UMnyele weZulu

EDITION 8: 15 AUGUST 2024 XXXII IAU GENERAL ASSEMBLY CAPE TOWN, SOUTH AFRICA

Interview with Willy Benz

The IAU's incoming President

By Guido Schwarz - Pg 3

Blending cosmology with philosophy

Pg 6

Kavli Prize lecture on terrestrial exoplanets

The Terrestrial Worlds of Other Stars - Pg 14

2023 Shaw Prize winners talk - Pg 11

A stellar nursery. Image courtesy of NASA, ESA and the Hubble Heritage Team (STScI/AURA).

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UMnyele weZulu

Table of Contents

This is the last day of the IAU-GA2024 and the last issue of Umnyele wezulu. This event has been ground-breaking for many reasons, not the least of which is it the first time being held on African soil. It has provided an opportunity for more African astronomers to meet and network with their international counterparts and to expose them to the technological advances being made in international astronomy. As the Sun sets on IAU-GA2024, it will continue to shine for a few billion years more on the science of astronomy.

Upcoming Events

Cosmic Echoes art exhibition
06 to 15 Aug

IAUS 394: All-inclusive AGN (hybrid session)
15 Aug

Multi-wavelength Astrometry
15 Aug

Executive WG on Dark and Quiet Sky Protection
15 Aug

Closing Ceremony Handover
15 Aug

(Background) Cape Town, host city of the XXXIIⁿᵈ IAU. Image: South African Tourism
(Top) James Webb Space Telescope image of Carina Nebula. Image: NASA, ESA, CSA, STScI

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XXXII IAU GENERAL ASSEMBLY

CAPE TOWN, SOUTH AFRICA, 2024

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Interview with Willy Benz, incoming IAU President

By Guido Schwarz

"I note the central role of the IAU in global scientific coordination and communication among professional astronomers."

Willy Benz, the incoming IAU President

Willy Benz will become the new President of the International Astronomical Union (IAU) today. We spoke to him about his new role and what challenges will keep him busy.

Willy Benz, from today you will be the newly-elected President of the IAU. What does this election mean to you?

It brings all sorts of conflicting emotions. Of course, I feel extremely honored and proud, but at the same time I am aware that it will be a great challenge. There have been so many great presidents in the more than one hundred years of the IAU's history, and now it is my turn. Frankly, you cannot help but feel the weight of the job.

But now it's time for action, and I have a lot of energy and passion for it. The three years as President-elect have allowed me to prepare for this moment, especially with the two great teachers I have been fortunate to have - current President Debra Elmegreen and past President Ewine van Dishoeck.

Your new position has less to do with science and more to do with steering the destiny of the entire astronomy community. What motivates you to take on this task?

I don't see myself as steering the destiny of the entire astronomical community. That is not the role of the IAU. Rather, its role is to safeguard and promote the science of astronomy in all its various aspects through international cooperation. This includes, of course, the purely scientific aspects, but also the use of astronomy in education, public outreach, and development.

All these aspects have always interested me because I am convinced that they are mutually reinforcing. A more educated and economically prosperous society is more likely to engage in basic research, which in time will further increase its well-being. A virtuous circle in which astronomy can play an important role.

What goals have you set yourself for your term as President of the IAU?

The IAU has published a Strategic Plan for 2020-2030 outlining its key objectives. We are now halfway through the decade and a first status report on progress towards these goals was presented at GA2024. The best strategy is only useful if it is implemented, and the IAU should not change its strategy every three years just because there is a change of President. So, I intend to continue to implement the strategy, with modifications or adjustments, of course, if necessary. Together with the Executive Committee we will monitor this aspect.

Among the key objectives of the Strategic Plan, I note the central role of the IAU in global scientific coordination and communication among professional astronomers. International strategic planning is essential to explore how to build partnerships and develop joint projects that would not otherwise be possible, and to maximise the scientific return from these efforts.

As the IAU grows and takes on more responsibilities, we need to ensure that we can balance the budget at the end of the day. Fundraising has been identified by the Executive Committee as a way to increase our income, but this is easier said than done. In order to be successful and to handle the potential donations, the IAU will need the help of its members and their network of contacts and will need to further develop its communications and financial management to make them fit for purpose.

Anyone who invests money in IAU projects is hardly doing so because of a financial return. What "return on investment" can donors expect?

The IAU believes that astronomy is a science that can inspire and transform society. Donors will share this vision. In the IAU, they will have found a unique global network of professionals committed to astronomy and to using it to make the world a better place for all. Their return on investment will be the work of the IAU network around the world to transform science and society through the inspiration of astronomy. Together we will create a new sense of community and common purpose.

