IAU Catalyst | November 2024

Information Bulletin

Contents

Image featured in the IAU Press Release on 'Satellite Mitigation Project Led by IAU CPS Wins Major Grant' [Aug. 8, 2024] A long-exposure image of the Orion Nebula with a total exposure time of 208 minutes showing satellite trails in mid-December 2019. Credit: A. H. Abolfath/NOIRLab/NSF/AURA

1 Executive Committee

1.1 Reflexions from the President at the Closing of the XXXII General Assembly in South Africa

Willy Benz,
IAU President

Finding the right words to express what we have experienced during the XXXII General Assembly (GA), to acknowledge the legacy of this event for astronomy on this continent and beyond; and to thank all those involved in its organisation it is more than a challenge – it is an almost impossible task.

I want to echo here the words of my predecessor President Debra Elmegreen and Interim General Secretary Piero Benvenuti expressing our sincere gratitude to the Organisers – Kevin Govender and his team have worked wonders.

As I reflect on the two weeks spent in Cape Town, I think it is appropriate to recall the vision of the organisers at the closing ceremony:

"This is not simply an opportunity for astronomy, this is an opportunity to change the way the world sees Africa. When a continent so often looked down upon can lead the world in a field as technical as astronomy, then we change perceptions, we challenge preconceptions, we shake unconscious biases – we make the world think differently about the potential of all people in the world to contribute to the human endeavour"

Have we achieved that? Have we succeeded in making the world think differently? I would argue that in a way we have. It has taken us 100 years, but we have finally caught up, and organisers made it happen. Astronomy on the African continent is certainly a full and respected member of the family!

As in all families, relationships need to be nurtured over time. So now that we return home, let us remember more than the beautiful scenery of Cape Town, the warm hospitality of our hosts, and the excellent organisation. Let us remember that together we are pushing the frontiers of astronomical knowledge in a collective effort to better understand the universe we live in, our origins and our future, and to make the world a better place for all.

Let us remember that in this endeavour we need everyone and everyone matters!

Together, the IAU family is committed to excellence in everything it does for science and society. Nothing less is needed to meet the scientific and societal challenges that lie ahead. We look forward to working with all of you over the next three years.

Finally, GAs are the rhythm of life in the IAU, and at the end of a GA, a number of people leave office whose work has enabled us to make progress towards achieving our goals.

I would like to acknowledge their efforts and dedication and express my deepest gratitude to all of them. A special mention goes to our President, Debra Elmegreen, and our Interim General Secretary, Piero Benvenuti. Together they have steered the IAU with professionalism, efficiency and above all passion!

Thank you very much to all.

NOTES & REFERENCES

Adapted from the General Assembly Closing Ceremony speech by President Willy Benz, on August 15, Cape Town, South Africa.

1 Executive Committee

1.2 Reflexions from the General Secretary at the Closing of the XXXII General Assembly in South Africa

Diana Worrall,
IAU General Secretary

The two weeks spent at the General Assembly (GA) in Cape Town, South Africa, were truly inspirational as we met to discuss and explore the science that stimulates us and motivates us to share that exploration and knowledge with others. The GA has allowed in abundance the opportunity for the exchange of ideas both through arranged sessions and more informal encounters, whether in person or online. The scope has been such as to extend our exposure to new developments in areas with which we are less familiar, through prize talks and invited discourses.

I am grateful, first and foremost, to all the participants for making this a truly engaging GA. I extend my particular thanks to our hosts in Cape Town and all who have contributed to sponsoring and organising this GA.

For those associated with just one facet of the IAU, perhaps primarily through a Division, Commission or Working Group, the GA has provided the opportunity to learn more about the broader portfolio of IAU activities, including the work of all four Offices and the Centre for the Protection of Dark and Quiet Skies. These are partnered with institutions in various cities across the globe and involve large numbers of individuals from the community through the various networks they have established. The IAU has a recognised and pivotal role in advancing and protecting astronomy worldwide, and we should feel proud to be a part of that. While ambitious endeavours require funding, I am particularly grateful to the many who are giving their time freely and initiating and supporting a range of activities with our shared goals.

At the closing of the GA, I move humbly into my role as General Secretary for the next triennium. I trust in your support as we work together with a common purpose, albeit recognising that we might sometimes stumble over mechanics and challenges along the way.

I look forward to meeting you in three years in Rome, if not before.

NOTES & REFERENCES

Adapted from the General Assembly Closing Ceremony speech by General Secretary Diana Worrall, on August 15, Cape Town, South Africa.

Figure 1: IAU General Assembly 2024 in Cape Town, South Africa Group Photo. Credit: IAU GA2024 LOC

1 Executive Committee

1.3 Executive Committee 2024-2027

Officers

Willy Benz
President

Diana Mary Worrall
General Secretary

Brian P. Schmidt
President Elect

Laura Ferrarese
Assistant General Secretary

Advisor

Debra Meloy Elmegreen
Past-President

Vice-Presidents

Hyesung KANG
Vice-President (2nd Term)

Solomon Belay Tessema
Vice-President (2nd Term)

Ilya G. Usoskin
Vice-President (2nd Term)

James Okwe Chibueze
Vice-President (1st Term)

Monica Rubio
Vice-President (1st Term)

Gražina Tautvaisiene
Vice-President (1st Term)

Figures 2-12: Composite of the Executive Committee group photo taken duting the General Assembly 2024. Credit: IAU GA 2024 LOC

2 IAU Fundraising

2.1 Investing in the Future

Genevieve Marshall
Head of Fundraising

Kevin Govender
Chair of the GA2024 Local Organising Committee

Willy Benz
IAU President

The XXXII IAU General Assembly (GA), held in Cape Town from 6 to 15 August 2024, was a great success. It was the first GA to be held on African soil, and the open-access and hybrid sessions attracted thousands of delegates and members of the public. It also marked a new triennium in which the IAU reaffirmed its continued commitment to implementing its Strategic Plan 2020-2030[1] in partnership with its Offices and Centre. This will require diversifying income and attracting new funding.

