

Shared Skies

BRICS ASTRONOMY NEWSLETTER: VOL 1 ISSUE 1



science, technology
& innovation

Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA



SAAO
South African
Astronomical Observatory



The 0.6-metre telescope at the Pico dos Dias Observatory in Brazil. The facility is owned and operated by the National Astrophysical Laboratory of Brazil and supports astronomical research and education.

Shared Skies

BRICS Astronomy Newsletter: Vol 1 Issue 1

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Cover Image description

Conceptual rendering of the MOSAIC Instrument Core Subsystem (ICOS), developed with Brazilian participation for the MOSAIC spectrograph of the Extremely Large Telescope (ELT), the world's largest optical and infrared telescope under construction. Image courtesy of LNA.

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ISAST 2026

THE 12th INTERNATIONAL SEMINAR ON
AEROSPACE SCIENCE AND TECHNOLOGY



AEROSPACE FOR HUMANITY

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6 - 8 OCTOBER 2026
Tuesday - Thursday

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OPENING REMARKS



Prof. Dr. Arif Satria

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Prof. dr. Ova Emilia

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University (UGM)

TOPICS

- 1 UAV Technology and its Application
- 2 Satellite Engineering and Remote Sensing
- 3 Space Science and its Application: Space Weather and Space Situational Awareness
- 4 Astrophysics
- 5 Space Policy and Space Economy
- 6 Rocketry & Propulsion
- 7 Fundamental Aerospace Science: Flight Dynamics, Aerodynamics, Modeling and Simulations

KEYNOTE SPEAKERS



Prof. Brian P. Schmidt AC FRS
(To Be Confirmed)

Nobel Laureate in
Physics (2011),
Australian National
University



Prof. Dr. Mohd Yazid bin Yahya

Director of Centre for Advanced
Composite Materials (CACM),
University Technology
Malaysia (UTM)



Ir. Y. H. Yogaswara, Ph.D.

Faculty of Defense Science
and Technology,
Indonesia Defense University
(UNHAN)

DEADLINES

Abstract Submission Deadline
(09 July 2026)
Abstract Acceptance Notification
(16 July 2026)
Full Paper Submission Deadline
(16 August 2026)
Notification of Paper Acceptance
(16 September 2026)
Camera-ready Paper Submission
(22 September 2026)
Early Bird Registration Deadline
(09 September 2026)
Regular Registration Deadline
(30 September 2026)

REGISTRATION FEES

Category	Early Bird	Regular	Late
Students (Local)	Rp 700.000	Rp 1.000.000	Rp 1.500.000
Non-Students (Local)	Rp 1.200.000	Rp 1.500.000	Rp 2.000.000
Students (International)	\$65 USD	\$80 USD	\$120 USD
Non-Students (International)	\$100 USD	\$150 USD	\$175 USD

LISTENERS

- Local: Rp 500.000
- International: \$50 USD

SUBMISSION



linktr.ee/isast.2026

PUBLICATION

- Scopus Indexed Proceeding (TBD)
- Indonesian Journal of Aerospace - IJOA (Sinta 2)

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SPONSORS (TBD)

We are very excited to introduce the BRICS Astronomy Newsletter. This publication brings you updates on various programs and activities taking place across the BRICS member countries, as well as the work being done by the Working Group, the Secretariat, and the Coordination Office, along with the respective organizations within these structures.

2026 started quite well as ties across the member countries are strengthening through several engagements that have taken place over the past year, and through continued engagements this year. We are also happy to note the call for the BRICS STI Framework Program as well as the pilot BRICS STI Flagship Project. These show progress after several years of engagement through the annual Working Group meetings and the drafting of resolutions and indicate that we have taken small but progressive steps towards a cohesive collaboration across the various member countries.

Through this newsletter, we also aim to provide you with updates on the progress made on the various projects, including the flagship project, the BRICS Intelligent Telescope and Data Network, as well as the various social impact programs. We also welcome contributions from



people who do not work with us directly to showcase the work they are doing in their respective corners of the world around astronomy research, engineering, outreach, education, and development programs. We want to connect with you, grow with you, and build a connected community across the various member states. I hope you enjoy the first issue, and we look forward to many more issues coming.

Dudzile Kubheka
Coordinator: BRICS Astronomy

The digital newsletter you are reading is an effort to demonstrate the dynamism, potential, and activities of astronomical institutes, organizations, entities, and groups active among the BRICS countries. In this medium, we aim to narrate what is happening in the sky from the broad perspective of BRICS member countries, and to be storytellers of the tales of the sky and not merely limited to referring only to the names of famous entities in the news. Each issue of this newsletter, which will be published quarterly, will provide a multidimensional look at the phenomena, experiences, and steps of development in astronomy—a field that considers not only education, outreach, and development, but also research and investigation at the frontiers of astronomical science.

Astronomy undoubtedly owes much of its progress throughout history to the efforts of scientists who lived, researched, and left their brilliant achievements as a legacy for human science and culture across the regions that today form the BRICS member countries. Today, the pioneering activities of Russia and China in the field of space; South Africa and India in astronomical research; Brazil, Egypt, Indonesia, Iran, and the United Arab Emirates in astronomy development and outreach; Ethiopia in strengthening astronomy education; and Saudi Arabia in the preservation of dark skies are all recognized on the global stage.

It is precisely because of such a proud past and promising future that we seize this capacity as an opportunity for the first issue of the BRICS Astronomy Newsletter to reach you.

We sincerely appreciate sharing your experiences, findings, and capabilities with the world.



The publication of the first issue would not have been possible without the support of Duduzile Kubheka and Sesona Mqheliswa in guiding, advancing, and editing this publication.

At the International Astronomical Union Regional Conference in 2025, MEARIM7 in Amman, Jordan, I spoke about the high potential of the geographical expanse of the BRICS countries in hosting dark skies; the appearance and the passage of aurorae; and more across different parts of this region, and how this creates enormous potential for increasing Astrotourism capacity. Yet, this region is not merely a territory blessed with landscapes and skies across two hemispheres; the astronomical and space capabilities of BRICS are impossible to overlook. How good it is that we take a step toward presenting them better.

Mohammad Javad Torabi
Scientific Editor

Welcome to the inaugural issue of the BRICS Astronomy Newsletter. This publication marks an important milestone in strengthening communication, collaboration, and knowledge sharing across the BRICS astronomy community. As our partnerships continue to grow through joint research initiatives, workshops, training programs, technological development, and scientific exchange, this newsletter aims to serve as a platform to highlight the people, projects, and progress shaping astronomy within BRICS member countries.

In this first issue, we reflect on recent developments, collaborative efforts, publications, and scientific achievements that showcase the collective commitment of our institutions and researchers to the advancement of astronomy and space science. Beyond highlighting milestones, this newsletter also aims to promote greater connections among researchers, students, and stakeholders across our network.

Our aim is to not only document activities but also to create an engaging and accessible space for storytelling, scientific visibility, and regional collaboration. Future editions will continue to evolve in response to the interests



and needs of our community to ensure that this platform remains relevant, informative, and impactful.

We sincerely thank all contributors, institutions, and members of the BRICS astronomy community whose participation made this first issue possible.

We hope you enjoy reading this issue and look forward to growing this platform together.

Sesona Mqheliswa
Language Editor

CALL FOR

BRICS Astronomy Working Group Meeting 2026

ABSTRACTS AND REGISTRATION

Multi-messenger and Multi-wavelength Transients

- DATES: 26 - 30 OCTOBER 2026
- VENUE: INTER-UNIVERSITY CENTRE FOR ASTRONOMY AND ASTROPHYSICS (IUCAA), PUNE, INDIA
- FORMAT: HYBRID



विज्ञान एवं प्रौद्योगिकी विभाग
DEPARTMENT OF
SCIENCE & TECHNOLOGY





BAWG Data Science Hackathon 2026

Call for Applications

Dates: 29 - 30 October 2026
Format: In-person
Location: IUCAA, India

Requirements:

- Students enrolled for Honours, Masters or PhD
- Strong Python programming skills
- Time and willingness to review the provided materials before the event

Deadline: 31 July
Apply: <https://wkf.ms/4oyzQ7A>

Logos: Department of Science & Technology, aries, IUCAA, BRICS

BRICS Astronomy plans to host a BRICS Astronomy Working Group (BAWG) Data Science Hackathon in 2026, alongside the BAWG conference in India.