One of the central concerns of the IAU is the protection of the dark and quiet sky. Why is this topic important?

Astronomy is fundamentally a science based on observation, and observation requires access to a dark and quiet sky. Without observation, there will be no astronomy, because even theorists will run out of imagination or means to test their ideas. If astronomers don't defend a dark and quiet sky, who will? Beyond science, the night sky is also a cultural heritage inherited from countless previous generations. We owe it to them to preserve this gift for future generations.

Working to preserve a dark and quiet sky is therefore at the core of the IAU's mission. For example, the IAU and its partners are already helping to provide neutral and global astronomical expertise to assess the impact of large numbers of satellite constellations on astronomical facilities. The growth in this sector is phenomenal, and informed discussions between the various stakeholders are essential to enable progress while allowing astronomical observations to continue.

You will be representing more than 12 000 active astronomers worldwide for the next three years. How can you ensure that you can make the concerns of the members heard?

In my experience, there are three critical elements: communication, communication, and communication! We need to be able to listen to our members and communicate our ideas to them. This is not as easy as it seems, despite the many electronic means of communication, but it can be done if everyone is prepared to really try. Ultimately, every member should feel that they can have their concerns heard and their

IAUS 394

08:30-10:00
Thursday, 15 August
CTICC Audi 1

ideas considered. This means taking action as a member and as an IAU official. As motivation thrives on success, I believe that together we can build an even stronger community.

The General Assembly 2024 ends today. How do you feel when you go home?

I will certainly leave Cape Town with a sense of achievement. For many reasons, this has been a unique IAU General Assembly that will be remembered for years to come. I am truly grateful to all who have contributed in so many different ways to making this event so special.

Since arriving in South Africa on 4 August, I have spent most of my time between the conference and my hotel room, with little time for anything else. I don't want to leave this country without spending some time discovering its beauty. My wife and I will spend the next week exploring the southern coast before returning to Switzerland and business as usual.

Willy Benz, the incoming IAU President

During the GA, our fantastic volunteers visited over 100 schools in and around Cape Town and enjoyed great discussions with students of all ages from primary to high school.

Blending cosmology with philosophy

By Laura Hiscott

Astronomy makes us ask questions of the mind as well as Nature

Astronomy is often described as the oldest science. Indeed, people have been wondering at the stars since long before the scientific method was formalised. Although astronomy today deals in concrete data that can offer clues to well-defined problems, the discipline as a whole will always be inextricably tied to those profound questions that border on the philosophical: *Where did we come from and why are we here?*

On Tuesday 13 August, George Ellis, Professor Emeritus and Research Fellow at the University of Cape Town, gave the last public talk of this General Assembly, entitled *The Nature of the Universe: What we know and what we don't know*, offering a thought-provoking foray into these more metaphysical ideas.

After a brief overview of modern methods and technologies for astronomical observations, Professor Ellis discussed the best current picture we have of our Universe. He covered everything from the expansion of the Universe and the possible curvatures of spacetime to how Cosmic Background Radiation led to gravitational instability and structure formation, and dark energy and the cosmological constant, and the heat death of the Universe.

Professor Ellis summarised the "Big 5" issues that remain in cosmological theories: the nature of dark energy; the nature of dark matter; what could have powered inflation; the discrepancy between measurements of the Hubble constant; and how galaxies and black holes could have formed so early in the Universe's history, as revealed by JWST.

Even within astronomy, Professor Ellis noted, cosmology is a unique science; since we only have one Universe, we cannot do experiments on it, nor can we compare it with other similar objects, in the way that we can compare different stars or galaxies. He emphasised that it doesn't even make sense to talk about "laws" the Universe follows, because, by definition, a physical law is something that applies to multiple objects, not just one.

In the final section of the talk, Professor Ellis addressed the metaphysical issues with which the science is intertwined, such as why the Universe exists, why there are laws of physics, why they are what they are, and how life and individual agency arises.

He discussed the anthropic problem that the Universe seems to be fine-tuned to allow for the existence of life, explaining that the multiverse concept does not resolve it, but just "displaces it one level up." Even if life exists only in a small fraction of parallel Universes, one could still ask why the multiverse allows for the existence of life anywhere.

Professor Ellis also argued against the theory that we are in a simulation, noting the immense computing power that would be required, and describing the notion as "a fashionable form of Intelligent Design, where God is a computer nerd."

Perhaps unsurprisingly, the questions that followed the talk leaned towards the philosophical. One audience member noted that we would not expect other animals to grasp many of the physical theories that humans have developed, and asked Professor Ellis whether that means there is a limit to the questions that we Homo sapiens – animals ourselves – can hope to answer.