Our efforts to deliver on the investment have begun. Innovations from the GA provide an exciting example of the potential. In support of the IAU's commitment to maximising fundraising to deliver its vision, a number of longstanding and new partnerships were initiated for the GA combined with significant discounts negotiated from suppliers. Partners including SKAO, NAOJ, ESA and AIP, the incredible grant from the Simons Foundation, the African Astronomer Travel Fund with LSST-Discovery Alliance, the Kavli Foundation and the Heising-Simons Foundation, ensured astronomers, regardless of their circumstances, experienced a world-class scientific programme. BrandSA were sponsors, alongside Amazon Web Services and South African Airways.

A high-level breakfast briefing sponsored by the IAU and British High Commission attracted 83 participants to explore the future of astronomy on the African continent. Diplomatic guests at the breakfast, and across the GA included Australia, Canada, Finland, India, Italy, Kenya, the Netherlands, Spain, Switzerland, Türkiye and the USA, many of whom provided financial support. We are most grateful to our partners and will continue nurturing these relationships.

It is thanks to the tireless dedication of our community that we're able to deliver such significant impact. Over the coming months we look forward to sharing with you our plans as we continue to build a better future for society through astronomy.

NOTES & REFERENCES

[1] Consult the IAU Strategic Plan 2020-2030 at https://www.iau.org/static/administration/about/strategic_plan/strategicplan-2020-2030.pdf

[2] Sponsors and Exhibitors for the General Assembly 2024: https://astronomy2024.org/our-sponsors-and-exhibitors/

Figure 13: Panel discussion during the high-level breakfast briefing. Credit: IAU GA2024 LOC

Figure 14: Minister of Science, Technology and Innovation, Professor Blade Nzimande speaking at the General Assembly 2024 Opening Ceremony. Credit: IAU GA2024 LOC

3 IAU Divisions, Commissions & Working Groups

3.1 The Division C Days at the XXXII IAU General Assembly in Cape Town

Richard de Grijs
IAU Division C
Past-President & Advisor

Division Days offer a forum for contributions that won't easily fit elsewhere in an IAU General Assembly's programme. The Division C Days at the XXXII General Assembly in Cape Town fully lived up to those expectations, and then some! With one fewer session to populate than in Busan in 2022, selecting presentations to achieve a balanced programme was always going to be a daunting prospect. Moreover, we also wanted to reflect on and celebrate the lives and contributions of Paulo Bretones and Carolina Ödman-Govender, Division superstars who sadly passed away. They will be sorely missed!

Once we had allocated time to the Commission highlights, invited speakers (including our 2023 PhD prize recipient) and an all-too-brief panel discussion, there were just four slots left for contributed talks—for which we had received well over 170 applications! Division C currently hosts five Commissions. In Cape Town, Commission C5 ("Cultural Astronomy") formally joined our four existing Commissions. We dedicated two of our five sessions to Division highlights, roughly split between education and outreach, and history and heritage. Interestingly, we welcomed a proposal to have the 30th meridian—running along the length of the African continent into eastern Europe—recognised as UNESCO intangible cultural heritage.

Given that this General Assembly was held, for the first time, on African soil, we allocated two of our remaining sessions to highlights from African astronomy. We heard about amazing developments in science, driven largely by astronomy (e.g., the Square Kilometre Array), across the continent, from South Africa to Nigeria, Ethiopia and Morocco. Our final session focussed on "Astronomy in Conflict Zones", of which there are sadly too many in the world today. Attendees heard about promising initiatives to decolonise astronomy, engage with Indigenous communities, rekindle astronomy education in Sudan, and break down barriers in Cyprus, prior to a brief but insightful panel discussion.

I thoroughly enjoyed learning about a whole host of new insights from areas that enrich our multicultural global experience, but above all I loved meeting so many amazing colleagues and old (and new!) friends who are all contributing to making the world a better place through their enthusiasm and the application of their skills as practitioners of astronomy. Kudos to everyone—and watch this space for more amazing updates!

3 IAU Divisions, Commissions & Working Groups

3.2 The Division G Days at the XXXII IAU General Assembly in Cape Town

Andrej Prša,
IAU Past-President & Advisor Division G

Merieme Chadid
IAU President Division G

The XXXII IAU General Assembly in Cape Town, South Africa, has been a resounding success; as part of its scientific program, the General Assembly included two days dedicated to Division G affairs and science highlights.

The Division G Days program included two invited (PhD award) talks, 36 contributed talks, and 84 poster presentations – a record number of contributions from the Division G membership!

The talks were divided into five sessions, covering young and pre-main sequence stars; single, binary and multiple stellar systems on and off the main sequence, including asteroseismic targets; compact and degenerate stars, and stellar remnants; the role of magnetic fields in stellar evolution; and observational facilities and modern approaches to data analysis. Poster contributions were even more varied, touching on virtually all aspects of stellar astrophysics – a true feat for Division G enthusiasts. The majority of presentations were in-person contributions, with the audience being both in-person and online. The two highlighted talks were given by Dr. Naira Azatyan from the Byurakan Astrophysical Observatory in Armenia, titled "Search and Study of Young Infrared Stellar Clusters," and by Dr. Antoine Bedard from Warwick University in the UK, titled "Buoyant crystals give a second life to white dwarf stars." The program was rounded off by a 30-min all-hands discussion on the future heading of the Division G, soliciting advice from the audience on how to make Division interaction easier, beneficial and impactful for the entire Division membership.