The hackathon will gather students from across the BRICS Astronomy community to collaborate in teams on real research challenges that sit at the intersection of astronomy and data science. Participants will choose from the two problem tracks. The first focuses on clustering variable stars from light curves and spectra using unsupervised learning to identify meaningful patterns in stellar variability. The second deals with

data-driven optical calibration of SUIT using multi-instrument solar observations which aims to infer the in-flight point spread function and evaluate its impact on solar UV studies. In both cases, participants will use the IUCAA cloud computing system to develop and test their approaches.

The event primarily targets postgraduate students, from Honours to PhD level, although exceptional final-year undergraduates may also be considered. Students with a strong background in Python and some familiarity with the command line are especially encouraged to start preparing. Since notebooks and support materials will be shared in advance of the hackathon, participants will also need to be ready to do some independent preparation before the event.

Beyond the technical challenge, the hackathon is designed to be a collaborative and international experience that allows students to strengthen their data science skills, work on current scientific problems, and connect with peers from different regions. It also provides a strong case for academic and institutional support, especially for students who may need assistance with travel to India for the conference and hackathon.

2026 BAWG Annual Meeting

The dates for the 12th Annual BRICS Astronomy Working Group Meeting have been confirmed! The meeting will take place from 26-30 October 2026 at the Inter-University Centre for Astronomy and Astrophysics (IUCAA) in Pune, India. It will bring together members of the astronomy community, including researchers, outreach and education and development practitioners, as well as policymakers from across the BRICS member countries.

The program will consist of:

- Science workshop

- Astronomy development in the member country updates
- Education, development, and outreach talks
- BRICS Astronomy Working Group meeting
- Hackathon
- Public engagement activities
- Science communication training

A formal announcement containing further details, which include registration information, venue, abstract submissions, presentations and deadlines, will be released soon.

Brazil Joins Global Effort to Build Instrument for the World's Largest Telescope

By Bruno Castilho, Décio Ferreira, Giuliana Capistrano (LNA)

Brazil contributes to one of the most ambitious projects in modern astronomy through its participation in the Mosaic consortium, responsible for developing a multi-object spectrograph for the Extremely Large Telescope (ELT) currently under construction in the Atacama Desert, Chile.

The Brazilian involvement is led by the Laboratório Nacional de Astrofísica (LNA), a research unit of Brazil's Ministry of Science, Technology, and Innovation (MCTI), in collaboration with the Institute of Astronomy, Geophysics, and Atmospheric Sciences at the University of São Paulo (IAG-USP). Operated by the European Southern Observatory, the ELT is expected to become the world's largest optical and infrared telescope. Featuring a 39-metre primary mirror, the facility will open unprecedented opportunities to explore and study the Universe.

The Mosaic instrument is designed to significantly advance research on galaxy evolution, chemical enrichment, and the large-scale structure of the cosmos. Capable of observing more than 200 astronomical targets simultaneously, the instrument will enable large-scale surveys across different epochs of the Universe.

Brazil plays a key role in the project through the development of the Instrument Core Subsystem (ICOS), which integrates and consolidates all other subsystems of the spectrograph. The Laboratório Nacional de

Astrofísica leads the design and development of the ICOS, with the instrument expected to be integrated and tested at LNA's new laboratory facilities currently under construction in Itajubá, Brazil. Brazil's involvement in the project will also secure access for Brazilian researchers to the ELT, further strengthening the country's position in advanced astronomical research.

The Brazilian team comprises eight engineers and approximately 20 astrophysicists, including primary users of the instrument as well as engineers and technologists involved in its development. The project is coordinated in Brazil by Beatriz Barbuy of the Institute of Astronomy, Geophysics and Atmospheric Sciences of the University of São Paulo, with support from the São Paulo Research Foundation (FAPESP).

Beyond its scientific significance, the project represents a major advancement in Brazil's technological capabilities. Participation in the development of a critical subsystem for such a complex instrument reflects the expertise cultivated in the country over recent decades, while it also supports the training of engineers and students and encourages the involvement of Brazilian industry in high-level international projects.

The Brazilian contributions are expected to be completed by 2032, after which the components will be assembled in France. The Mosaic instrument is scheduled to begin operations at the ELT in 2038.



Photo caption:
*Artistic rendition of
MOSAIC-ICOs being
assembled at the
laboratory.*

About LNA

The Laboratório Nacional de Astrofísica (LNA), based in Itajubá, Brazil, was established in 1985 as the country's first national laboratory. It operates the Pico dos Dias Observatory and manages Brazil's participation in international observatories such as Gemini and SOAR.

LNA is a national leader and an internationally recognized institution in the development of astronomical instrumentation, contributing high-level technology to global scientific collaborations.

Discovery of a SULFUR-RICH Molten Exoplanet

By: Anusha S

Astronomers have recently identified an unusual exoplanet that may belong to a potentially new class of sulfur-rich molten planets. The planet, known as L 98-59d, was studied using observations from the James Webb Space Telescope (JWST) along with supporting ground-based observatories. Researchers found that this planet has an extreme environment, unlike most planets previously discovered.

The planet orbits a small red dwarf star about 34 light-years from Earth. Although the planet itself was first discovered earlier, recent observations have revealed detailed information about its atmosphere and interior. Models suggest that the planet may host a long-lived global magma ocean with little or no stable solid crust. Temperatures on the planet exceed 1 500°C, making it one of the most hostile environments observed among nearby exoplanets.

One of the most unusual findings is the composition of the planet's atmosphere. Instead of being dominated

by common gases like nitrogen or carbon dioxide, observations suggest the presence of hydrogen-rich and sulfur-bearing gases, including hydrogen sulfide. This sulfur-rich atmosphere may contribute to maintaining the planet's extreme thermal environment.

This discovery is significant because it challenges existing planetary classification systems. Most rocky planets are expected to eventually cool and form solid crusts, but L 98-59d appears to have remained molten for billions of years. The study of such extreme planets helps scientists better understand planetary formation, atmospheric chemistry, and the diversity of worlds in our galaxy. Although this planet is not suitable for life, the methods used to study it may help astronomers identify more potentially habitable planets in the future.

Overall, the discovery highlights how modern telescopes like JWST transform our understanding of exoplanets and revealing worlds far more diverse and exotic than scientists previously imagined.

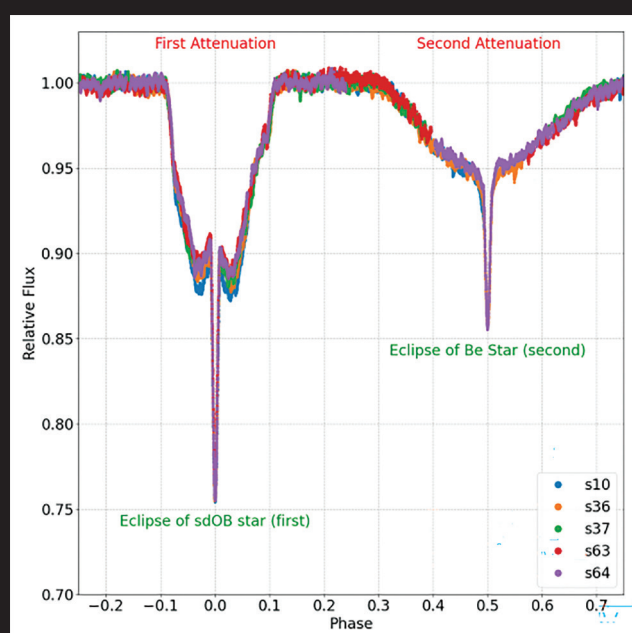
Sources: Reuters, JWST, Astronomy Now

Probing a Be Star Disk Through Eclipses: New Insights from V658 Car

By Ariane Cristina Fonseca Silva, Tajan Henrique de Amorim, Alex Carciofi (USP) e Felipe Navarete (LNA)

Be stars are rapidly rotating massive stars surrounded by thin gaseous disks, which are strong emitters of hydrogen lines such as H α . These disks play a key role in understanding how massive stars lose mass and angular momentum. However, in most cases, they cannot be spatially resolved, and the combined light from the star and its disk is observed as a single point source, making their characterization largely indirect.