Professor Ellis opined that there was a good chance we would discover the nature of dark matter and dark energy, but that we may or may not achieve a working theory of quantum gravity. However, fittingly for a talk touching on the mysteries of life's existence, he said he thought we would probably never learn exactly how sentience arises, and how matter can become aware of its surroundings and itself. It is, after all, called the "hard problem of consciousness."

IAU General assemblies in the era of the internet

By Christina Thöne

a story of how quickly things get lost in time and space.

The IAU GA has been in existence since 1919, but only since the '50s has it started to have the format we see today with triennial meetings, hosting symposia and smaller sessions, nowadays called Focus Meetings. Proceedings have been published since the beginning and are some of the few records of past GAs the more one goes back in time. The IAU daily newspaper was firrst published in 1958 in Moscow in four languages and amazingly, you can still read the PDF today. All daily newspapers since then have been stored on the IAU website, except, one. The newspaper archive of the 2018 GA in Vienna is gone and there is only one page of it left. Let's hope, our editions, that we put so much work in these last two weeks, will stick around for longer.

GA homepages are even more volatile. The oldest, still in existence and mostly functional, is the GA in Prague in 2006 (the one with the Pluto demotion).

Rio 2009, Beijing 2012 and Honolulu 2015 are gone, except for a few symposia and FMs hosted externally, such as the one the author of this article organised at the 2015 GA, making considerable effort to get a permanent forward and hosting server. There is still a page around of the Manchester GA in 2000, but it seems to have been hacked, preserving most of the front page and sneaking in some link to an astrology page! It's shocking how quickly information gets lost in the modern age and we should really think as a community about ways to preserve information and access much longer.

This GA was advertised as the first real hybrid GA. Online participants could meet and walk around on Spatial; there are online poster sessions; and questions can be asked online. The GA 2022 in Busan was fully streamed due to the many pandemic restrictions; just entering Korea required two COVID-19 tests.

How quickly things have changed. Back in Rio 2009, smartphones were not yet common and obtaining a local SIM with data almost impossible. To allow people to communicate without wifi (which frequently failed), they made little mailboxes, so you could drop a note into someone's box if you wanted to meet for dinner. You really didn't want to walk around much with your computer -

(Above middle) The author of the article dressed up for the 2012 Beijing GA conference dinner in the Bird's Nest, the stadium where Ursain Bolt made history (the author became an IAU member at that meeting!). (Below middle) Entrance to the 2009 Rio GA conference center. Back then we still got fancy, embroidered bags! (Top) A 15 year younger self.

(Top left) Intensely working astronomers under the tropical Hawaiian sun.

(Top middle) The author of the article opening FM 10.

(Top right) In a traditional Korean dress.

(Left) Evidence for online-presented plenaries! Worked rather well back then already.

(Below) 2022 Busan GA conference picture, all in masks (author indicated with an arrow, haha!)

if you think Cape Town is unsafe, be assured, Rio was another dimension.

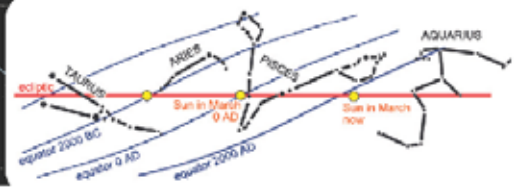
In 2012 we did have smartphones and good wifi, but then it was in China, where the useful part of the internet is blocked without a VPN, including your own email. Who still remembers the speech of the current president of China, Xi Jinping, at the GA, back then vice-president? He left a good impression on everyone, caring for science, too good in retrospect. During his speech, internet at the conference was switched off. Honolulu 2015 did not have any of these issues, though we encountered protestors in front of the conference hall demonstrating against TMT. Funnily, no big event stack around in the head of the author of the 2018 Vienna meeting, quite the opposite to this one. Many here will have had more GAs, but with a sample of six, this has clearly been the most exciting and different meeting so far, maybe marking a new era of diverse, hybrid and exciting GAs.

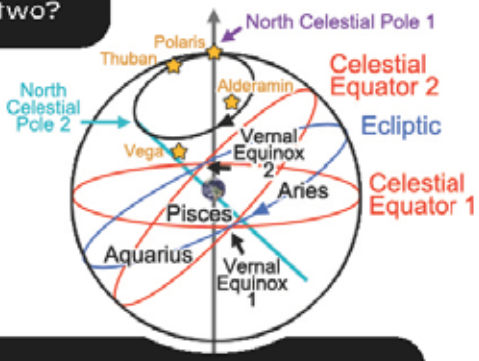
And please, make some effort to preserve the past, so that you can do this little "internet archeology", stumble over old webpages, pictures and links and remember "the good old times".

