowned astronomers including Giovanni Cassini. We trace this evolution through the Rattanakosin era, when King Rama IV accurately predicted a total solar eclipse, to the modern Apollo era, where contemporary journalism emerged in Thailand, uncovering untold stories such as King Rama IX's correspondence with NASA. Additionally, we discovered the identity of the Thai voice featured on the Voyager Golden Record.

Our methodology includes a literature review and verbal interviews with individuals who have played a role in the historical development of space and astronomy journalism in Thailand. We conclude that advancing space journalism in Thailand will significantly benefit our scientific and space communities.

O40. Cultural Cosmos: Interactive Map of Lakota Archaeoastronomical Sites in the Black Hills

Piramon Kumnurdmanee, University of California, Santa Cruz / Spaceth.co

This project goal is to develop an interactive website for users to dive into the expansive star knowledge of a Great Plains indigenous group, the Lakota Sioux people. The Lakota Sioux people, a historically nomadic indigenous group, have long believed that Earth is the reflection of what happens in the sky. The hills within the area now called the Black Hills in South Dakota and Wyoming

are connected to the Lakota Sacred Hoop asterism. Each season, the Lakota Sioux gather at different sites in the Black Hills area for ceremonies due to the different aligning constellations. The website will show an interactive map of the archaeoastronomical sites representing the connection between land and sky of the Lakota people in The Black Hills.

With the expansion from the study of Lakota migration history, connections with sky and land, and interactions with neighboring indigenous groups, this project will be the groundwork for other archaeoastronomical sites in the Great Plains and beyond.

O41. Joining Hands with Science Teachers for a Transformed Astronomy Classroom

Rabina Maharjan, Saraswati Niketan Secondary School

Astronomy education has been overlooked in Nepal in terms of content as well as pedagogy. The content for astronomy is included in the science curriculum and is limited within one or two chapters in the textbooks. During the facilitation mostly conventional methods of teaching and learning dominate. In this scenario, the need for an eye opener for the teachers was a necessity in order to empower and equip the science teachers from secondary and basic level schools with sound knowledge and appropriate pedagogy for teaching and learning astronomy. The TTP, 2023 (Teacher Training Program funded by IAU-OAE) was designed to familiarize the participant teachers to both content and innovative pedagogy of Astronomy teaching. The core content of the TTP were innovative pedagogies for teaching astronomy (Inquiry-based Learning, Project-based Learning, 5E Lesson Plan), Hands on activities for visualizing Astronomy content (Solar system, Phases of the moon) and ICT Tools for teaching Astronomy. The participants not only learned about the pedagogies but had opportunities to design the plan based on those innovative pedagogies which they could implement in their classroom. Entrusted with the mentoring model of teachers' professional development, the participants kept in touch even after the session and shared their lesson plans expecting some inputs and feedback from the resource person of the sessions. Therefore, the mentoring model allowed mentor and mentee to work with the teachers and co-construct the knowledge rather than just training them in a hierarchical trainer-trainee model during the session only. The TTP participants were 15 secondary level science teachers who teach in grade 8, 9 and 10. They were the teachers from public as well as private schools from Kathmandu as well the nearby districts such as Bhaktapur, Lalitpur and Kabhre. Through the community of practice they still share the success and failure stories and support each other which can be considered as a byproduct of TTP 2023.

O42. Space Pedagogy: Forging Interplanetary Citizens

Guadalupe Zapata Castro, Instituto Politecnico Nacional

This paper proposes a deep reflection on the need to develop a space pedagogy. Considering education as the core of any formative project, the following question arises: What kind of citizens do we want to train to face the challenges of space exploration and consolidate humanity as an interplanetary species?

Inspired by the Greek ideology of training virtuous citizens, we propose an educational model that cultivates foundational skills such as critical thinking, the ability to learn autonomously, and adaptability to a constantly changing world. Moreover, this proposal considers it essential to foster a creative spirit and a holistic vision that integrates science and the arts.

Lacking a specific pedagogy for space training, this work seeks to lay the groundwork for its construction. An interdisciplinary approach that considers the challenges and opportunities posed by space exploration, and that is also inspired by the fundamental principles of education.

The implementation of a space pedagogy in Mexico will not only contribute to the training of future astronauts but will also inspire new generations to pursue STEM careers and develop a global consciousness. By cultivating a culture of innovation and exploration, Mexico can position itself as a key player in building a sustainable space future.

O43. Promoting diversity and inclusivity in astronomy outreach: Lessons from Malaysia's multiracial communities through service-learning activities

Othman Zainon, Universiti Teknologi Malaysia

Promoting diversity and inclusivity in astronomy outreach is essential for fostering equitable access to scientific knowledge and bridging cultural divides. Malaysia's rich cultural landscape, encompassing Malay, Chinese, Indian, and indigenous populations, provides a dynamic backdrop for exploring the intersection of astronomy, multiculturalism, and community engagement. By incorporating service-learning principles, astronomy outreach initiatives can empower participants to become active agents of change within their communities while fostering cross-cultural understanding and appreciation. Through collaborative partnerships with local stakeholders, educators, and organizations, service-learning activities offer transformative experiences that transcend ethnic boundaries and celebrate cultural diversity. The importance of culturally responsive pedagogy, intercultural dialogue, and reflective practice was highlited in designing service-learning initiatives that resonate with Malaysia's multiracial communities. By leveraging the power of service learning, astronomy outreach practitioners can cultivate inclusive spaces where diverse voices are heard, valued, and empowered to explore the wonders of the universe together. This study underscores the role of service learning as a catalyst for promoting diversity, inclusivity, and social cohesion within Malaysia's multiracial society, paving the way for meaningful cross-cultural engagement and mutual understanding. The results shows that act explores the integration of

service-learning activities within astronomy outreach programs as a means to promote diversity and inclusivity, drawing lessons from Malaysia's multiracial communities.

O44. Empowering Regional and Rural Schools: Building Long-term Collaborations in Astrophysics and Dark Matter Education

Jackie Bondell, University of Melbourne

The Centre for Dark Matter in Australia has developed a partner school program to build long-term collaborations with traditionally underserved regional and rural secondary schools in Australia. Now in its fourth year, this program has expanded to seven schools across two states, reflecting its growing impact and success. This initiative aims to inspire and engage students in the field of astrophysics and dark matter, providing them with unique educational opportunities that they might not otherwise have access to.