Present from the Division G leadership were Drs. Andrej Prša (then-president), David Soderblom (advisor), and Merieme Chadid (president-elect). For any and all further suggestions, questions and comments, please reach out to the current Division G leadership either through the IAU secretariat, or directly to any of the Division G officers.

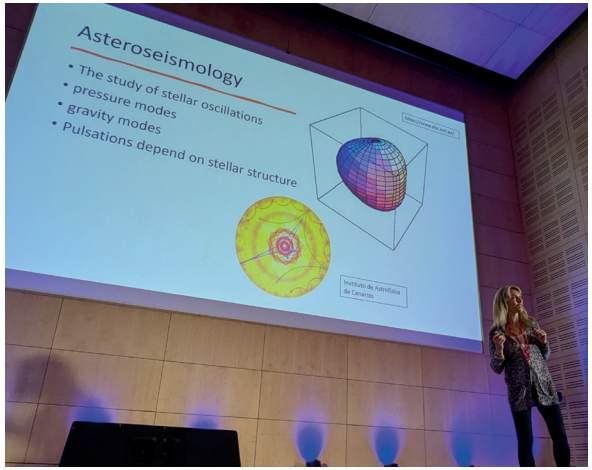


Figure 15: Dr. Kelly Hambleton presenting the fundamentals of asteroseismology to the Division G Days audience. Credit: The Authors

NOTES & REFERENCES

[1] IAU Division G Webpages are available at https://www.iau.org/science/scientific_bodies/divisions/G

Figure 16: Drs Merieme Chadid (president-elect) (Left), Andrej Prša (then- president) (Centre), David Soderblom (advisor) (Right), and. Credit: The Authors

4 Scientific Meetings

4.1 First IAU General Assembly on the African Continent

Charles Takalana,
Co-Chair of the GA2024 Local Organising Committee

Kevin Govender,
Chair of the GA2024 Local Organising Committee

Vanessa McBride,
Co-Chair of the GA2024 Local Organising Committee

The 32nd IAU General Assembly (GA) was held at the Cape Town International Convention Centre and online from the 6th to the 15th of August 2024, hosted by the South African National Research Foundation. There were 2648 participants (2045 in-person and 603 virtual) from 107 countries (28 African countries), with 647 participants being students (500 in-person and 147 virtual). 911 grants were awarded. There were 211 science sessions (including plenaries) and 16 fully hybrid poster sessions. A wide range of social and side events took place, including 16 which were "online-first". There were 20 sponsors and 43 exhibitors. The immersive platform Spatial had over 4200 views, and there were over 1100 active members on Slack, with 21733 messages sent throughout the event. The open-access streams on YouTube had 20.2k views and 374 subscribers. There were 8.2k unique viewers and over 300 returning viewers. Media coverage was extensive with media monitoring services reporting a total media circulation of 87,993,115. The extensive outreach and education activities reached thousands (see 'A Public Look at the IAU General Assembly 2024' by IAU GA 2024 Outreach & Education Co-Chairs Sally Macfarlane, and Duduzile Kubheka in this publication)

This GA marked several firsts: It was the first ever open-access IAU GA (sessions were streamed live on YouTube and are still freely available). It was also the first ever fully hybrid poster session in a meeting of this sort, allowing poster presenters to be online on Zoom or in person. Another notable first was the inclusion of poster abstracts with direct links to the posters on the NASA Astrophysics Data System (ADS), further enhancing accessibility and visibility. It was the first time any VR-compatible immersive platform (Spatial) was used for an IAU GA, and for the first time ever, there was a live radio broadcast (Radio Astro) for 8 hours per day on every day of the GA. Yet another first was the establishment of an African craft market within the venue itself, engaging local small businesses. The conference provided free child care and the extensive programme of social events ensured that participants were exposed to African culture (not just South Africa) as well as what can only be described as the humanity of scientists. This human touch was a highlight mentioned by many participants.

Huge thanks must go to the incredible organising team, composed almost entirely of volunteers, who helped make it all happen.

NOTES & REFERENCES

For more information about 32nd IAU General Assembly please visit the official website at www.astronomy2024.org

Figure 17: For the first time ever at a GA, there was a live radio broadcast (Radio Astro) Credit: IAU GA 2024 LOC

Figure 18: The numerous volunteers who worked to make the GA a success gather on stage for a stading ovation from the participants at the Closing Ceremony. Credit: IAU GA 2024 LOC

4.2 A Public Look at the IAU General Assembly 2024

Sally Macfarlane,
IAU GA 2024 Outreach & Education Co-Chairs

Duduzile Kubheka,
IAU GA 2024 Outreach & Education Co-Chairs

Hosting the IAU GA 2024 on African soil for the first time has made a notable impact. In addition to celebrating and promoting astronomy research in Africa, it provided an unparalleled opportunity to engage the African public with astronomy. The outreach and education team, supported by a veritable army of talented and passionate science communicators (consisting of IAU GA 2024 participants, volunteers, students and others), embarked on an audacious and ambitious hybrid outreach and education program that spanned the entire two weeks of the IAU GA 2024 and beyond.

When the conference participants were petitioned for assistance with outreach activities, the response was overwhelmingly encouraging with over 600 respondents. As a result, 120 participants and even more volunteers assisted the team with a wide range of outreach activities during the IAU GA 2024. This included public talks from notable world-class astronomers and astronauts, visits to schools, visits by schools to the conference centre, puppet workshops, a cultural exchange evening, a talent show, a live podcast, virtual teacher training sessions, "Meet an Astronomer" virtual sessions, and even a 10-minute live contact with the International Space Station (ISS). This ISS contact event, in collaboration with ARISS (Amateur Radio on the International Space Station), was especially momentous as it took place on South Africa's National Women's Day commemoration on 9 August and involved three female astronauts: ISS astronaut Capt. Sunita Williams answered questions from space during the contact; Dr. Mae Jemison, the first black female astronaut in space, presented the keynote speech; and commercial astronaut Dr. Sian Proctor attended the event in person. School visits were another major highlight, where participants engaged with and inspired learners during visits to over 70 schools across Cape Town and surrounding areas.