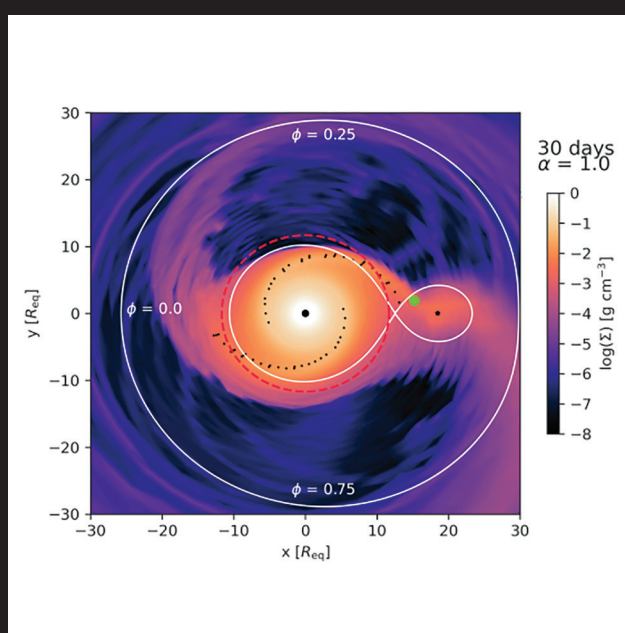
The system V658 Car represents a rare and valuable exception. In the study *X-Raying a Be Star Disk: Fundamental parameters of the eclipsing binary Be star V658 Car* (Amorim et al. 2025), recently accepted for publication in *The Astrophysical Journal*, we show that V658 Car is the first known eclipsing binary system composed of a Be star and a hot subdwarf (sdB) companion. This unique configuration allows the >



[Photo caption:] Figure 1.

Left: TESS light curve of V658 Car. Each color represents a different observing sector. A deep eclipse occurs when the hot subdwarf (sdOB) is occulted by the Be star and its disk (phase 0.0), followed by a narrower eclipse when the Be star is eclipsed (phase 0.5).

Right: SPH simulation of a binary system with a 30-day orbital period and a given mass ratio. The color scale represents



surface density, showing a two-armed disk (dotted lines) and mass transfer from the Be star disk to the companion. Assuming a Keplerian disk, the physical locations of the double-peaked emission (red dashed circle) and the oscillating emission (green point) in the Fe II 9997 Å line can be mapped based on their peak velocities. The latter varies along the orbital period and is therefore represented as a point, while the former remains stable and is shown as a circle. Further details can be found in Rubio et al. (2025).

individual characterization of both stars while minimizing the contribution of the disk, making it one of the most precisely constrained Be systems known to date.

The nearly edge-on alignment of the system turns V658 Car into a natural laboratory for the study of circumstellar disks. As the system evolves along its orbit, the light from both stars passes through different regions of the disk to produce narrow eclipses and broader attenuation features that encode direct information about the disk's structure and density.

A comprehensive and coordinated observational effort was required to characterize the system. High-precision photometry from the TESS mission revealed two narrow eclipses per orbital cycle, along with a broader attenuation interpreted as the passage of the companion behind the Be star disk. Multi-band photometry, supported by contributions from Brazilian amateur astronomers, improved estimates of interstellar extinction and stellar parameters.

Optical and near-infrared spectroscopy, obtained with instruments such as NRES and TripleSpec (at the SOAR telescope), enabled the separation of spectral signatures from the Be star, the subdwarf companion, and their circumstellar environments. Additional data from the IUE satellite (ultraviolet) and Gaia DR3 (optical) completed the system's spectral energy distribution, providing strong constraints on temperatures, radii, and luminosities.

One of the key results comes from the analysis of the Fe II 9997 Å infrared line, which shows a double-peaked emission profile with a varying asymmetry that follows the orbital motion of the companion.

Assuming a Keplerian disk, this behavior allows the precise localization of the emitting region within the disk. These observations provide the first direct confirmation of a mass-transfer bridge, through which material from the Be star is transferred to a disk around the companion—a phenomenon previously predicted by hydrodynamical models but never observed.

In addition, the He I 20581 Å line reveals a clear double-peaked emission profile following the companion's motion, providing direct evidence of a circumsecondary disk. V658 Car thus belongs to a small and important class of Be binary systems in which disk formation around the companion has been detected.

Polarimetric observations carried out at the Pico dos Dias Observatory (OPD) further constrained the geometry and density of the disk. In Be stars, polarization arises primarily from Thomson scattering of stellar radiation by free electrons in the disk. Given the nearly edge-on inclination ($\sim 89^\circ$) of V658 Car, even small variations in the balance between direct and scattered light produce measurable changes in polarization.

The observed polarization degree shows modulations

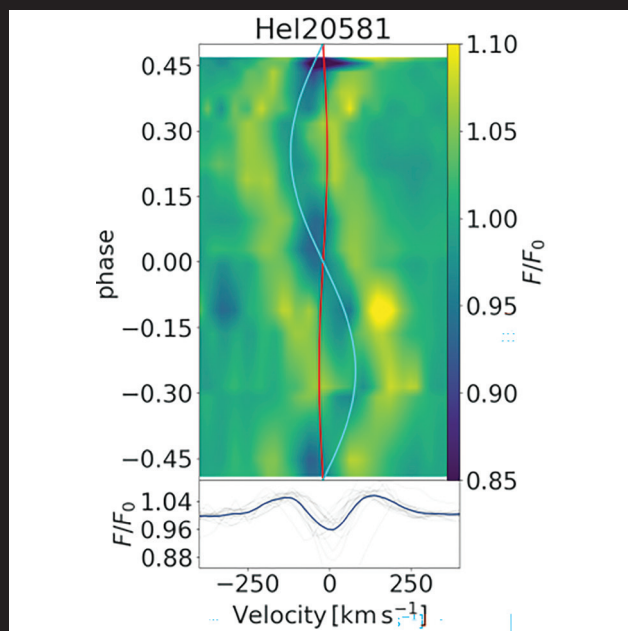
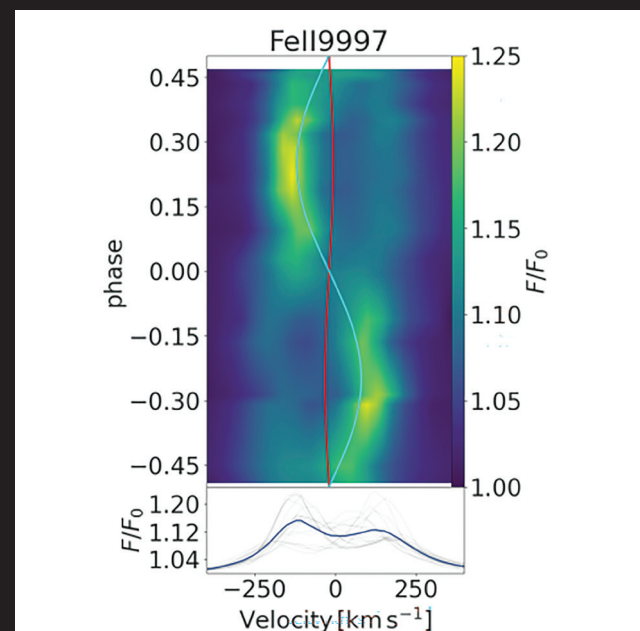


Figure 2. Dynamic spectra of V658 Car for two infrared lines: He I 20581 Å (left) and Fe II 9997 Å (right). The solid red and blue



lines indicate the orbital motion of the Be star and its companion, respectively.