This session will explore various aspects of the program, beginning with the inspiration, drive, and support behind its development. We will explore how the program was conceived and the motivations that have sustained its growth over the years. Furthermore, we will discuss the structure of the program, highlighting how it aligns with the Centre’s cutting-edge scientific research. By integrating current scientific advancements into the curriculum, the program ensures that students are learning the most up-to-date information in astrophysics and dark matter in an age-appropriate manner.

Additionally, we will provide an overview of the program's scaffolded and curriculum-aligned lessons. These lessons cover a wide range of topics, including gravity, the galaxies, the nature of science, and particle models. Each lesson is designed to be engaging and accessible, helping students to develop a deep understanding of complex scientific concepts.

An important part of the session will be an update on evaluating the program's efficacy. This evaluation is conducted with the University of Melbourne Faculty of Education, ensuring the program's impact is rigorously assessed. Preliminary findings suggest that the program has been highly effective in enhancing students' sense of belonging in science, which is a key indicator of long-term engagement in studying science.

This presentation at the SEA-PEO 2024 conference is particularly relevant. By sharing our program's successes and insights, we hope to contribute to the collective goal of enhancing science education and outreach efforts globally.

O45. Astronomical Activities Inside and Outside the Classroom to Enhance Astronomy Learning Skills Through a STEM Approach

Boonyarit Choonhkit, National Astronomical Research Institute of Thailand (NARIT)

The Nakhon Ratchasima Regional Observatory provides services such as planetarium shows, astronomy exhibitions, and stargazing activities with telescopes for schools, organizations, and the general public. Due to the high number of visitors and the limited capacity for group visits to the planetarium and exhibitions, we have designed activities and produced astronomy media as alternatives. These activities aim to enhance astronomical learning skills, inspire interest, and develop skills in using astronomical equipment through a STEM approach. They align with existing astronomy curricula in schools, covering topics such as the occurrence of day and night, the changing seasons, Moon phases, the Sun's rotation, measuring star distances using parallax, calculating crater sizes on the Moon, the solar system model, zodiac constellations, celestial sphere rotation, H-R diagrams, stellar evolution, and telescope usage.

Schools can choose activities based on their available time. For the general public, family-oriented sessions are available twice a month on Saturdays. Feedback indicates that the observatory has been able to accommodate an increasing number of schools with over 150 students. Sometimes, smaller schools with fewer than 50 students also show interest in supplementary activities. According to satisfaction surveys, students have gained more knowledge, enjoyed the activities, and improved their skills in using astronomical equipment.

O46. NARIT Astronomical Society (NAS), Astronomy club network for High school student in Thailand

Jessada Keeratibharat, National Astronomical Research Institute of Thailand (NARIT)

Astronomy club in Thailand was not very widespread in schools and establishing one can be challenging. NARIT Astronomical Society (NAS) is a series of astronomy camps specifically tailored with the goals of facilitating the establishments of astronomy clubs in schools in mind. Participants get to learn relevant skills in amateur astronomy, exchanging their ideas and creating a sense of community with peers who share similar interests.

Over the 10 years that NAS has been organized, we have trained over 500 participants from 50 astronomy clubs and 50 schools.

With the addition of NAS Virtual Camp Online, we were able to expand our reach and create a virtual meeting space where over 3,000 members were able to exchange ideas and develop their own to be implemented in their own clubs.

In the result overing 10 years of NAS, we can experience that the Astronomy club is an efficient first community in school for students to get their first exposure to Astronomy in several aspects in terms of practical knowledge, astronomy project and public outreach. By Creating an annual specialized training program, NAS was able to take the lead into creating a community where astronomy clubs across Thailand are able to justify their existence and have a lasting place where they can freely communicate, engage, and learn from each other.

O47. Improving School Astronomy Education Program at Bosscha Observatory: Innovative Strategies and Engaging Experiences

Luthfiandari Luthfiandari, Bosscha Observatory

As part of the Faculty of Mathematics and Sciences at Bandung Institute of Technology (ITB), Bosscha Observatory performs the university's mission of research, education, and public service. Educating students and teachers in astronomy is one of the key goals in fulfilling our public service mission.

Astronomy is not taught as a particular subject in Indonesia's school curriculum so it is often included in other subjects in limited portions. Adding to the challenges, teachers in Indonesia are not equipped with the basic skills to teach astronomy, so astronomy is often seen as difficult content to teach, creating difficulty for students to grasp the astronomical concept. To address this, we provide interactive learning experiences through practical activities that help students better understand astronomy.

Our educational approach includes a program of school visits to the observatory, where students engage in hands-on activities, either in groups or independently, under the guidance of our astronomers and our educator officer. The visit included a range of activities covering different astronomy topics, tailored to the needs of each school and level of student. Students also have the opportunity to observe the Sun through a telescope and learn about the work of astronomers.

Through evaluation assessment, feedback from teachers has been overwhelmingly positive, highlighting the effectiveness of our interactive and practical approach in enhancing understanding of astronomy. Additionally, teachers have reported that these activities have inspired them to incorporate similar activities in their schools, enriching the educational experience.

However, the program has faced several challenges. One significant issue is the limited availability of resources and equipment, which can restrict the number of participants and the variety of activities we offer. This limitation impacts our ability to provide a comprehensive learning experience. Moreover, there's an ongoing necessity for continuous training and professional development for educators. This ensures they remain updated with the latest advancements in astronomy and modern educational techniques, which is crucial for delivering high-quality education. Addressing these challenges is essential for the program's success and growth. Despite these challenges, the

positive impact of the programs underscores their value and the importance of finding solutions to these obstacles.

O48. Designing process of astronomy exhibits for planetariums and science centers

Suparerk Karuehanon, National Astronomical Research Institute of Thailand (NARIT)

There are many factors to be considers when designing astronomy exhibits. First, the exhibits must be informative and provide correct, accurate, and relevant information. However, exhibits must also be captivating, either by means of displays, usage of multimedia, allowing for engagements or interactions with the audience. However, achieving all of these can often means exhibits come at a higher cost. Moreover, complicated exhibits with many moving parts often means it might need constant services or breakdown often, particularly if the audience involves large group of small children. A good design practice therefore must consider all of these and come up with a good compromise between all relevant factors.