Overall, the outreach and education program achieved significant success, reaching diverse audiences across various platforms and creating a meaningful impact on learners, educators, and the public. Indeed, the program reached around 28,000 school learners, 85 educators and around 3,800 general public. Although these numbers speak for themselves, efforts are currently underway to ensure a long-lasting and more meaningful impact through the African Astronomical Society. In addition to hosting educational virtual talks by a growing network of global science communicators, the 100 ePoster systems (each comprising of a 40" screen, Rasberry Pi computer, webcam, mouse and keyboard) will be donated to under-served schools across South Africa, planting seeds for astronomy clubs where regular virtual astronomy events can then be held. The IAU GA 2024 was indeed a momentous occasion, but future legacy-building plans such as these will ensure that it remains impactful for years to come.

Figure 19: School visits to the exhibition hall on 14 August. Credit: IAU GA 2024 NOC.

Figure 20: Keynote presentation by Astronaut Dr. Mae Jemison, the first black American female to go into space during the National Women's Day on 9 August. Credit: IAU GA 2024 NOC.

4.3 General Assembly 2027: All Paths Leading to Rome

Lucio Angelo Antonelli,
Chair of the IAU General Assembly 2027 Local Organising Committee

Italy has been one of the major supporters of the International Astronomical Union since the very beginning.

In 1922, Italy hosted the 1st IAU General Assembly (GA) in Rome, following the creation of the IAU in 1919. Senator Vito Volterra, the estimated mathematician and physicist, led the Organising Committee of the GA held at the Reale Accademia dei Lincei. Since then, Italy has organised only one additional GA 72 years ago, in 1952.

In 1999, the Italian National Institute for Astrophysics (INAF) was established with the aim of planning, governing, promoting and developing research in all the domains of Astronomy and Astrophysics in Italy. INAF represents the Country in the key world-class astronomical infrastructures, both ground- and space- based. In 2027, INAF will approach its 30th anniversary, so, after 30 years of INAF and 75 years after the last GA, it was time for Italy to organise another general assembly.

Italian scientists are involved with responsibility roles in all the major international present and future projects for Astronomical research: ground-based facilities and space missions for both Universe observation and Solar System exploration. Many of these large projects are presently planned to take place in the second half of this decade and contribute to reshaping the way we investigate the Universe and constitute a potential unified theme for the General Assembly under the title “Astronomy in the era of the large infrastructures on the ground and in space”.

The 2027 General Assembly will be hosted from August 10th to 19th in Rome at the Auditorium Parco della Musica “Ennio Morricone”, a modern building designed by Renzo Piano and able to host more than 5000 people. The Auditorium is located in the Flaminio area, only 3,5 km far from the city centre and well connected to it.

The Municipality of Rome is supporting us in organising the meeting, and we will host some satellite events to involve the city in our activities. The General Assembly in 2027 will also be a unique opportunity for the attending scientists to visit other INAF astronomical facilities in Italy. Young researchers and researchers from disadvantaged countries are especially encouraged to attend.

INAF is delighted to host the 33rd edition of 2027 in Rome, mobilising its resources to make this a memorable event.

Figure 21: Passing of the IAU Flag to the 2027 Local Organising Committee. Credit: IAU GA2024 LOC

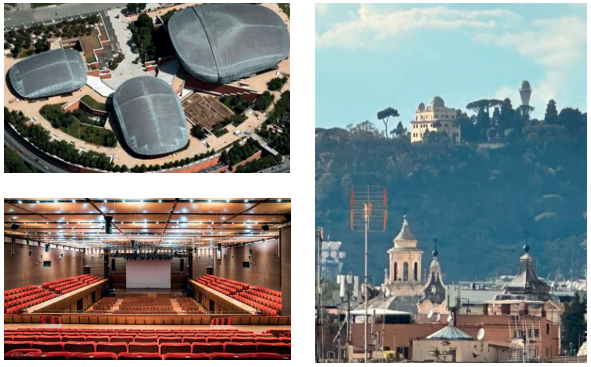


Figure 22: Auditorium Parco Della Musica – “Ennio Morricone” (top left) with Sala Sinopoli (bottom left) and INAF Headquarters in Monte Mario (former site of the Astronomical Observatory of Rome). Credit: IAU GA 2027 LOC

5 Awards & Recognitions

5.1 An ODE to Our Prize Winners!

Ewine F. van Dishoeck,
IAU Past-President

The year is 2015; the location is the XXIX General Assembly in Hawaii. As future IAU President-elect, I enjoyed the opening ceremony, which is always a GA highlight. But one thing struck me: we were honouring our Gruber Prize winners for their fantastic scientific achievements, but there was little else in terms of younger generation or more diverse prize winners. The 2016 IAU Executive Committee, therefore, started a process to enhance and diversify the IAU's portfolio of prizes to reflect changes in its priorities, and this became part of its 2020-2030 Strategic Plan. One new element proposed by the Division Presidents, was to award a PhD Prize in each Division. In addition, the Gruber Prize Fellowship for early career researchers was increased.

However, outstanding efforts in Outreach, Development and Education (ODE), which are also part of the IAU's mission, were not yet honoured, yet they are an integral part of every professional astronomer's daily life. Thus, the IAU EC resolved in 2020 to celebrate and stimulate these aspects of our field explicitly. The inaugural prizes awarded at the XXXI GA in Busan honoured four wonderful pioneers in ODE[1].