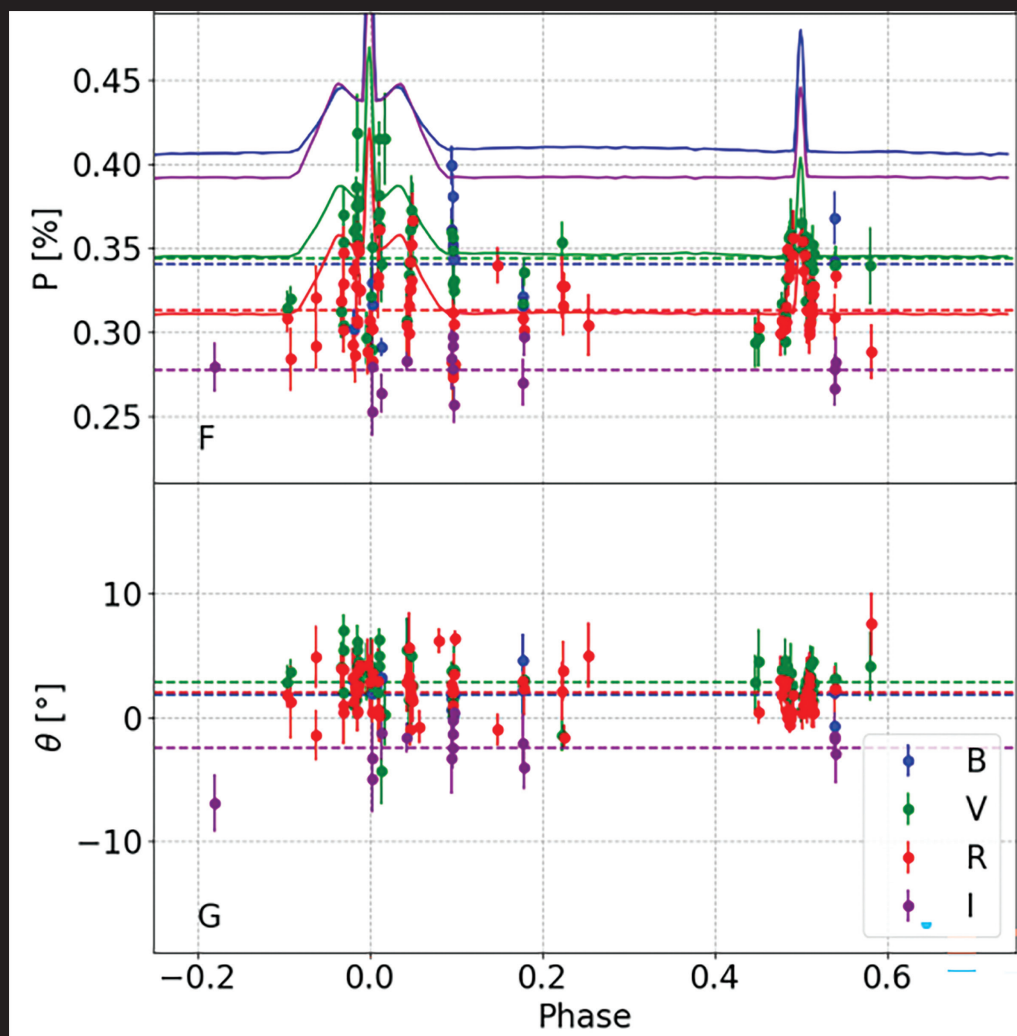


Figure 3. Intrinsic polarization of V658 Car as a function of orbital phase.

Top panel: Degree of polarization (P).
Bottom panel: Polarization angle (θ).

Data points represent observations, with colors indicating different photometric bands. Dashed lines show the average values in each band, while solid curves represent the adopted model for the Be star disk and its variation during eclipses and attenuation events.

correlated with the photometric events. During the secondary eclipse, polarization increases, consistent with the temporary obscuration of a weakly polarized light source. However, the primary eclipse exhibits a more complex behavior, suggesting that part of the disk is also being obscured, likely due to asymmetries in its structure.

Meanwhile, the polarization angle remains nearly constant across orbital phases and wavelengths, indicating a stable and well-defined disk geometry aligned with the orbital plane. This supports evolutionary scenarios in which the disk forms through mass transfer in a binary system.

The combined modeling of photometric, spectroscopic, and polarimetric data places strong constraints on the disk properties. The results indicate a dense, optically thick disk extending close to the Roche lobe limit of the system.

From the perspective of stellar evolution, V658 Car is only the second known system composed of a late-type Be star and a hot subdwarf companion, and the first with a well-defined eclipsing configuration. Its precise characterization makes it a benchmark system for studying Be star disks in post-mass-transfer binaries.

- **About the Authors:** Ariane Fonseca Silva and Tajan Amorim are PhD students in Astronomy at IAG/USP; Alex Carciofi is a professor and researcher at IAG/USP; and Felipe Navarete is a researcher at LNA and the Brazilian Manager of the SOAR Telescope.
- The full version of this article is available on the BRICS Astronomy website.



Beyond the Lens:

From astronomy training to women-led

by: Anupama Pradeepan

Livelihoods in India

In Coimbatore, a group of first-generation women graduates has spent the past year doing something that rarely happens in science outreach—they stayed long enough for learning to turn into work. The CSTERC Women AstroPreneurs' Collective (CWAPC) was designed with the clear intention to move beyond short-term engagement in astronomy and create a pathway where scientific training can lead to technical capability and income generation. This required starting with a problem that is often acknowledged but rarely addressed in practice.

India has seen a steady rise in women entering higher education, including in science disciplines, yet this increase does not translate into participation in

The gap is not in
theoretical knowledge, but
rather in access to tools,
hands-on training, and
sustained mentorship.

technical sectors. In manufacturing, fabrication, and instrumentation—spaces that form the foundation of technology, especially fields like astronomy and space science—women remain significantly underrepresented. The gap is not in theoretical knowledge, but rather in access to tools, hands-on training, and sustained mentorship.

CWAPC was built to work directly within this gap

The program brought together 20 first-generation women graduates, many of whom had studied science but had no prior exposure to technical workspaces. The structure was intentionally long-term as a year was necessary to move from familiarity to competence.

The first six months focused on telescope building. Participants were trained in mirror grinding, optical alignment, and assembly and worked with the CSTERC Hexon Telescope. This was not demonstrative learning as it required precision, repetition, and the ability to work through errors. Early assessments showed low confidence in the handling of tools and machinery. Over time, this changed through consistent practice and by the end of this phase, participants were able to independently assemble and test telescopes, grounding their understanding of optics in practical work.

This technical foundation is central to the program. Astronomy, in this context, is not used only as a subject

of study but also becomes a medium through which participants engage with instrumentation, measurement, and fabrication—skills that are directly relevant to broader technical industries.

The second phase focused on application. Participants were supported in translating their skills into small-scale, viable ventures. This included the development of ideas, understanding cost structures, and the identification of potential markets. For many, this was their first structured engagement with entrepreneurship.

Digital and AI tools played an enabling role in this transition. Participants used these platforms to create product designs, communication materials, and basic business plans. These tools reduced entry barriers and allowed participants to shape how they presented their work independently.

By the end of the year, the outcomes were both visible and measurable. All participants completed the technical training and several micro-enterprises were initiated, with a subset continuing to operate actively. These ventures ranged from astronomy-based educational offerings to product-based work that integrates scientific themes into locally relevant markets. Early revenue generation, though modest, marked an important shift from training to economic participation.

More significant than the numbers is the transition in >





capability. Participants who began with limited exposure to technical environments are now able to work with tools, build instruments, and pursue their own ideas. This shift from theoretical familiarity to applied skill is where the program's impact lies.

CWAPC also offers a model that can be adapted across contexts. Its core components are straightforward sustained engagement, access to technical infrastructure, and mentorship that extends beyond instruction into application. These elements make it possible to connect astronomy with livelihood pathways, particularly for communities where access to such opportunities remains limited.

As the first cohort completes the program, the focus is on continuity. An incubation space is being developed in Coimbatore to support participants as they continue

to build and stabilize their ventures. A second cohort is in preparation, with the aim to extend this approach to more women.

This work is grounded in a simple understanding—exposure alone is not enough. Skill requires time and opportunity requires structure and when both are in place, astronomy can move beyond observation. It can become a field through which individuals not only understand the Universe but also build a place for themselves within it.