O49. Integrating astronomy at the 2024 Ubonratchathani Candle Festival

Paniwad Senked, Lao-Ngam Pittayakom school

One of the most significant Ubon Ratchathani traditions is the Candle Festival. Every year, it takes place on Asanhna Bucha Day and Khao Phansa Day, which is the Buddhist equivalent of Lent. More than 10,000 tourists from outside and Thailand have come to attend the festival this year. Asanhna Day was a lunar holiday marked by a full moon. Thus, the the full moon observation and other astronomical activities were organized to increase youth and tourist to interested of astronomy. The astronomical event is a part of the Candle Festival's Ubon Ratchathani Geopark exhibision. The event is held at Thung Si Mueang Ubon Ratchathani for two days and one night on July 20–21, 2024. Four present students and two alumni of Lao Ngam Pittayakom School organized it. During the day, on July 20 and 21, respectively, from 9 AM to 6 PM and 9 AM to 12 AM, sun observation and plaster painting, astronaut, dinosaur and animals plaster, were conducted. On July 20, there was a full moon observation using a Dobsonian telescope in the evening. We are chatting with the parents to publicize the event in the evening and other astronomy events and astronomical tourism attractions in the Ubon Ratchathani Geopark area while the kids are having fun painting plaster. The first activity we had scheduled, a trip to the planetarium, had to be postponed due to heavy rain before it could begin.

It was found that half of the roughly 1,000 participants were young people (ages 3 to 15). Teachers and students from other provinces are interested in this activity, as well as elderly and

disabled tourists and amateur astronomers from France and the UK. Students from Khongchiam Wittayakom School in particular showed a great deal of interest in methods for observing the sun using telescopes. The kids showed a great deal of interest in the plaster painting activity. Parents are excited to let their kids participate in the events and snap pictures of them when they are using the telescope. Using telescopes to observe the moon is a popular activity for tourists they are thrilled to use their smart phones' cameras to capture images of the moon through telescopes and preserve them as mementos.

While the sun observation activity on July 20 was excellent during the day, it was unable to be held on July 21 due to numerous rain clouds. As a result, other objects, such as birds, distant trees and telecommunications towers, are used as observation targets instead of the sun. In conclusion, this event's organization marks the first time that astronomical events have been integrated with the traditional candle festival, greatly fostering interest in astronomy among tourists. Additionally, despite the growing interest in astronomy among tourists, there aren't many chances to engage in astronomical activities. As a result, ongoing public and youth outreach to astronomy should be encouraged.

O50. Astro Challenge: Astronomy trivia competition as an alternative to classroom learning

Jitraporn Junpeng, National Astronomical Research Institute of Thailand (NARIT)

This is the story of an astronomy trivia competition with more than 7,000 students participating. The ""Astro Challenge"" is Thailand's astronomy competition, first organized in 2019 by the National Astronomical Research Institute of Thailand (NARIT). It combines the intention to use astronomy and the enjoyment of play during the youthful age. It is designed as a game show format that is fun, challenging, and exciting to enhance skills, creativity, and problem-solving abilities. It smoothly integrates astronomy knowledge into different categories, allowing participants to learn and have fun at the same time.

The competition has been held three times in 2019, 2021, and 2023. During the second edition in 2021, the COVID-19 crisis led to a change of the competition format, shifting it to an online platform. However, it turned out to be the year with the highest number of participants, reaching 3,663 individuals. This indicates a growing interest in astronomy among Thai students. The trend continued in the third edition in 2023, with over 3,000 participants competing onsite in four regions, more than three times the number in the first edition.

This activity got a lot of attention from teachers, and students joined, achieving great success. The post-activity evaluations indicate that the majority highly enjoyed the event. Among the preferred topics, the simpler ones such as ""Star Tales"" and ""Solar System"" were particularly favored. They also want the activity to happen regularly. We hope that the activity can be modeled or be expanded upon for other astronomy-related academic events in other countries as well.

O51. Astronomy in an International School in Phuket, Thailand

Derrick Lim, Natureverse Thailand

Despite the recent proliferation of space technology and exploration, students in international schools in Thailand's exposure to astronomy are still rather limited. Several factors may be at play, including lack of experienced and knowledgeable personnel, lack of equipment and facilities, focus on subject exams, and gaming platforms. This presentation shares about the possibilities for astronomy education in a school with a planetarium, with the Berda-Claude International School in Phuket, Thailand as a case study. We present factors that helped to drive astronomy awareness and interest, ideas on how we can engage students to develop an interest in astronomy, and our findings on astronomy curriculum in schools.

O52. Astronomy Education at Khon Kaen University

Chaiyapong Ruangsuwan, Khon Kaen University

Astronomy Education at Khon Kaen University aims to promote the understanding, skill, and attitude toward astronomy for university students, school students, and the public. The Faculty of Science and the Faculty of Education provide courses suitable for physics students and science education students, respectively. The Faculty of Science has also provided the astronomy camp for students at the Khon Kaen University Observatory since 2003, the one-day and night weekend camps served the stargazing, moon phase activities, and telescope related to the national curriculum. The Museum and Lifelong Learning Center of Khon Kaen University served the museum camp, various topics activities in science where astronomy activities were the most selected. The activities for school students were based on low-cost material to drive the psychomotor associated with argumentation throughout the activities. Furthermore, the Astronomy Diagnostics Test (Thai-version) was used to indicate the astronomy background of the students who participated in the activities provided by the Faculty of Science, and the result showed that many students contained common misconceptions as previous research.

Workshops

W01. Planetary Imaging with Color Sensor Cameras

Christopher Go, University of San Carlos

Monochrome planetary imaging had been the standard for years. The recent development of high quantum efficiency and low noise color sensor cameras have greatly improved the image quality of the captured by these cameras. With the planets higher in the northern hemisphere and the ease of capture and processing make color sensor cameras an better choice not just for beginners but also for advanced users. The workshop will discuss how to capture and process images using color sensor cameras.

W02. Powers of Ten: From Atoms to the Universe

Matipon Tangmatitham, National Astronomical Research Institute of Thailand (NARIT)

Astronomy is the field that deals with numbers that are "astronomical" and often hard to comprehend for students. One of the most powerful tools to get the students to appreciate how big these astronomical objects and distances are by use of a scale model. In this activity we introduce the idea of a card game, a sorting task, and making use of everyday objects to represent the astronomical scales in the way that a layperson can comprehend, and learning details from atoms to the universe in the way that is not only informative, but engaging and fun.

W03. Astronomy activities on a cloudy night

Farprakay Jiarakoopt, National Astronomical Research Institute of Thailand (NARIT)

Many people have faced the issue of organizing stargazing activities on cloudy nights when viewing the stars isn't possible. If you're unsure what to do next, consider incorporating activities that might offer participants alternatives and show off their arts and crafts skills to the fullest.