One of the joys of being past President was to chair the ODE Prize Committee and read all the outstanding nominations from across the world: so much talent and inspiration! Whereas the 2022 winners operated globally, the 2024 ODE winners[2] made important contributions in their regions. At the XXXII GA in Cape Town, we honoured them on stage at the opening ceremony but also enjoyed their talks the following day[3]. Saran Poshyachinda created a world-leading outreach and education program in Thailand. Cenca Bridge had a unique and transformative impact on the ability of undergraduate students in the Central America-Caribbean region to engage in astronomical research and capacity building. Linda Strubbe and Bonaventure Okere created high-quality inquiry-based educational experiences in astronomy for African university students with the PASEA schools. An "ode of joy" to all these prize winners! I can't wait until the next edition in 2027.

Figure 23: Award attribution during the Opening Ceremony at the IAU GA 2024. Credit: IAU GA 2024 LOC.

NOTES & REFERENCES

[1] ODE Prize winners in 2022: https://www.iau.org/news/pressreleases/detail/iau2206/
[2] ODE Prize winners in 2024: https://www.iau.org/news/pressreleases/detail/iau2407/
[3] ODE Prize winners talks at the General Assembly: https://astronomy2024.org/day-2-august-7/

5 Awards & Recognitions

5.2 PhD Prizes 2022

Division A Fundamental Astronomy
Irene de Blasi, Italy
Dynamics and stability in Celestial Mechanics: from galactic billiards to Nekhoroshev estimates

Division B Facilities, Technologies and Data Science
Joachim Moeyens, USA
The Characterization and Discovery of Solar System Small Bodies in Modern Astronomical Surveys

Division D High Energy Phenomena and Fundamental Physics
Andrew Mummery, UK
Illuminating tidal disruption events with a time-dependent theory of relativistic accretion discs

Division E Sun and Heliosphere
Yajie Chen, China, Nanjing
Forward Modeling of Solar Coronal Magnetic Field and Plasma Diagnostics

Division F Planetary Systems and Astrobiology
Malena Rice, USA
A Dynamical Synthesis of Planetary Systems

Division G Stars and Stellar Physics
Antoine Bédard, Canada
Characterization and modelling of the spectral evolution of hot white dwarf stars

Division H Interstellar Matter and Local Universe
Piyush Sharda, Netherlands
The role of metals from molecular clouds to galactic discs

Division J Galaxies and Cosmology
Daniel Horta Darrington, USA
Unveiling the mass assembly history of the Milky Way from its stellar halo

PhD at-large Prize
Naira Azatyan, Armenia
Search and study of young infrared stellar clusters

Exceptional Inter-Division Prize
David Hosking, USA
The decay of MHD turbulence and the primordial origin of magnetic fields in cosmic voids

Figure 24-34: IAU PhD Prizes 2022. The IAU PhD Prize recognises the outstanding scientific achievements of astronomy PhD students internationally. Credit: The awardees.

5 Awards & Recognitions

5.3 PhD Prizes 2023

Division B Facilities, Technologies and Data Science
Jeroen Audenaert, USA
Artificial Intelligence in Astronomy: Unraveling Variable Stars with Machine Learning and the NASA Kepler and TESS Space Missions

Division C Education, Outreach and Heritage
Johanna Casado, Argentina
Research on Access, Use and Effective Exploration of Astronomical Observational and Bibliographic Data from Sonification

Division D High Energy Phenomena and Fundamental Physics
Yonadav Barry Ginat, Israel
Gravitational Waves and Non-Linear Phenomena in Gravitational Astrophysics

Division E Sun and Heliosphere
Robert Jarolim, Austria
Frontiers of Artificial Intelligence in Solar Physics

Division F Planetary Systems and Astrobiology
Mohammad Farhat, France/Lebanon
Dissipation in the Earth-moon System

Division G Stars and Stellar Physics
Roman Gerasimov, USA
Evolution of Atmospheres and Chemistry of Ancient Stellar Populations

Division H Interstellar Matter and Local Universe
Charles Law, USA
Zooming in on the Chemistry of Star and Planet Formation

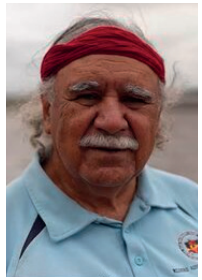
Division J Galaxies and Cosmology
Scott Lucchini, USA
The Magellanic Corona and its Role in the Evolution of the Magellanic Stream

IAU PhD at-large Prize
Abril Sahade, Argentina
Deflection of Coronal Mass Ejections

Figure 34-42: IAU PhD Prizes 2023. The IAU PhD Prize recognises the outstanding scientific achievements of astronomy PhD students internationally. Credit: The awardees.

5 Awards & Recognitions

5.4 IAU Honorary Members 2024

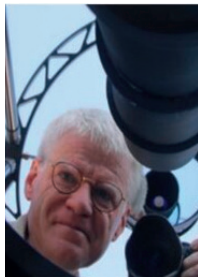


Ghillar Michael Anderson
Australia

Pavel Suchan,
Czech Republic

Gad M. El-Qady
Egypt

Mohammed Al-Amoudi
Ethiopia



Thierry Midavaine
France

Krisztián Sárneczky
Hungary

Snævarr Guðmundsson
Iceland

Roberto Bias
Italy

Seki Tsutomu
Japan

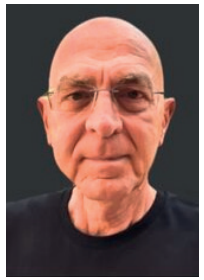
Pavol Rapavý
Slovak Republic

Andrej Guštin
Slovenia

Inmaculada Figueroa
Spain

Serhiy Verbytskyy
Ukraine

Barbara A. Mikulski
USA



Claudio Costa
Vatican City

Figure 42-57: IAU Honorary Members 2024. The IAU Honorary Membership gives official recognition to individuals who have significantly contributed to the progress of astronomical research and culture in their country. Credit: The awardees.