- The CSTERC Women AstroPreneurs' Collective (CWAPC) is supported by the International Astronomical Union's Office of Astronomy for Development (IAU-OAD) and implemented by CSTERC Techno Science in collaboration with the Open Space Foundation, Coimbatore, India.



Following the exceptional rainfall of 2019, a temporary lake formed in Iran's Lut Desert, one of the driest places on Earth. Knowing the phenomenon would be short-lived, I traveled to document this rare landscape. Captured on October 18, 2020, this panoramic image features the Milky Way, Jupiter and Saturn above the lake, accompanied by atmospheric airglow and Zodiacal Light along the ecliptic plane. Reflected on the calm surface of the temporary lake, these celestial phenomena create a unique scene born from the intersection of a rare climatic event and a pristine desert night sky.

**Astrophotographer:
Moshen Salehi**

OBSERVATIONS

of Comet C/2025 K1 Fragmentation

By Margarita Safonova

In response to the outburst and break up alert of comet C/2025 K1 (ATLAS) following its perihelion on 08 October 2025, when it came within 0.33 AU of the Sun, we observed it with the 2-metre Himalayan Chandra Telescope (HCT) of the Indian Astronomical Observatory (IAO, IAU code N50) on November 16, 2025.

On November 11, 2025, the images from the Two-meter Twin Telescope, Tenerife, Canary Islands, Spain, showed three distinct fragments, each with its own comae and anti-sunward tails. The central fragment was the brightest; the westward fragment was at $\sim 5''$; and the fainter eastward fragment at $\sim 2''$ from the central. At the time of our observation, just five days later, the separation between the components was already larger—the central fragment was still the brightest; the eastward one was $6.1''$ from it; and the westward (trailing) one was at $7.9''$ from the central (Fig. 1). They each still displayed their own comae and tails. The eastward fragment was clearly elongated, especially visible in u' filter, which indicated further fragmentation. The images also showed a broad, parabolic dust envelope, which exhibited a rapid expansion. Our observations confirmed the presence of multiple discrete components of the nucleus of C/2025 K1 comet and showed that the morphology of the fragmenting system was evolving on a timescale of days.

It is also interesting that this comet was called the Color Changing Comet, as before the perihelion, it had a greenish tint, which is usually the result of a reaction between diatomic carbon molecules (C_2) and the sunlight. However, like a 'celestial chameleon', C/2025 K1 has changed color, transforming from green to gold

in more recent weeks. That is why the color in our true-color (RGB) image is golden (Fig. 2).

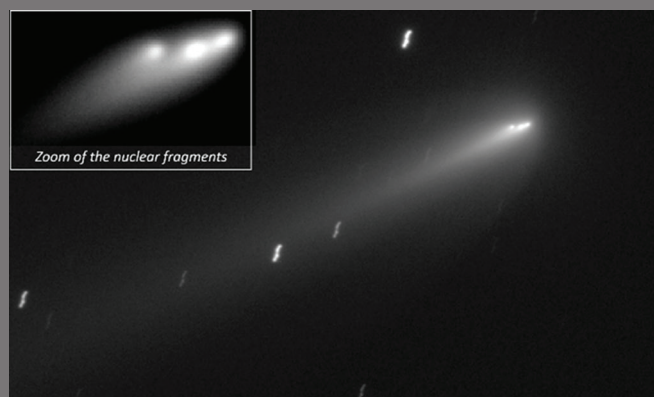


Figure 1.
Image credits: Margarita Safonova, Niruj Mohan Ramanujam (IIA).

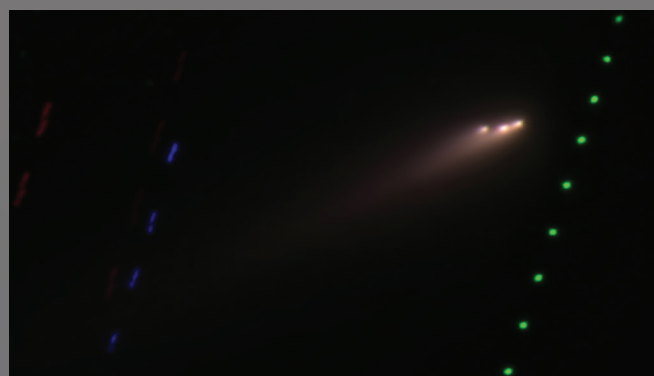


Figure 2. RGB (true-colour) image of the comet fragments.
Image credits: Margarita Safonova (IIA), Marek Husarek (Slovakian Astronomical Institute)

- About the Author: Margarita Safonova is a researcher at the Indian Institute of Astrophysics and the M. P. Birla Institute of Fundamental Research in Bangalore, India.

Data Analytics Training Program

By: Moleboge Lekoloane

In March 2026, BRICS Astronomy announced applications for the Data Analytics Training Program that combines data science, machine learning (ML), and astronomy. The 10-week virtual course is designed to accommodate participants ranging from beginners to advanced practitioners, to strengthen their ability to analyze complex datasets and enhance their research capabilities.

Throughout the program, participants are introduced to practical tools and techniques for managing, analyzing, and interpreting large-scale datasets. The training focuses on building applied skills that can be directly used in research and data-driven environments. The response to the call for applications was overwhelmingly positive, with approximately 1 200 submissions received. This strong uptake underscores the growing demand for accessible, high-quality training opportunities at the intersection of data science and astronomy.

The curriculum builds progressively, beginning with foundational skills such as Python programming and

development environment setup. Participants then advance through core areas including data structures, statistical analysis, and data visualization.

The program also covers specialized topics such as astronomical data handling using FITS files, time series analysis, and the application of machine learning techniques, including clustering, classification, and regression, to astronomical datasets. The program also introduces explainable AI to enable participants not only to develop models, but also to interpret and communicate their outputs effectively.

The training concludes with a capstone project in which participants apply their newly acquired skills to real-world astronomical data and present their findings. Overall, the initiative reflects a broader commitment to strengthening data-driven research capacity across the Global South and empowering the next generation of scientists to make meaningful contributions to astronomy.

- For more information: <https://bricsastronomy.org/2026dat/>

South African Astronomy Olympiads

By: Danielle Naidoo

Currently, South Africa lacks an active presence in astronomy olympiads, with no national astronomy-focused event or participation in any international competitions. Last year marked the first collaboration between the South African Astronomical Observatory (NRF-SAAO) and the South African Institute of Physics (SAIP) to include an astronomy section in the 2025 South African Physics Olympiad (SAPhO), which yielded impressive results. This successful partnership has been extended for the 2026 SAPhO, scheduled for later this year.

South Africa is currently working to establish a national Astronomy Olympiad, with astronomy not just as an add-on but at its central focus. This initiative aims to be more than just a simple exam; it will be a sustainable and multifaceted project that lasts for years. It will feature

a yearly intake of young high school learners to create a growing pool of participants and allow for ongoing support and development through their involvement.

The program will include training sessions, mentoring, multi-round examinations, an astronomy training camp, and a science fair, and will utilize the Cascade model to ensure mutual benefit for all participants. This comprehensive yet detailed approach will ignite curiosity for some, while it reinforces interest in astronomy and other STEM subjects for others. It will also provide an impactful experience for learners and valuable opportunities, while it equips them with essential skills to excel in their pursuit of a future in science. Following the rollout of this national Olympiad, South Africa aims to join its fellow BRICS countries on the global stage by competing in the International Olympiad on Astronomy and Astrophysics (IOAA).

Virtual Observatories for Education Workshop (VO4EDU)

By: Narusha Isaacs-Klein & Priya Hassan

The VO4EDU (Virtual Observatories for Education) workshop, sponsored by Inter-University Center for Astronomy and Astrophysics, Pune, India (IUCAA), was held with the primary aim of training Master's students, research scholars, teachers, and young researchers in accessing, analyzing, and deriving scientific insights from modern astronomical data archives. This was held at the Maulana Azad National Urdu University, Hyderabad, India, and organized by Priya Hasan, S N Hasan, and Moleboge Lekoloane.