One such activity is "Constellation Maker." Participants will build an electrical circuit using LED bulbs, which represent stars in a constellation. Each LED will emit light according to the actual spectrum type of stars in that constellation. Once the circuit is complete, the LEDs will light up, mimicking the appearance of a constellation in the night sky.

Another engaging activity is the "Stellar Light Box." Participants will learn about the positions and arrangements of key constellations by drilling holes in a box according to their positions. When illuminated from inside, the light shining through the holes will resemble a star-filled night sky. This activity is budget-friendly and especially effective for nighttime sessions.

W04. DIY Planetarium

Jessada Keeratibharat, National Astronomical Research Institute of Thailand (NARIT)

Planetarium has always been a powerful learning tool to get students engaged in astronomy. However, planetariums are cost prohibitive. In this workshop, we offer a cost effective solution in which a DIY planetarium can be made using sections of triangular cardboards held together by paper clips. Participants will together learn how to construct and finish building a cardboard dome and then setting up a projector reflecting off a spheric mirror onto the dome. The spheric mirror projection can be used in conjunction with freeware such as stellarium or openspace. This system can be used to supplement classroom and education, play fulldome movies, or used as an alternative way to display or attract crowds during science week or traveling exhibit. This DIY planetarium is the same setup NARIT has been distributing to over 130 participating schools since 2022.

W05. Beyond Visible Light: Astronomy in Multiwavelength

Thanakorn Aungkawattana, National Astronomical Research Institute of Thailand (NARIT)

Optical light is but a small part of the electromagnetic spectrum. In this workshop, we explore how we can detect other electromagnetic waves such as radio, infrared, and uv using materials and equipment easy to find from general stores. Then, explore how different wave interact differently from different medium. Are things that are transparent and opaque in one frequency still remain that way in another? How can we connect these findings to understand other phenomena in the world such as global warming, and how to protect yourself from harmful radiation.

W06. Phases of the Moon Workshop

Thressapong Siriboon, National Astronomical Research Institute of Thailand (NARIT)

The Phases of the Moon is one of the most obvious astronomical phenomena that is relatable to wide audience. The phases of the Moon has cultural, societal, and deep religious relevance to every societies of the world. This workshop propose a simple demonstration to how the phases of the Moon can be demonstrated to a range of audience. Young audience can learn and observe how the a person on Earth might observe the changing of phases of the Moon. More advanced adults might also learn how we could predict the rising and setting time of the Moon using this same demonstration.

W07. Maximising Impact: Social Media Strategies and Outreach Integration

Diana Haikal, Australian Research Council Centre of Excellence for Gravitational Wave Discovery (OzGrav)

This is a two-part workshop delivered by Diana Haikal and Jackie Bondell from the Australian Research Council Centre of Excellence for Gravitational Wave Discovery (OzGrav).

In today's digital age, social media is an indispensable tool for science communication and outreach. This two-part workshop is designed to help participants harness the power of social media to amplify their outreach efforts.

Part 1, led by myself Diana Haikal, Senior Communications and Engagement Advisor at OzGrav, will dive into the world of social media platforms and how they can be used to share science stories. Participants will learn tips and tricks for creating engaging content, including visuals, hashtags, and interactive posts that captivate the audience. We'll also discuss how to align social media efforts with broader outreach goals, ensuring a consistent and impactful strategy. Plus, we'll explore ways to measure the success of the campaigns with practical tools and metrics.

In Part 2, Jackie Bondell, OzGrav's Senior Education and Outreach Manager, will guide participants through designing and running interactive outreach programs. From hands-on activities to simulations and engaging discussions, participants will explore different formats to connect with their audience in meaningful ways. Examples will include innovative uses of technology such as virtual reality, as well as non-digital activities.

To bring it all together, we'll end with a collaborative activity where participants will brainstorm and outline a social media campaign that complements the interactive science outreach program highlighted in Part 2. This exercise will help the participants create a cohesive strategy that integrates both social media and hands-on outreach efforts.

This workshop draws on seven years of OzGrav's award-winning experience in delivering impactful and innovative outreach programs.

W08. Fun with Dry Ice: Make a Comet + Cosmic Ray Detector

Pranita Sappankum, National Astronomical Research Institute of Thailand (NARIT)

In this workshop, participants will learn hands-on activities that can be used as a science show or to inspire young audience. In the first activity we try to simulate the appearance of a comet nuclei by assembling the major ingredients found in a comet: dry ice, water, ammonia, organic compound, and dirt. These assembled "dirty snowball" allow for audience to experience what the comet nucleus might look like. The remaining dry ice can be used for the second activity: Making a simple cosmic ray

detector. As dry ice is used to cool supersaturated a chamber made of everyday materials, the supersaturated alcohol vapor inside will condense and leave a trail once any charged particle travel through the mist. This simple device can be used to demonstrate the audience how the world surrounding us is filled with many invisible particles whizzing through space at near speed of light that our eyes cannot detect.

Posters

P01. Accurate communication of astronomy in equal in my community

Faikham Phuedphud, Renunakhonwittayanukul School,Ministry of Education

My school including my community is located in the border of the country near the Mekong River. This river separates Thailand and Laos, only 7 km, making people in my community have common understanding Laotian language and some of them have beliefs about astronomy phenomena without scientific principles in the story of astronomy and still lacking opportunities to access actual information or accurate knowledge about astronomy principles and theories. Therefore, I as an astronomy teacher and a member of the community, I need to support them to access the right information including explain them about the astronomy's phenomena , principles and theories. Therefore I applied to be a member of an organization which relating teaching astronomy in 77 provinces organized by the National Astronomy Research Institute. (Public Organization) National Astronomical Research Institute of Thailand (Narit) since 2016, then I received support for both medias and knowledge of astronomy that is correct and reasonable.

Those support from NARIT help me to be able to teach my students and students from other school and people in my community who are interested in astronomy. I has held various astronomy activities both inside and outside classroom, including the continuous observation of various phenomena and what I explain them accurate knowledge and astronomy phenomena also they can to access knowledge effectively through the mediaTechnology and social media provided.

As I have done activities to continuously communicate knowledge in astronomy, I found that both students and

People in my community have more awareness in the story of astronomy. The belief that is not quite correct, such as The belief in the sun rises to the east every day. Or even beliefs about the lunar eclipse. Lunar Eclipse has changed from generation to generation which are more accurate from communication through the principles and evidence that are provable.

P02. Astronomy and opportunities for people in remote areas in Thailand.

Sampat Kaeoiam, Wat Jomkiri Nakprot Municipal School

The school receives telescope support from the National Astronomical Research Institute of Thailand (Public Organization) In 2015, we brought a telescope to organize activities for students. Both in terms of teaching Organizing an astronomy camp. The school supports the teaching of astronomy.