6 Science Focus

6.1 Highlights on Focus Meeting 1: Harnessing ground-based optical telescopes: an opportunity for emerging astronomy in Africa

Yosry Azzam,
Chair of the IAU Focus Meeting 1

Astronomy has a long and rich history in Africa – the world recognised this fact and the importance of its geographical location more than two centuries ago. In addition to South Africa, which hosts the 11-m South African Large Telescope (SALT), hosts the SKA project, which is considered the world's largest radio telescope, a number of African countries are rapidly developing their astronomy programs and instruments, such as the refurbished Kottamia astronomical observatory in Egypt, Oukaimeden observatory in Morocco, the Entoto observatory and research centre in Ethiopia, the 32m radio telescope observatory in Ghana, a 1m optical telescope in Burkina Faso, several radio astronomy initiatives in Nigeria, and much more. In addition, Egypt will build a larger telescope, which is envisioned to be 6.5-m, the Egyptian Large Optical Telescope (ELOT).

With this recognistion, Cape Town was chosen to host the IAU General Assembly in 2024 (6-15 Aug. 2024), held for the first time in Africa. Along this GA, a successful Focus Meeting (FM1) was organised, including six oral sessions and four poster sessions during the two days of Aug. 6 and 7. Oral sessions included twelve invited talks from world pioneers on various FM-related topics, and fifteen contributed talks. Likewise, poster sessions included 25 posters.

The presentations of these sessions discussed various topics related to African and other world ground-based astronomical telescopes. Some of these were related to ELOT, SALT, SKA, Korea Microlensing Telescope Network (KMTNet), Automatic Telescope for Optical Monitoring (ATOM), the whole earth telescope, Europlanet telescope network, black hole TOM, Rubin's LSST, the Lalibela Ethiopian telescope, Kenyan optical telescope, and the benefits of virtual observatory to under-served communities. In addition, the presentations discussed the networking of telescopes across the African continent and paid attention to identifying new observatory sites through site testing, as well as the protection of existing observatories in Africa and worldwide from both light pollution and growing satellite constellation interference. Moreover, the presentations included topics related to establishing scientific and technical aspects of future astronomical observatory projects.

Those presented topics will help in defining the science cases that can be exploited with African telescopes and will enrich the outreach and educational activities in schools, universities, observatories, and astronomical societies across the African continent. That will also support scientific research and international collaborations amongst African countries, strengthening African collaborations and minimising the efforts and resources through collaborations to maximise the outcomes.

Figure 58: SOC for the FM1. Credit: The Author

Figure 59: Group photo for the FM1. Credit: The Author

6 Science Focus

6.2 Highlights from IAU 390 Symposium on "A multi-point view of the Sun: advances in solar observations and in space weather understanding"

Marco Romoli,
Chair of the IAU Symposium 390

The IAUS 390 Symposium, held from August 6-8, 2024, during the first week of the 32nd IAU General Assembly in Cape Town, South Africa, aimed at presenting recent findings from space- and ground-based observatories that study the Sun and heliosphere from various vantage points. Several spacecraft are observing the Sun from unique orbits. The Parker Solar Probe, for instance, approaches the Sun within 10 solar radii, while the Solar Orbiter's orbit will soon tilt relative to the ecliptic plane, allowing it to capture the first-ever views of the Sun's poles. Alongside long-standing missions like SOHO, SDO, and STEREO, new observatories from China and India—ASO-S and Aditya-L1—have joined this international effort.

Combining observations from multiple viewpoints, the Symposium aims to foster collaboration between solar and space weather researchers to advance coordinated exploration. Discussions focused on how the Sun's magnetic field and solar wind shape the corona and heliosphere, as well as how solar activity and eruptions impact the heliosphere and the environments of Earth and other planets.

The meeting covered six major topics related to advancements in solar observation and space weather, showcasing cutting-edge observations, models, and current challenges in solar physics. Sessions ranged from magnetic and solar wind connectivity from the photosphere to the heliosphere to understanding the dynamic Sun and its role in space weather. Notably, one session highlighted rapid advancements in data analysis techniques, including the use of machine learning and deep learning in solar physics. The final session reviewed lessons learned and discussed future developments, with an emphasis on polar solar missions and new space-based observatories.

The Symposium's plenary talk, "Beyond Flatland: A Star of Many Dimensions" on August 8, was delivered by Dr Sarah Gibson from NCAR/NSO, who emphasised the importance of coordinating multiple observatories to advance our understanding of the Sun's influence on the heliosphere and planetary environments.

The event featured 75 presentations, with both oral and poster contributions, including 17 presenters from the African continent, the host region of the IAU General Assembly.

Figure 60: The Symposium's plenary talk delivered by Dr Sarah Gibson from NCAR/NSO. Credit: The Author

Figure 61: Discussions focused on how the Sun's magnetic field and solar wind shape the corona and heliosphere. Credit: IAU GA LOC

6.3 Transforming Our Cosmic Understanding: JWST Insights and Community Building at the IAU Symposium in Cape Town

Themiya Nanayakkara,
Chair of the IAU Symposium 391

Michael Maseda,
Chair of the IAU Symposium 391

The IAU Symposium (IAUS) 391: "The First Chapters of Our Cosmic History with JWST", was held as part of the General Assembly (GA) in Cape Town, coinciding with two years of data from the James Webb Space Telescope (JWST). The symposium focused on breakthroughs in understanding the Universe's first few billion years and evaluating JWST's transformational capabilities.