The Need for Virtual Observatories

Astronomy has shifted from a data-scarce to a data-rich science. With ground-based surveys and space telescopes such as the Hubble Space Telescope, James Webb Space Telescope, and ESA's GAIA mission generating terabytes to petabytes of data, having efficient data access and interoperability is crucial. The International Virtual Observatories Alliance (IVOA), established in June 2002, was created to address this challenge. Today, IVOA comprises 17 member alliances which work to create protocols such as the Table Access Protocol (TAP) and VOTable format to ensure that different data centers and archives can interoperate seamlessly. The alliance promotes the FAIR principles—making data Findable, Accessible, Interoperable, and Reusable—with a vision of “science for all”.

Workshop Structure and Participation

The VO4EDU workshop brought together experts from China, Russia, the United Kingdom, and India, who delivered about 20 lectures on data access, machine learning, and programming techniques for astronomical research. The event was held in a hybrid mode, with 900 registered participants, including 40 selected from prestigious institutions, such as IITs, IISERs, Delhi University, JNU, University of Hyderabad, Osmania University, and BITS Hyderabad. All registered participants gained access to all sessions which were broadcast on the Zoom platform. Additionally, we had

20 Master's students and research scholars from the MANUU. The program included lectures, hands-on training sessions, and a sky-watching event.

Outcomes and Deliverables

All sessions were live-streamed and recorded. The complete playlist is available on YouTube to ensure continued access for the wider community

<https://www.youtube.com/@ShristiAstronomy>

- [Point:] Detailed information can be found on the official workshop website: <https://bricsastronomy.org/vo4edu/>

Overall, the VO4EDU workshop successfully equipped early-career researchers with essential skills to harness the power of virtual observatories and fostered a culture of open, interoperable, and reproducible astronomy.

BRICS VO4Edu Roadmap and Future Initiatives

Building on the success of the previous events, we plan to host a monthly expert seminar series: Showcasing BRICS expertise, Q&A, and collaboration opportunities.

This initiative targets early-career researchers, postgraduates, data scientists, and developers to emphasize IVOA tools to enhance research capabilities, promote open science, and drive interdisciplinary innovation.

Empowering BRICS Researchers Through Equitable Access to Global Astronomy Data

The VO4EDU workshop exemplifies BRICS Astronomy's commitment to equitable access, capacity building, and international cooperation. By empowering participants to leverage global data archives, it bridges infrastructure disparities and positions BRICS researchers at the forefront of data-driven discovery.

Making Habitable Worlds: Planets versus megastructures

By Raghav Narasimha Ponnaganti, Margarita Safonova, and Chandra Sivaram, Indian Institute of Astrophysics, Bangalore, India

In 2015, Tabby's star (KIC8462852) caught the world's attention due to a paper by citizen scientists who noticed its seemingly unexplainable brightness variations. The forward theory was offered – KIC8462852 is surrounded by a Dyson sphere—a megastructure made by an alien civilization to collect all energy output from their star. Its light curve was eventually shown to have chromaticity more characteristic of interplanetary dust, but the world was woken up to the idea of megastructures. However, when Dyson suggested his megastructures idea in 1960, only Solar System planets were known; it took more than 20 years to realize that nature has no problem making planets and does it with a flair. The total number of planets in the Galaxy is estimated to be in billions. With such abundance of planets, there would be no need to destroy the entire planetary system to make one sphere. Besides, to construct just an 8 cm thick shell would require all of the Solar System's rocky material, including Earth.

Building a sphere around the Sun would trap the solar wind inside and eliminate the heliosphere which shields >75% of the Milky Way radiation (cosmic rays, ISM). In addition, there would be no protection from solar flares, CMEs, etc as there would be no natural magnetic field. Instead, planet(s) could be moved into the habitable zone

at a constant low-thrust acceleration using high-power directional lasers, resulting in a gradual spiral transfer from one orbit to another. Even a free-floating planet could be captured and moved into the system depending upon the needs. Such high-power laser operations could produce detectable techno-signatures and serve as potential indicators of extraterrestrial engineering. These High-Power Laser Techno-signatures (HPLT) are unambiguous, long-lasting signals, and are detectable over interstellar distances, making them promising targets for SETI. In addition, systems with unusual planetary arrangements, such as TRAPPIST-1 or Kepler-20S, where many Earth-like planets are arranged close to their star, could be the result of ETI moving planets intentionally to suit their needs.

The detection of high concentrations of planets in close proximity or systems with resonant orbits—systems with Strange Exoplanetary Architectures (SEAs) —could suggest intentional engineering by ETI, prompting targeted searches for biosignatures and techno-signatures.

- This work was highlighted in media, such as Universe Today; The Astrobiology Web; and WION News, and published in the Proceedings of IAU Symposium No.387 (Toward) Discovery of Life beyond Earth and its Impact, 2026, doi:10.1017/S174392132400187X.

Science

COMMUNICATION TRAINING

By Duduzile Kubheka

Run by BRICS Astronomy and the African Astronomical Society (AfAS), in collaboration with the South African Astronomical Observatory (NRF-SAAO), this program is designed to equip researchers, students, professionals, and science communicators in astronomy and other basic sciences across BRICS and African countries with essential science communication skills. The initiative aims to strengthen participants' ability to effectively communicate scientific knowledge, engage the public, and inspire greater interest in astronomy and the sciences more broadly.

Held alongside the AfAS Conference 2026, held in Kasane, Botswana, in March 2026, the workshop featured expert presenters with both academic and practical experience in science communication. The initiative sought to bridge the gap between academia and practice by addressing existing challenges within the science communication landscape. The program aims to:

- Equip researchers with practical skills in science communication and public engagement.
- Foster collaboration between BRICS and the African astronomy community under a shared vision of inclusion and engagement.
- Strengthen science communication capacity across the Global South through coordinated training and mentoring.
- Encourage participants to develop outreach initiatives and serve as ambassadors for astronomy within their communities.

Moderated by Duduzile Kubheka, the session explored the importance of science communication and featured discussions on key topics related to public engagement and policy. Presentations included an overview of science engagement and its impact by Duduzile Kubheka and A.P. Jayaraman; science communication and media engagement by Thembele Mantungwa; and engaging policymakers and understanding policy-making processes by Declan Kirrane. Conducted in a hybrid format, the session brought together participants from across the globe.

This program will now move into more advanced stages, developing structured modules for more targeted engagement and clearer segmentation of target audiences. This next phase will involve collaboration with additional partners across Africa, BRICS, and the broader Global South, including regionally tailored training sessions delivered in partnership with local organisations. These efforts aim to support the continued growth and development of the field, while establishing stronger communities of practice and networks.

The next in-person training session will take place at IUCAA, India, later in the year alongside the annual BRICS Astronomy Working Group meeting.

- This project is led by Duduzile Kubheka, BRICS Astronomy and BITDN Coordinator, and Thembele Mantungwa, NRF-SAAO/AfAS Communications Chair.



CAPTION: Radio antenna deployment, China

RADIIO:

Connecting cultures under the same radio sky

by: Eleni Vardoulaki, Hongming Tang, Hira Fatima, Faisal Rahman

In a world often divided by geography, language, and opportunity, science has the unique power to unite. One of the most inspiring examples of this is the global initiative Radio Astronomy for Development, Intercultural Innovation, and Outreach (RADIIO), which is transforming how young people experience astronomy across continents. RADIIO represents a new model for science education—inclusive, hands-on, and deeply connected across cultures. RADIIO was funded

by the Office of Astronomy for Education (OAE) of the International Astronomical Union (IAU) for the year 2025.

Listening and viewing the invisible universe

Astronomy is often associated with what we see—stars, planets, and galaxies lighting up the night sky. But much of the universe remains invisible to our eyes. Through radio astronomy, scientists can detect signals from physical

Online International Workshop RADIIO 7 March 2026



CAPTION: Collage from the RADIIO activities in Greece, Pakistan and China presented at the Online International Workshop of RADIIO on 07 March 2026.



processes associated with the centers of galaxies, with star-forming regions, and with energetic phenomena that reveal the hidden structure of the cosmos.