Learning resources have been created and developed in the school, such as an astronomy room, stargazing area, and astronomy knowledge corner. Teachers received training to create and develop astronomy teaching materials. To be used in organizing teaching activities such as building telescopes and planet models from plaster. Build a solar system from recycled materials. An astronomy camp was organized. To develop students to be leaders in transmitting knowledge in astronomy. To serve people in the community when Important astronomical phenomena such as moon viewing activities on Loy Krathong Day. Jupiter is closest to Earth during the lunar eclipse of the year. Observe the partial solar eclipse above the Thai sky, etc. There are activities organized in various places such as network schools, walking streets, department stores. Important Buddhist places, astronomical activities organized in past years It is an activity organized for students in school. But one time when Driving up the mountain, have you ever wondered how the children on the mountain learn astronomy? Why do children and people in the community These remote places do not have the opportunity to access astronomy like people in big cities. When we have the opportunity to travel to These far away When we have a telescope supported by the National Astronomical Research Institute, why don't we bring in a sponsored telescope? Come use it to organize activities for children on the mountain. or people in remote areas To give them the opportunity to access astronomical activities Stargazing activity on the top of the mountain Therefore there is a purpose. for everyone in Thailand Have the opportunity to access and be equal in the field of astronomy. Astronomy will make everything people have equal access.

P03. The design of astronomy terms in Thai sign language

Pisit Nitiyanant, National Astronomical Research Institute of Thailand (NARIT)

"Sign language" is not the universal language, but there are differences in many countries and territories. The astronomical terms in sign languages also have differences in various regions. Astronomy is one of the branches in science class in schools for deaf people. But in the case of Thailand, there are lack of astronomical terms in Thai sign language and variation between regional schools for deaf.

NARIT is aware of this problem and conduct "the design of astronomical terms in Thai sign language" by consideration and discussion between 3 parties: NARIT (with astronomical outreach staffs), teachers from the network of Thai schools for deaf and National assosiation of the deaf in Thailand (deaf people & Thai sign language expert). The result is 59 astronomical terms in Thai sign language. The author wish that the process of this design will be the guideline and inspire for the design of astronomical terms in other sign languages in other countries.

P04. Alternative Conceptions of Senior High School Students to Astronomy Concepts

Joshua Micole Felizarta, Rizal Technological University / Bloomfield Academy

Filipino students are required to undertake the revised basic education curriculum (RBEC, or K–12 curriculum) from kindergarten up to senior high school set by the Department of Education (DepEd). Included in the revised curriculum are astronomy concepts that are taught at different grade levels in junior high school (from Grade 7 up to Grade 9). Topics in Grade 7 include the concepts of seasons and eclipses. Characteristics of asteroids, comets, and other members of the solar system are taught in Grade 8, while characteristics of stars and constellations are taught in Grade 9. (Department of Education, 2016) The arrangement of topics in astronomy and other science concepts in elementary and junior high school is patterned using a spiral progression curriculum. This curriculum was promoted by Bruner. Bruner (1960) encourages different educational institutions to teach concepts first at a more simplified level, but as the learner progresses, those concepts will be relearned and they will add concepts that are more complex but related to the first one. Thus, concepts will have a gradual increase in difficulty.

Based on this, researchers would like to determine the different alternative conceptions of astronomy

concepts taught to senior high school students during junior high school.

P05. Using STAR EVOLTED Board Game to Help Students Sequence Stellar Life Cycle.

Taweesak Poochai, Sakaeo School

This study investigates the effectiveness of the STAR EVOLTED board game as an educational tool for assisting Grade 7 students in sequencing the stellar life cycle. The participants were 30 students enrolled in a basic astronomy course during the 2024 academic year. The results indicate a significant improvement in students' understanding of stellar evolution patterns when using the board game. Specifically, 43.33% of students could correctly sequence all five stages of stellar evolution, while 26.67% could sequence four patterns, and 30.00% managed to sequence three patterns. In contrast, when instructed through traditional lectures and video clips, no student could successfully sequence more than three patterns. Semi-structured interviews revealed that most students found the board game particularly helpful for memorization and organizing concepts. However, it was noted that establishing clear rules for gameplay is essential to minimize conflicts among players.

P06. Astronomy activities “To Primary school students”

Sarutaya Lunsakawong, Trattrakarnkhun school Trat Thailand

Astronomy activities for primary school students Organized astronomy activities according to the project to develop students' potential in astronomy. The activity format has been continuously developed over a period of 7 years, with the event organizers being astronomy students and students with an interest in astronomy. Go out to organize astronomy activities for primary school students in various schools in Trat province. The activity format will be divided into bases for primary school students divide into groups to participate in each base with high school seniors stationed at the base. Help explain and lead primary school students in activities. Each base will consist of Astronomical planetarium, Telescope, Sun glasses, Paper plane and other astronomical activities depends on the appropriateness of each school. Each time, the highlight activity is the Astronomical planetarium, which is very popular among primary school students and teachers. In the astronomical planetarium activities, primary school students participated and listened to constellation lectures, answered astronomy questions, played games, and made worksheets from teachers who brought them to join the activities. The objective is to develop astronomical knowledge for primary school students. To develop potential and various skills astronomy for students who are interested in astronomy develop teaching and learning of astronomy for maximum benefit. The results of the activities can be summarized as follows: Primary school students had the highest level of satisfaction with organizing activities. Students who organized activities for the development of astronomy increased because the knowledge gained from studying was put to practical use. There is also the development of scientific skills through the activity organizing process astronomical.

P07. Utilization of Planetariums in Alignment with the Thai Education Curriculum

Supatcha Uttayanin, Chonprathanwittaya school

This research aims to study the utilization of planetariums in alignment with the Thai educational curriculum, with a focus on designing lessons and activities for use within planetariums to enhance students' understanding of astronomy. The target group includes 4,049 students from Chonprathanwittaya School in the academic year 2024, ranging from grades 1 to 12. The research was conducted using a planetarium dome with a diameter of 16 meters, located at Chonprathanwittaya School, which accommodates 117 viewers at a time.