The symposium received over 100 submissions for around 35 available slots, reflecting the high level of interest in the field. We invited 15 speakers from diverse fields for the symposium and ensured that diversity, equity, and inclusion considerations were prioritised throughout the meeting to represent different backgrounds and career stages. We also aimed to create a friendly and inclusive atmosphere to encourage open discussion and collaboration. Key scientific themes included JWST's insights into the first galaxies, quiescent galaxies, cosmic reionisation, active galactic nuclei, and the interstellar medium and dust buildup in early galaxies. The symposium also highlighted the synergy between observations and simulations, using the next generation of tools to maximise JWST's potential.

The plenary talks were delivered by Dr. Nancy Levenson and Prof. Richard Ellis, who discussed JWST's core principles and their transformative impact on both the scientific and broader development and educational landscapes.

A key motivation for organising this symposium in Cape Town was to leverage JWST's open skies policy, which allows unrestricted global access to the telescope and data, ensuring researchers worldwide, including those in Africa, benefit from its observations. This event aimed to bridge training gaps by bringing JWST experts to Cape Town and fostering skill development among African scientists. Thus, we had a JWST hands-on workshop following the symposium, attended by 40 participants from several African nations. Travel assistance was provided for around 20 researchers, and a networking event helped participants build connections. We thank the Australian High Commission in Pretoria for their support, which made this initiative possible, and our lecturers for their contributions to the workshop.

As organisers, it was a pleasure to see everyone engage passionately and make a meaningful impact on the African scientific community, thank Kevin Govender, Ram Venugopal and the local team for being outstanding hosts. We look forward to the next opportunity for the GA to return to Africa.

NOTES & REFERENCES

Join "JWST in Africa" Slack Workspace: https://join.slack.com/t/jwstinafrica/shared_invite/zt-2pa3rxa1c-RxU~_qnft1lzgMtrl5i73g
JWST African Workshop Material and Symposium Recordings: https://github.com/themiyan/IAUS391_JWST_Workshop.git

Figure 62: Mosaic with relevant moments for the IAUS 391. Credit: The Author

6.4 Neutral hydrogen in and around galaxies in the SKA era at the IAU Symposium 392 in Cape Town

Elizabeth Adams
Chair of the IAU Symposium 392

Recent years have seen the opening of new observational frontiers in the study of neutral hydrogen (HI), with next-generation radio telescope facilities coming into operation. As the raw fuel for star formation, knowledge of the HI properties of galaxies is essential to construct a full understanding of the build-up of the stellar mass and evolution of galaxies. With the SKA Observatory precursor and pathfinder telescopes, we can, for the first time, follow the HI emission from galaxies across cosmic time, key information that has until now been missing from the multi-wavelength census of galaxy evolution. These new observations, coupled with state-of-the-art cosmological simulations of galaxy formation and evolution, provide a more complete understanding of the life cycle of galaxies.

IAUS392 brought together observational and theoretical communities to discuss the topic of neutral hydrogen in and around galaxies in the SKA era, with an explicit connection to multi-wavelength studies. With the SKA pathfinders in full swing and the construction of SKA started, this was ideal timing for the symposium. The community agreed: there were over 90 posters and 34 contributed talks, in addition to the 15 invited talks.

The symposium kicked off with the plenary session. The three speakers (Kristine Spekkens, Kyle Oman, and Michelle Cluver) did an outstanding job of setting the stage for the full symposium by introducing the three main aspects: HI observations, simulations of HI, and multi-wavelength connections for HI studies.

We paid careful attention to the balance of the program and were very happy with how it turned out. Over half of the contributed talks were from early career researchers, with an almost equal split in gender. In addition, we had two poster sparkler sessions to highlight excellent posters, with an emphasis on early-career researchers from Africa. We also took full advantage of the hybrid format of the GA with interaction from online participants.

Figure 63: The IAUS392 plenary session. with Kristine Spekkens. Credit: IAU GA 2024 LOC

Figure 64: The IAUS392 plenary session with Kyle Oman. Credit: IAU GA 2024 LOC

Figure 65: The IAUS392 plenary session with Michelle Cluver. Credit: IAU GA 2024 LOC

7 IAU Offices

7.1 Astronomy for Society

Joyful Mdhluli,
IAU Office of Astronomy for Development Postdoc

Kelly Blumenthal,
IAU Office for Astronomy Outreach Director

Itziar Aretxaga,
IAU Office for Young Astronomers Director

Markus Pössel
IAU Office of Astronomy for Education Director

The IAU Offices and Centre – the OAD, OAE, OAO, OYA and CPS – have had a rich history of collaboration since their creation. During the XXXII IAU General Assembly, the Offices and Centre coordinated a joint booth in the exhibit hall, fostering connections between the delegates and the diverse work of the IAU, which were reinforced in the Institutional Meetings.

The joint session for the Offices and Centre on 9 August focused on "Science for Society," featuring keynotes from Dr Khotso Mokhele (Chairman of African Explosives and Chemical Industries, Hans Merensky Holdings and Westfalia Fruit International), Dr Vanessa McBride (Science Director, International Science Council), and Prof Debra Elmegreen (IAU Past-President). Their talks discussed the topic within the context of policy and development, open and equitable access to information, and technological advancements. Prof Elmegreen emphasized that scientific progress is achieved by diverse communities working together, stimulating new ideas and inviting broader perspectives. This principle underpins the IAU's mission and vision and motivates the work of the Offices and Centre. A panel discussion followed, highlighting the role of the Offices and Centre in advancing science for society, notably cultural astronomy, promoting scientific thinking, building sustainable programmes in local communities, and changing people's perceptions about our place in the Universe.