RADIIO brings this invisible universe into classrooms, not through expensive observatories, but through simple, low-cost radio antennas that students can build themselves. This approach transforms students from passive learners into active explorers of the universe.

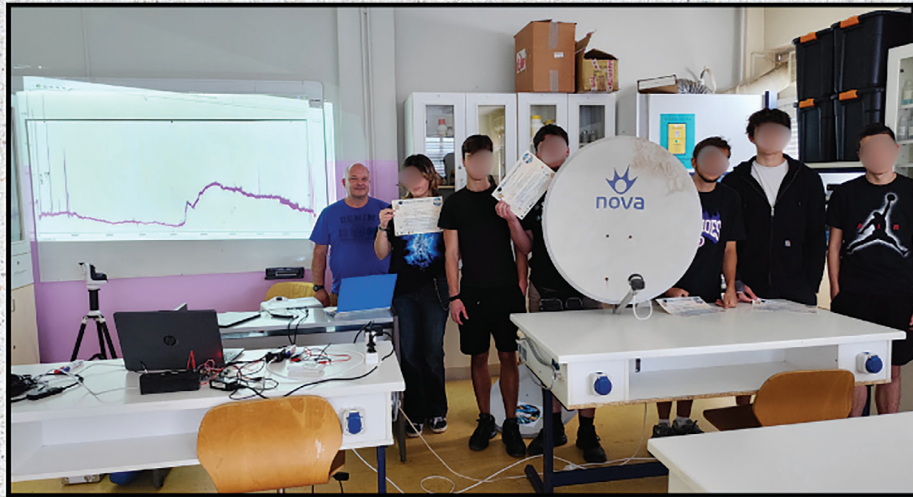
A truly global initiative

RADIIO has created a network that spans Europe and Asia, connecting students and educators across Greece

and Cyprus, China, and Pakistan with the additional participation from India and beyond. The program reached more than 2 600 students and teachers across 147 schools in Greece alone, alongside extensive participation in China and Pakistan.

What makes RADIIO particularly powerful is its commitment to equity and access. Activities were implemented in urban centers such as Athens, Shanghai, and Karachi; rural and underdeveloped regions; remote island communities in Greece; schools with limited technological resources; and inclusive educational environments, including a school for >

2ο ΓΕΛ Βριλησίων - 19/9/2025



CAPTION:
Visit to the 2nd
General Lyceum
of Vrilissia,
Athens, Greece.
Detection of
solar radiation
at 10 GHz, and
demonstration of
antenna students
assembled and
connected to
laptop via an
Arduino.



RADIIO brings this invisible universe into classrooms, not through expensive observatories, but through simple, low-cost radio antennas that students can build themselves.

deaf students. This diversity reflects a core belief—science education should not be limited by geography or resources.

Learning science by doing science

RADIIO goes beyond traditional teaching. It places students at the center of discovery. Participants engaged in:

- Building and operating radio antennas
- Exploration of the 21 cm hydrogen signal from our galaxy and detection of 10 GHz solar radiation
- Participation on in citizen science projects such as Radio Galaxy Zoo: EMU

8ο Γυμνάσιο Χαλανδρίου
9/5/2025

RADIIO



Ανίχνευση Ήλιου στα 10 GHz με Ραδιοκεραία
και παρατήρηση Ήλιου με ηλιακό τηλεσκόπιο

Ομιλία για
το αόρατο
Σύμπαν



CAPTION: Visit to the 8th Gymnasium of Chalandri, Athens, Greece. Solar observation and detection of solar radiation at 10 GHz.

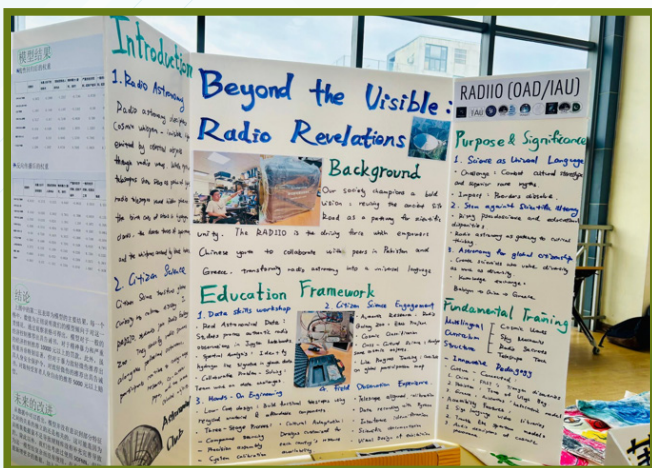
- Learning how real astronomical data is collected and analyzed
- Attending interactive seminars and hands-on workshops
- Presentation of their projects on an international workshop

In Greece and China, in-person visits allowed students to directly interact with scientists and equipment, while in Pakistan, online workshops in Urdu ensured accessibility and strong engagement across a wide audience.

Measurable impact, lasting inspiration

The impact of the program has been both measurable and meaningful. Evaluation results show that over 93% of participants reported improved understanding of astronomy. Additionally, more than 95% gained at least a basic understanding of radio astronomy. Overall, there was a strong comprehension of key scientific concepts, including telescope techniques and cosmic observations.

But beyond the numbers, the program sparked curiosity and enthusiasm for science; confidence in engaging >



CAPTIONS: (TOP LEFT) Students in China assemble a FAST radio telescope model. (LEFT) Students' assignment on radio astronomy, China. (TOP) Students posing with the radio antenna designed by the Planetarium of Shanghai, China.

with complex ideas; and a sense of belonging in a global scientific community

In China, teachers trained through the program have already begun independently delivering radio astronomy education, demonstrating the long-term sustainability of the initiative.

Science diplomacy in action

One of the defining achievements of RADIIO is its role in fostering intercultural exchange. The program culminated in a full-day international workshop in March 2026, that brought together students from Greece, China, and Pakistan in a shared virtual space. Over eight hours, participants presented their work, exchanged ideas, and engaged in scientific dialogue.

This beautiful demonstration of diplomacy connected young minds across borders—RADIIO builds bridges through knowledge, innovation, and shared exploration of the universe.

A scalable model for the future

RADIIO has successfully demonstrated a model that is:

- Scalable by reaching thousands across multiple countries
- Flexible in combining online and in-person engagement
- Inclusive through its accessibility to diverse socio-economic groups
- Sustainable through the support of open-access materials and trained educators

All educational resources, including lectures, workshops, and datasets, remain freely available to enable the continued use and expansion beyond the lifetime of the initial funding.

Aligning with a global vision

RADIIO is part of a broader movement that shapes the future of global astronomy. Through its activities, it highlights the importance of international cooperation for the advancement of science and education and showcases initiatives that connect research, technology, and society across nations. It also contributes to capacity building in emerging regions; the development of future scientists and innovators; strengthens international partnerships, and enhances public understanding of science.



CAPTION: Students testing the radio antenna at the Theory Schooling System in Karachi, Pakistan.

Looking ahead

The success of RADIIO has created strong momentum for growth. With additional support, the program aims to expand to new countries and regions to engage teachers in training programs; to develop more multilingual and accessible content for the engagement of students locally; and to increase participation in citizen science. Our goal is to deepen the collaboration with international partners and make it a truly global standard for radio astronomy education via a proven model with significant impact.

One sky, one community

No matter where we live, we all share the same sky. RADIIO reminds us that astronomy is about bringing humanity together through curiosity and discovery. From rural classrooms to international workshops, students are tuning into the same cosmic signals not only learning about galaxies and stars, but also about collaboration, understanding, and shared purpose.

In a rapidly changing world, initiatives such as RADIIO show us what is possible when science is made accessible, inclusive, and global. In doing so, they help shape a future where the next generation doesn't just observe the universe, but also explores it together.



CAPTION: Seminar explaining radio antenna operation at the Theory Schooling System, Karachi, Pakistan.



CAPTION: Students in China learn about the FAST radio telescope.