The findings indicate that the integration of planetarium-based learning with the Thai curriculum effectively fosters students' analytical thinking skills. Planetarium-based lessons enhance students' scientific thinking and observational analysis skills. Lessons and activities were tailored to different grade levels, aligning with the science content in the basic education curriculum. For early elementary students, the lessons focus on observing the sky during the day and night, understanding the differences between various times of day, and recognizing the importance of the Sun as the

primary source of energy and light for Earth. The planetarium is used to simulate the sky's transition from daylight to darkness, introducing the Sun as a model to visualize its structure and role as a critical energy source for Earth and other planets. For upper elementary students, the lessons explore Earth's rotation, resulting in day and night, seasonal changes, and the solar system. The planetarium helps students understand Earth's rotation and orbit around the Sun and provides a comprehensive view of the entire solar system. For lower secondary students, the focus is on learning about the solar system, celestial objects in space, Earth's movements affecting seasonal changes, lunar phases, and the occurrence of solar and lunar eclipses. For upper secondary students, the curriculum covers macrocosmic structures such as galaxies, nebulae, black holes, and the expansion of the universe. The planetarium facilitates a deeper understanding of the universe's structure and evolution, offering realistic visualizations of celestial objects and astronomical phenomena that cannot be seen with the naked eye. Additionally, students can watch astronomy-related films that increase their interest in the subject. The evaluation of students' satisfaction with the planetarium activities revealed a high level of interest and a positive attitude towards learning astronomy, with 90.12% of students rating their experience as excellent and 9.88% as good.

P08. A study of crescent visibility criteria: Exploring the differences and comparing crescent visibility criteria between Thailand and Malaysia

Basree Maseng, Astronomy student, Department of Physics and Materials Science, Faculty of Science, Chiang Mai University

The criterion of the first crescent (Hilal) is an important part of determining the new month in the Islamic calendar. It is necessary to observe the first crescent after the new moon, i.e. on the 29th of every month in the Islamic calendar. In Thailand, the first crescent is only observed during selected important months such as Shawwal, Ramadan, and Dhul-Hijjah. There is no clear crescent visibility criterion. As a result, some first day of a month in Thailand differs from other countries in South-east Asia. In this presentation, we compared the crescent visibility data in Thailand from August 2021 to December 2023 with Malaysia's. For example, 1st March 2022 in Thailand is the 1st of Shawwal, while in Malaysia it is the 30th of Ramadan. In this research, we will present the differences in the new moon dates set in Thailand and Malaysia and compare the crescent visibility criteria from Yallop and Odeh.

P09. STEAM Astronomy Integration Camp for high school education.

Witchaphon Puangkaew, The secondary educational service area Uthai-Thani Chainat

On January 5, 2024, Khuruprachasan School will host the first-ever STEAM Astronomy Integration Camp for high school students in grades 10 through 12. This program encourages children to learn in an integrated STEAM education format through astronomy camp activities. The objectives are as follows: 1. To help students reach their full potential in astronomy by developing scientific process skills. 2. To encourage kids to study astronomy through STEAM learning activities centered on the learner in the twenty-first century. 3. To give student leaders of the young astronomers' club the opportunity to properly demonstrate their astronomical potential. 4. To establish a network of young astronomers' groups connecting Khuruprachasan School to secondary schools in Chainat province.

The target group includes 80 students from Khuruprachasan School, 10 student leaders in astronomy, and 30 students from adjacent secondary schools, for a total of 120 participants. This initiative provides a learning environment for students to participate in hands-on STEAM education activities such as the origin of life on Earth, cloud formation, acid rain formation, comets, the solar system, telescopes and solar observation, and observing celestial objects using astronomy programs and naked-eye observation.

Following the events, it was discovered that the student leaders of the young astronomers' club have the potential to successfully transmit astronomical knowledge and form professional networks. The emphasis was on ensuring that participating students were actively engaged in the activities, learned core information, and had real-world experiences that stimulated them to study astronomy and build scientific process skills. This resulted in a more positive attitude toward science education in the twenty-first century, helping pupils effectively apply their knowledge. Students also collaborated in the events and indicated high pleasure with their participation.

P10. Comparative study of Geodesic dome designs for small planetarium design in schools.

Boonsong Henngam, Piboonbumpen Demonstration School Burapha University

Comparative study of Geodesic dome designs for small planetarium design in schools

This research aims to study the comparative study of Geodesic dome designs for small planetarium design in schools. Two types of domes were studied: Ribbed Dome and 2v GeodesicDome, which were built with a diameter of 4 meters. The design and calculation were made so that the largest part size was no more than 1.10*1.60 square meters, so that it could be conveniently transported by car for astronomical activities in various locations. The physical structure of the dome was studied and the corrugated paper pieces used in its construction were calculated. The advantages and disadvantages of each dome type were studied, both in terms of suitability for use with planetariums and assembly or installation.

The results of the study found that the Ribbed Dome is a dome that is flexible in design to suit the limitations of the size of the paper used. The joints of the paper pieces are consistent with the grid

lines in the horizon coordinate system. The assembly is easier to understand, there is no confusion about the parts and sides that need to be connected, and there is no need for people to hold it all the time. The assembly has less paper waste from cutting and assembly. (Do not consider joining 2 pieces of paper together.) As for the 2v GeodesicDome design, The design looks more modern and It is stronger because of the triangular shape of the pieces.

P11. Open House Open Academic House of Amnat Charoen School "Stars take their little ones to explore the universe"

Sirinan Photphuthon, Amnatcharoen School

Activity results There were a total of 5,000 students participating in the activity. with students from the Astronomy Club at Amnat Charoen School There are 80 lecturers. The activities are divided into 3 bases: Base 1: Celebrities bring fun to the little ones for fun and joy. It is an outdoor activity consisting of 10 activities: telescope caravan. space technology planet model Mapping the stars, finding stars, haha, using a helicopter to have fun. Luna should know that she lives in our world. Astronomy corner Fun astronomy game astronomical images. Base 2, Glow in the Dark, light in the dark, consists of 5 activities: take pictures of stars with the cosmic lantern corner. Take pictures, write on fire Write your thoughts among the stars (glowing colors) and create a zodiac lamp. Make a wish and ask for blessings from the stars. Base 3: Science Phichit Fun presents a science project. There were 25 students who applied to present their projects. In addition, teachers from many schools in Amnat Charoen Province came to contact and coordinate for the club to serve children in the schools. Every activity received great interest and excitement from the participants. and is a collaboration between students in both middle and high school. Make students know how to work together Helping and also inspiring each other during activities.

P12. "Effective Strategies for Teaching Astronomy: Inspiring and Engaging Students in the Wonders of the Universe"

Pawanrat Srita, Chom Thong School

In the role of a teacher, conveying astronomical knowledge is crucial for inspiring and engaging students in science. Here’s how teachers can achieve this:

Creating an Engaging Learning Environment: Utilize a variety of teaching resources, such as images from telescopes, 3D simulations, and videos, to make astronomy lessons vivid and captivating.