The Offices and Centre also hosted a plenary session on 12 August, this time featuring Nobel Prize winner and future IAU President, Prof Brian Schmidt, along with representatives of each Office and Centre. Together, they discussed how to build an impactful career in astronomy and how the work of the Offices and Centre can contribute to this effort. In keeping with what had become the theme of the conference – astronomy for a better world – the panel discussed key ways to enact positive change: by engaging in lifelong learning, rewarding curiosity, and seeking out co-creative and collaborative efforts. It is in this spirit that the IAU Offices and Centre engage with their communities and identify synergies that leverage astronomy for the benefit of all.

Figure 66: Joint session for the Offices and Centre on 9 August focused on "Science for Society,". *Credit: IAU GA 2024 LOC*

Figure 67: Joint session on 'how to build an impactful career in astronomy' and how the work of the Offices and Centre can contribute to this effort. *Credit: IAU GA 2024*

8 Cooperation with other Unions and Organisations

8.1 The Gruber Cosmology Prize Awarded at the IAU General Assembly in Cape Town, South Africa

A. Sarah Hreha,
Executive Director, The Gruber Foundation

On August 8 in Cape Town, South Africa, IAU President Debra Elmegreen welcomed The Gruber Foundation to the General Assembly.

Gruber Executive Director Sarah Hreha awarded the 2024 Cosmology Prize to Marcia Rieke for her pioneering work in infrared astronomy, especially her oversight of instruments allowing astronomers to explore the earliest galaxies in the universe.

The Gruber Cosmology Prize honours a leading cosmologist, astronomer, astrophysicist or scientific philosopher for theoretical, analytical, conceptual or observational discoveries leading to fundamental advances in our understanding of the universe. Each year we encourage nominations that reflect the breadth of the field and the diversity of those working within it[1].

As part of the award ceremony 2023 Gruber Laureate Richard Ellis read the prize citation and made remarks about Dr Rieke, talking about her early camera work as part of a revolution in infrared astronomy which was championed by Rieke and colleagues. Rieke received the $500,000 award as well as a gold laureate pin and gave a lecture entitled “The James Webb Space Telescope: 25 Years in the Making to Discover the Most Distant Galaxies.” At the celebratory dinner at SIBA that evening celebrity chef Siba Mtongana greeted the Riekes and other guests.

Figure 68: IAU President Debra Elmegreen (left) welcomed The Gruber Foundation to the General Assembly. Gruber Executive Director Sarah Hreha (right) awarded the 2024 Cosmology Prize to Marcia Rieke (centre). Credit: TGF

During the Gruber Prize ceremony, IAU President-Elect Willy Benz presented the recipients of the 2024 The Gruber Foundation Fellowship in Astrophysics, which is administered by the IAU.

Aldana Griechener (Israel) will investigate the electromagnetic, weak, and gravitational signatures from the stars and binaries to r-process enrichment over cosmic time.

Jonathan Alexander Quirola Vásquez (Ecuador) will focus on unravelling the Fast X-ray Transients detected by Chandra, XMM-Newton and Swift-XRT.

Honghui Liu (China) will focus on the study of accreting compact objects with X-ray observations, using constraints from polarimetric and spectroscopic measurements to derive the best coronal geometry.

NOTES & REFERENCES

[1] Nomination forms for the The Gruber Cosmology Prize 2025 should be completed and submitted online by December 15, 2024 at http://gruber.yale.edu/prize-nominations

9 IAU Timeline: Dates and Deadlines

9.1 IAU Dates and Deadlines NOVEMBER 2024 – MARCH 2025

2024

NOVEMBER

Nov 12 - 15
- 6th Shaw-IAU Workshop (Virtual Meeting)

Nov 17 - 22
- IAUS 395 Stellar populations in the Milky Way and beyond Paraty, Rio de Janeiro, Brazil

DECEMBER

Dec 1
- DEADLINE for Proposals for IAU Symposia for 2026;

Dec 15
- DEADLINE for Nominations for the Gruber Foundation Cosmology Prize
- DEADLINE to Accept Individual & Junior Membership Applications
- DEADLINE for PhD Prize Application Submission

2025

FEBRUARY

Feb 15
- DEADLINE for NCAs, Adhering Organisations and Division Presidents to review applications;

MARCH

Mar 1
- Applications Open for Gruber Fellowship 2025

Mar 31
- DEADLINE for the Membership Committee to review the lists of proposed candidate IAU Members.

10 IAU Publications

10.1 IAU Publications March 2024 – October 2024

The IAU publishes scientific results and information in all areas of astronomy. IAU Publications comprise primarily the Information Bulletin and the Proceedings of the IAU General Assemblies and other scientific meetings sponsored by the IAU.

Here we present Catalyst readers with a summary of the recent publications and updates.

For further information regarding the full documents please go to the IAU official website IAU.org here.

SYMPOSIA PROCEEDINGS

The IAU published one new symposia proceedings.
Find them online here.

DIVISION REPORTS

The IAU published nine new Division Triennial Reports.
Find it online here.

COMMISSION REPORTS

The IAU published one new Commission Triennial Reports.
Find it online here.

WORKING GROUP REPORTS

The IAU published one new Working Group Triennial Reports.
Find it online here.

SMALL BODIES NOMENCLATURE BULLETINS

The IAU published seven new IAU Working Group Small Bodies Nomenclature Bulletins.
Find them online here.

NEWSLETTERS

The IAU published one new IAU Newsltters.
Find them online here.

International Astronomical Union, 2024.

Editors in Chief: Willy Benz, Diana Worrall

Managing Editor: Lina Canas

Production: International Astronomical Union Secretariat

Cover: ISS contact with Astronaut Capt. Sunita Williams on August 9, celebrating National Women's Day. Credit: IAU GA 2024 LOC