BRICS Astronomy collaboration reaches major milestone with signing of the GOTTA-BRICS PATHFINDER MEMORANDUM OF UNDERSTANDING

29 June 2026

Collaboration among BRICS member countries' and institutions continues to strengthen with the signing of a Memorandum of Understanding (MoU) for the GOTTA-BRICS Pathfinder Programme, marking a major milestone in advancing the BRICS Intelligent Telescope and Data Network (BITDN), the flagship project of the BRICS Astronomy Working Group (BAWG). The MoU was signed in May 2026 during a visit by delegates from Brazil to South Africa, following the signing of a Letter of Intent in Hangzhou, China, in April 2025, and subsequent discussions at the BAWG 2025 Business Meeting held in Brazil. The agreement brings together the National Astronomical Observatories of China (NAOC), Brazil's National Laboratory for Astrophysics (LNA), and the National Research Foundation's South African Astronomical Observatory (NRF-SAAO), with additional BRICS partners expected to join as the programme expands.

The GOTTA-BRICS Pathfinder Programme forms part of the Global Open Transient Telescope Array (GOTTA), an ambitious initiative to establish a global network of more than 100 metre-sized Schmidt telescopes capable of scanning the entire night sky every 30 minutes. Using the intelligent observatory model, advanced data management, and coordinated follow-up observations, the network will transform the detection and study of transient astronomical events.

The programme builds on BITDN, a pioneering BRICS-led research infrastructure initiative proposed in 2019 to establish a global optical telescope network across BRICS countries. BITDN aims to provide continuous, full-sky coverage for the study of transient and variable astronomical phenomena while fostering scientific innovation, technological development and international collaboration.

Beyond its scientific goals, BITDN places strong emphasis on societal impact through education, skills development, public engagement and social development programmes. Planned activities include hackathons, data analytics and artificial intelligence training, scholarships, exchange programmes, winter and summer schools, and science communication initiatives. The project also envisions public access to the GOTTA Event Horizon Cyber-Telescope platform, creating opportunities for schools, educators, students, amateur astronomers, and astronomy enthusiasts to engage directly with astronomical observations and data.

The initiative is equally committed to promoting equity and inclusion in science through open-access platforms and collaborative research opportunities, particularly for scientists and institutions in underrepresented regions, including



Africa. Through advances in artificial intelligence, machine learning, and big-data science, the programme will complement major international facilities such as the Rubin Observatory and the Square Kilometre Array Observatory.

As a critical next step, NAOC, LNA, and NRF-SAAO will work together to develop a prototype intelligent observatory network across China, Brazil, and South Africa. This Pathfinder Programme will validate the feasibility of the intelligent observatory model while laying the foundation for broader BRICS and global participation.

The signing of the GOTTA-BRICS Pathfinder MoU represents more than a formal agreement, it reflects a shared commitment to advancing scientific discovery, developing future generations of researchers, and strengthening international cooperation. Together, the partners are building a future where astronomy serves not only as a tool for exploring the Universe, but also as a catalyst for innovation, education, and societal development.

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South Africa – National Research Foundation

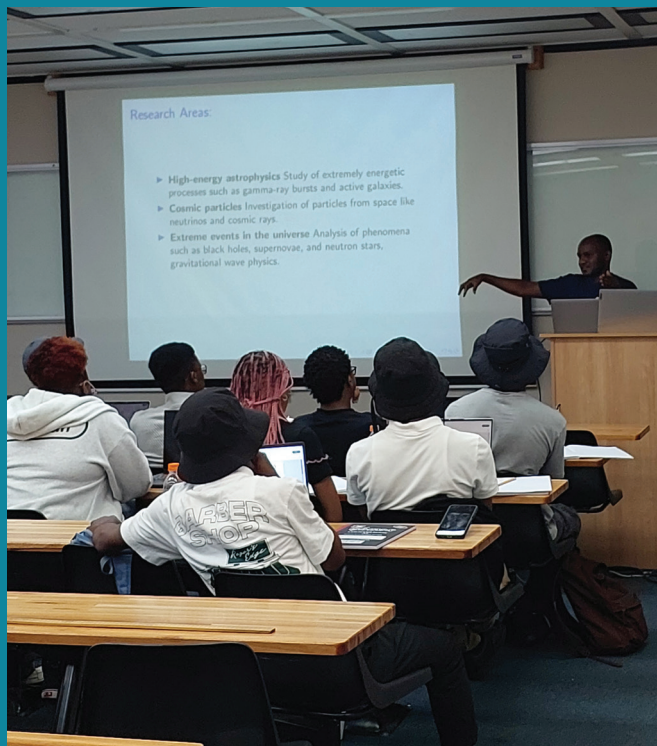
South African Astronomical Observatory (NRF-SAAO)

Dr Rosalind Skelton

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About BRICS Astronomy: <https://www.bricsastronomy.org/>





Dr. L. Nyadzani during the CAPP Theoretical Astrophysics Workshop.
Credit: Ms. C. Gouws – CAPP



Mr. L. Mazwi during the CAPP Theoretical Astrophysics Workshop.
Credit: Ms. C. Gouws – CAPP

Hands-On Astrophysics:

CAPP workshop blends theory with Python practice

By: Ms. Chanelle Gouws and Dr. Lutendo Nyadzani

The Centre for Astro-Particle Physics (CAPP) successfully hosted a Theoretical Astrophysics Workshop on 30 March 2026. The event was specially designed for the University of Johannesburg (UJ) physics undergraduate students.

The session opened with a welcome address by Prof. Buyi Sondezi, Head of the UJ Department of Physics, and Dr. Paul Molefe, Director of the UJ Soweto Science Centre. Following the opening, workshop organizer, Dr. Lutendo Nyadzani, delivered a talk that highlighted the

diverse career and research opportunities within the field of astrophysics. CAPP PDRFs, Dr. Khushboo Dixit and Dr. Tamador Aldowma, also contributed brief presentations and shared their expertise with the students.

Workshop organizer, Mr. Luyanda Mazwi, led the practical component of the day, guiding students through some hands-on experience in solving a basic astrophysics problem using Python programming. This workshop served both as a skill-building opportunity and an important outreach effort to inspire students and highlight opportunities within the field.

Title: *Catching TeV emission from GRB 221009A and alike with LHAASO, LACT and SWGO*

Authors: Yunlei Huang, Sujie Lin, Soebur Razzaque, Lili Yang & Zijie Huang

DOI: <https://doi.org/10.1140/epjc/s10052-026-15450-4>

Journal: The European Physical Journal C, Volume 86, article number 195, (2026)

Inspire Link: <https://inspirehep.net/literature/3125576>

Title: Implications of joint spectral analysis of gamma-ray bursts detected by Fermi Large Area Telescope and Gamma-ray Burst Monitor on phenomenological correlations

Authors: T.K.M. Aldowma, S. Razzaque, R. Martinelli, R. Gupta, F. Longo, N. Omodei, N. Di Lalla, J.L. Racusin, A.H. Airasca

DOI: <https://doi.org/10.1093/mnras/stag060>

Journal: Monthly Notices of the Royal Astronomical Society, Volume 546, Issue 4, March 2026, stag060

Inspire Link: <https://inspirehep.net/literature/3071329>

Title: Extremely Luminous Optical Afterglow of an Energetic Gamma-Ray Burst GRB 230204B

Authors: R. Gupta et al., (Incl. Soebur Razzaque)

DOI: <https://doi.org/10.3847/1538-4357/ae2794>

Journal: The Astrophysical Journal, Volume 997, Number 2

Inspire Link: <https://inspirehep.net/literature/2862720>

CAPP

PUBLICATIONS

About CAPP:

Scientists and students at the Centre for Astro-Particle Physics focus on research in Gamma-ray Astrophysics, Neutrino Astrophysics, Neutrino Physics, and Gravitational Wave Physics. We perform theoretical studies as well as data analysis and modelling. We are involved in all three experimental facilities, namely the Fermi Gamma-ray Space Telescope, the Cherenkov Telescope Array, and the KM3NeT Neutrino Telescope, to perform cutting-edge research.

Publications:

The Centre for Astro-Particle Physics (CAPP) hosted a Theoretical Astrophysics Workshop on March 30, 2026, for University of Johannesburg undergraduate students. This skill-building and outreach event featured research and career insights from physics faculty and postdoctoral researchers, concluding with a hands-on Python programming session.



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