Using Hands-On Activities: Organize activities that involve students actively, such as creating models of the solar system, simulating planetary movements, or using telescopes for practical observations, to provide real-life experiences with astronomical concepts.

Storytelling and Creating Narratives: Present content through stories, such as the history of significant astronomical discoveries or narratives about the evolution of astronomy, to make the material more engaging and understandable.

Connecting to Real-Life Applications: Explain how astronomical studies impact daily life, such as weather forecasting or understanding seasonal changes, to demonstrate the relevance of astronomical knowledge.

Promoting Collaborative Learning: Provide opportunities for students to work together on projects or research related to astronomy, such as group projects or discussions, to develop teamwork skills and critical thinking.

Encouraging and Inspiring: Support and motivate students to explore and learn more about astronomy, such as recommending additional resources or encouraging participation in community astronomy events.

Assessment and Feedback: Use assessments to gauge students' understanding and provide regular feedback to help them improve and advance their knowledge of astronomy.

In the role of a teacher, conveying astronomical knowledge helps to build understanding and awareness in science, stimulating interest and inspiring students to further explore and learn about the universe.

P13. Engaging Public with Solar Observation (Sun-Day)

Siti Sarah Nordin, Telok Kemang Observatory, Malaysia

When people discuss astronomy, their thoughts often turn to the night sky, where the moon, stars, and planets shine brightly. However, there is another celestial body that deserves our attention: the Sun. As a nation that receives abundant sunlight throughout the year regardless of weather conditions, Malaysia has a unique opportunity to educate its populace about our closest star. Therefore, Telok Kemang Observatory has taken the initiative to promote solar awareness through a variety of public programs. These include solar observation sessions, where participants can safely view the Sun through specially equipped telescopes; engaging solar talks that delve into the science and significance of our star; sundial workshops that teach the ancient art of timekeeping using the Sun's position; and solar astrophotography activities, enabling enthusiasts to capture stunning images of solar phenomena. These efforts not only foster a deeper appreciation for the Sun but also inspire a broader interest in astronomy within the community.

P14. Astronomy Activities for Youth and the Public organized by Prathai School Astronomy Club

Sharin Amthaisong, Prathai School

Prathai School has established an Astronomy Club, offering 3 main types of activities:

1.Training Student Leaders for the Astronomy Club: Students are invited to join the Astronomy Club voluntarily to learn about astronomy content and event organization. The training includes using astronomical tools and equipment and developing skills as astronomy event presenters.

2.Organizing Astronomy Activities for Students and Youth: Activities are organized in the form of astronomical observations and astronomy camps for our school's students as well as students from other schools. For example, events include observing phenomena such as Saturn being closest to Earth in the year, lunar eclipses, and Jupiter being in opposition to the Sun. Astronomy camps are divided into learning stations, such as celestial spheres, the solar system, star maps, angular measurement instruments, telescopes, and planetariums.

3.Organizing Astronomy Activities for the General Public: Activities are organized in the form of sky observations, such as viewing the Moon, Saturn, Jupiter, and Mars, as well as stargazing with the naked eye. These events are held during various festivals, such as moon observations on Loy Krathong, or in collaboration with other organizations, such as stargazing at Sai Thong National Park. The target audience includes tourists and the public.

P15. Astro Family Camp

Nattaya Siriwanasakul, National Astronomical Research Institute of Thailand (NARIT)

Astro Family Camp is an astronomy camp operated by NARIT's Regional Observatory for the Public at Chachoengsao. This astronomy camp is targeted for family group which consisted of small children and parents. The location of the observatory being close to the capital city of Thailand made this an ideal location that could attracts family from the capital. With this format, small children can take parts in more detailed activities particularly night activities that would normally be too difficult without accompanying adults. As such, activities are created with small children and accompanying adults in mind. Apart from promoting interest in astronomy from a very young age, this camp can also foster and strengthen the bond within families as they go through the activities together.

P16. From Classroom to Community

Kitsana Lamsombat, National Astronomical Research Institute of Thailand (NARIT)

The “From Classroom to Community” initiative builds on the Mobile Astronomy Project for high school students, initially launched in schools affiliated with the National Astronomical Research Institute of Thailand (NARIT). The project aims to provide youth with fundamental astronomical knowledge, which they can apply in the classroom, while encouraging scientific inquiry, critical thinking, and inspiring participants.

The Mobile Astronomy Project features a one-day, one-night camp. The morning session involves training on the basic use of telescopes for night sky observations, while the afternoon focuses on interactive stations related to solar system models, helping participants grasp the scale and distances of celestial bodies. Additional activities include understanding lunar phases, seasons, and observing the night sky through telescopes. This program has primarily been offered to selected schools within the network.

In 2024, the Regional Observatory for the Public, Nakhon Ratchasima adapted the program by moving the stargazing activities from schools to significant local sites or tourist attractions. This allowed students to practice locating celestial objects using telescopes and offered nearby communities the opportunity to engage in astronomical education, thus expanding access to learning and inspiring future scientific exploration.

P17. Astro Kids Summer Camp

Danupon Markjard, National Astronomical Research Institute of Thailand (NARIT)

Astronomy is a topic that is both distant, yet relatable and remains one of the most powerful inspirational tools for young audience. Astro Kids Summer Camp aim to introduce astronomy from everyday occurences to young children. In the camp, children can learn how to work as a team, explore their creativity, coming up with ideas and present them through various activities such as building rockets, design landing gears, using telescope and astronomical instruments.

P18. Princess Sirindhorn Astropark at a glance

Piyawat Thongthawee, National Astronomical Research Institute of Thailand (NARIT)

Princess Sirindhorn Astropark is not only home to NARIT's headquarters but also to its largest astronomical museum complex and observatory for the public. Officially opened to the public in 2020, it features 17 meters dome with capacity of over 160 seats in a full digital format. The planetarium offers two shows daily for general public, but is open upon requests from school visits generally a few more times daily as well. Apart from planetarium it also offers exhibits which are free of charge to the visitors. The number of visitors has been steadily increasing and reaching 182,055 visits in the past year.