(Above) How to make a conference picture at the GA in Vienna in 2018

IAU Constellation Boundaries Update for 2100: Science and Society Considerations

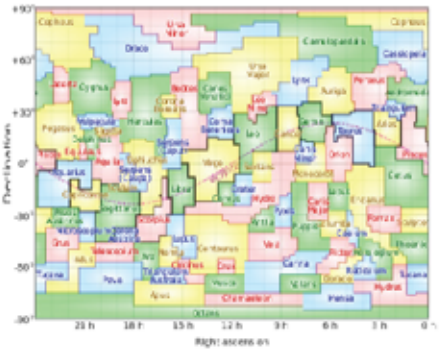
Why, How and Whom would an IAU Constellation Boundaries Update 2100 serve, through this millennium, or two?





Earth Axial / Precession of Equinoxes

E. Delporte 1920s: Celestial Star Map and Earth axial / precession of equinoxes based on 1875 information. The celestial boundaries need a millennial update for precision and precession, and for other revolutionary developments.



20th - 21st Century Forces Impacting Constellation Boundaries Update

Hubble Galaxy Discoveries 1920s:Galacticity, Cepheid variable stars beyond Milky Way, Einstein Special, General Relativity Theories, Space Age Rising 1950s, Moon Missions, Solar System Complete, Multi World Species, Interstellar Realities

Steve Durst, Director, ILOA / Space Age, info@iloa.org +1-808-936-8092

IAU General Assembly Session WG6:

Executive WG on Dark & Quiet Sky Protection

12 & 15 August 2024

Session:
12 August (10:00 – 17:00)
Commission B7 Business Meeting:
15 August (13:00 – 15:00)
(South Africa Standard Time = GMT + 2h)

Cape Town International Convention Centre
in Cape Town, South Africa
In-person and online

noirlab.edu/science/events/websites/iauga24wg6

slack
#wg6-dark-quiet-skies for the WG6 session

2023 Shaw Prize winners talk

By Tiaan Bezuidenhout

The teammembers discuss their discovery that led to their winning the Shaw Prize

The prestigious Shaw prize in astronomy is often described as the "Nobel of the East". The 2023 Shaw Prize prize was awarded to three astronomers who participated in the discovery and subsequent study of fast radio bursts (FRBs) - Duncan Lorimer, Matthew Bailes, and Maura McLaughlin. In their talks during the prize luncheon, each presented a different aspect of the development of FRB science since their discovery in 2007.

(Top) Murriyang, CSIRO's Parkes radio telescope. Image: CSIRO

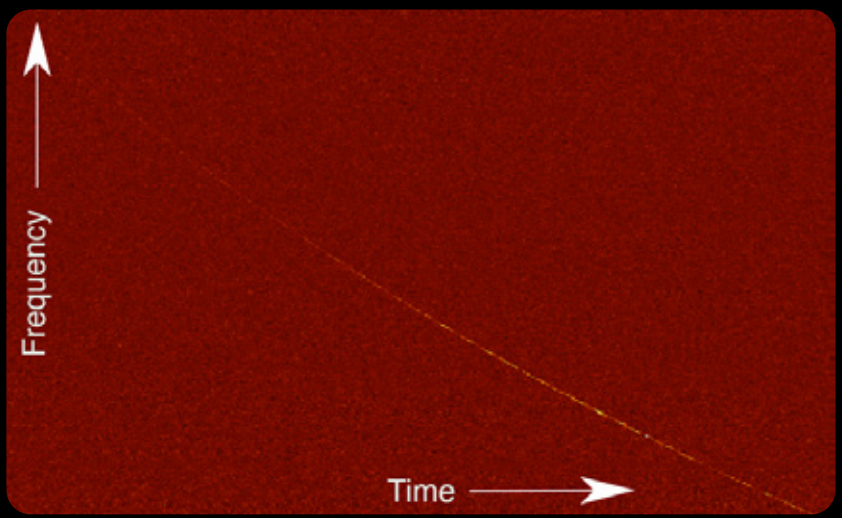
(Above, left to right) Winners of the 2023 Shaw Prize in Astronomy, Matthew Bailes, Duncan Lorimer and Maura McLaughlin. Image Shaw Prize

(Below) The Lorimer burst. Image: CSIRO

Lorimer told the story of his team's unexpected detection of a radio pulse twelve orders of magnitude brighter than any known pulsar while re-processing data from the Parkes observatory in Australia. The pulse was also highly dispersed by the intergalactic medium, indicating a likely cosmological origin.