P19. NARIT Public Night: Enhancing Lifelong Learning Through Astronomy

Siwarut Ploydang, National Astronomical Research Institute of Thailand (NARIT)

One of the primary goals of NARIT's outreach is to offer hands-on experience in astronomy to the public. Apart from the special astronomical events and specialized camps, the staple part of this program is serviced to the public via our 'NARIT public night' through our many observatories for the public every Saturday Night. At Princess Sirindhorn Astropark, we not only aim to educate and offer stargazing experience to the public, but we also hope to be part of the community. The ‘NARIT public night’ event is to give an opportunity for people to observe a lot of sky objects through different kinds of telescope. Moreover Visitors will get a knowledge of astronomy by NARIT’s staff. We explains the basic techniques for observing the night sky. While the main activity remains looking through telescopes, various activities are also supplemented to cater to audience of different age group and background. Awards and points system is also implemented via smartphone to offer the audience something to look forward to for a revisit. It has been proven that these methods are quite effective at retaining the audience and becoming part of the community since the vast majority of visits came from repeating visitors.

P20. Establishing network between new planetarium and the community

Kewalin Thongpoyai, National Astronomical Research Institute of Thailand (NARIT)

Regional Observatory for the Public, Khon Kaen is the latest Regional Observatory for the Public of National Astronomical Research Institute of Thailand (NARIT), starting operations in 2023. The first operation is establishing a network, contact and coordinate in order to make the Regional Observatory for the Public, Khon Kaen more well-known in Khon Kaen. Beginning with establishing communication with the regional government, public and private institutions. This includes presentation or collaboration with the regional town hall, geological parks, university, and national parks. Then builds up to exchanging and training of staffs within the area and establishing network and reaching the local community via social network.

One of the important events from networking is “Khon Kaen Star Party” project, there is a network of schools in Khon Kaen and nearby Khon Kaen join in providing services telescope and organize a variety of astronomy activities. In a night, a total of 1,017 participants attends the event

P21. Planetarium activity for all

Aussadawut Saengkudlor, The secondary educational service area office Chanthaburi Trat

The Planetarium activity for people took place between August 2023 and February 2024. Its objective was to promote astronomical knowledge by Planetarium activities targeting students, teachers, educational administrators, staff, and interested parties. The activities followed the Deming cycle (PDCA) with six steps: 1) Planning, 2) Leadership creation, 3) Execution, 4) Performance reflection, 5) Improvement and development, And 6) Sustainability creation. Activities included demonstrations on celestial phenomena like the Celestial sphere, Solar system, Northern star group lectures, Zodiac constellations, Star clusters, and planetarium sessions tailored to the interests of each target group. Approximately 5,000 participants, including students, teachers, educational administrators, and related individuals enthusiastically joined these events and gained astronomical knowledge. Participants expressed 90% satisfaction rate despite challenges such as inadequate event venues not conducive to setting up the planetarium. Atmospheric conditions inside the planetarium necessitated ventilation equipment, and data collection to improve future event planning.

P22. Sirindhorn Planetarium: Nurturing Young Minds, Inspiring Passion, and Fostering a Love for Astronomy

Sittikon Sampankhan, Suankularb Witthayalai School, Ministry of Education

Sirindhorn Planetarium at Suankularb Wittayalai School, Bangkok, Thailand

The Sirindhorn Planetarium, located at Suankularb Wittayalai School in Bangkok, Thailand, is a 70-seat facility dedicated to providing astronomical education. Initially established to serve the students of Suankularb Wittayalai School and its affiliated schools, the planetarium has expanded its mission to include offering basic astronomical knowledge to the general public with a keen interest in the subject.

The primary objective of the Sirindhorn Planetarium is to support and prepare students for participation in national competitions, particularly in the fields of astronomy and astrophysics. The planetarium plays a crucial role in training students for the Thai Astronomy Olympiad and other academic competitions. Over the years, the students trained here have achieved remarkable success, earning more than 50 gold medals in the Thai Astronomy Olympiad at both the junior and senior high school levels. Additionally, over 30 students have represented Thailand in international astronomy competitions, bringing home gold medals.

Beyond its role in fostering academic excellence, the Sirindhorn Planetarium serves as a hub of inspiration for students passionate about astronomy. It is home to the school's Astronomy Club, where students who share a love for the stars collaborate to organize various educational activities. These activities include after-school stargazing sessions open to students and the general public, special events like Saturn Opposition, Partial lunar eclipses, Moon and Planets conjunctions, and Science Week celebrations.

Between 2020 and 2024, the planetarium welcomed over 3,000 visitors, providing them with the opportunity to experience the wonders of the night sky firsthand. The planetarium continues to develop and enhance its services to accommodate the growing interest in astronomy among students and the public. By doing so, it aims to make astronomical knowledge and experiences more accessible to an ever-increasing audience, inspiring the next generation of astronomers and space enthusiasts.

P23. Astro Chat Masala (Interdisciplinary Communication in Astronomy)

Chrisphin Karthick, Indian Institute of Astrophysics

Astronomy is one of the most passionate subjects and is attractive to everyone. Like music, dance, sports, and science, space science and astronomy have become a call for a group of people with a deep interest in the field. This fascinating astronomy also includes history, maths, physics, engineering (telescopes and radio communication), culture, astronomical architecture, temples, etc. For example, being in the outreach field, I have come across some people with varied backgrounds showing their interest, like with history background, (which we can make to connect with astronomical history) and engineering background (where most of the telescopes and backend instruments are all with that support only - mechanical) and electronics and communication can be used as for radio communication with the satellites and space-based telescopes (such a long astronomical distance). Even material science knowledge can help build a space station that can withstand that temperature. Even sometimes, the universe and celestial objects behave harmonically in mathematics, orbital periods, and waves (music). Thus, While communicating astronomy to the public, we can also share it with the interdisciplinary section. This exploration can help the public and anyone interested in astronomy approach astronomy in various ways. This unity and diversity will help build a great community to support astronomy in the future. In this, I will present about the interdisciplinary fields that cover astronomy and the ways to integrate them into astronomic communication with the public.

P24. Demonstrating Einstein’s Time Dilation Using Simple Muon Detectors

Jyh Harng Tan, National University of Singapore, Department of Physics

Einstein’s theory of special relativity is one of the topics taught in undergraduate university physics courses. As undergraduates rarely have the opportunity to collect data and verify the concepts of Special Relativity, namely time dilation and length contraction, this paper aims to serve as a detailed instructional manual (self-contained) as well as provide insights from the undergraduates’ point of view on how to use a muon detector to collect data at various locations and altitudes to

experimentally verify the aforementioned concepts. This experimental element enhances and complements the understanding of Special Relativity. The desktop muon detector used — the CosmicWatch Desktop Muon Detector V2 — was developed by the Department of Physics at Massachusetts Institution of Technology.