The subsequent years-long search for further examples of this burst was then recounted by Lorimer's PhD supervisor, Bailes. This included the humorous chronicle about the difficulty of distinguishing real FRBs from interference caused by microwave ovens in the observatory site kitchen. FRBs' existence was finally proved in 2013, and many instances have since been observed using radio telescopes around the world.

McLaughlin rounded the story off by relaying the various efforts to find and study FRBs in recent years. Almost 1000 sources have been found to date, but they are still largely mysterious. Key questions remain surrounding their progenitors, host galaxies, and why some repeat while others don't.



Turn Light into Sound

By Laura Hiscott

New technology makes astronomy accessible for the vision-impaired

As this conference has emphasised, astronomy should be for everyone. We are all part of the Universe, we are all made of elements forged in supernova explosions, and the Universe is home to all of us.

Yet, traditionally, astronomy is a very visual science, with beautiful images of galaxies and nebulae that capture people's imagination and inspire curiosity. While these pictures are certainly an asset when it comes to outreach, relying on this single, visual dimension can make astronomy less inclusive than it should be, creating a barrier to blind and low-vision people.

Addressing this issue, the LightSound Project created a device called LightSound. Originally created for the total solar eclipse visible from America in 2017, the tool uses sonification – converting light into sound – to offer an alternative way of experiencing these astronomical events. As the Moon passes in front of the Sun, the device detects the changing light and translates it into changing characteristics of sound, which allow the user to "hear" the phenomenon as it happens.

Since 2017, the LightSound tool has been used during several more eclipse events, and has been redesigned and improved along the way. The team has now distributed over 1 000 devices to communities across North and South America. The tool was also showcased as part of the IAU's 2019 "Inspiring Stars" travelling exhibition.

Over the next decade, there will be three total solar eclipses visible from the African continent, so the LightSound team has introduced the device to communities in Africa. And beyond solar eclipses, it can also be used for public outreach events more generally, to enrich the ways in which people can engage with astronomy.

The team is holding a hands-on workshop today from 14:00 to 16:00 at the South African Astronomical Observatory, to show participants how to build and use the LightSound device. No prior experience is needed, and the team will provide all the materials. Also today, Allyson Bieryla, a Harvard astronomer and lead of the LightSound team, will present the project during sessions of Working Group 4 Astronomy for Equity and Inclusion.

Join the workshop and WG4 sessions to learn how to make astronomy accessible, ensuring no-one is barred from experiencing the wonders of our Universe.

(Top) Allyson Bieryla

(Middle) LightSound being used during 2019 South American Eclipse. Image: Museo Interacivo Mirador

(Above) LightSound in use at Space Center Houston during 2023 North American Annular Eclipse. Image: Rochelle Pettaway

Question of the Day

What has been your science highlight of the meeting? What has been your non-science highlight?

After two weeks packed with six symposia, 12 focus meetings, division talks and a huge number of side events from public talks to cultural happenings, let's see what has impressed people most.

Two lunches were among the highlights, for Pooja Devi it was the women in astronomy lunch, and for aspiring PhD student Reikantseone Diretse it was the young astronomers' lunch "because I got to meet Brian Schmidt, who advised us to do what we are most passionate about and right now is important for me to find out". Christopher Tout was more on the sporty side and enjoyed the hike to Lion's Head in good weather on Sunday. Scientific highlights were very diverse. "For me it was most important to see the data and results from a Chinese solar telescope observing solar flares and CMEs". Christopher Tout is "happy to finally see interest again in stellar evolution of any mass". Reikansteone loved to see the social impact of astronomy.

We hope you enjoyed the meeting as much as these three participants did, whether online or offline!

Pooja Devi from Nainatal, India, working on observational solar physics

Reikantseone Diretse, who has done a MSc on radio afterglows of GRBs and other transients and is currently working as data analyst for IDIA in Cape Town, while thinking about what field to choose for his PhD.

Christopher Tout from the Univ. of Cambridge doing theoretical modeling of stars across all mass-ranges

Kavli Prize lecture on terrestrial exoplanets

By Laura Hiscott

The Terrestrial Worlds of Other Stars

Earlier this year, Professor David Charbonneau of Harvard University and Professor Sara Seager of MIT won the 2024 Kavli Prize in Astrophysics, a prestigious prize awarded once every two years to recognise outstanding achievements in advancing our understanding of the Universe. In awarding this year's prize, the Kavli Foundation cited the recipients' "ground-breaking work on the discovery and characterization of extra-solar planets and their atmospheres."

Yesterday at the General Assembly, Professor Charbonneau gave the Kavli Prize Lecture, entitled *The Terrestrial Worlds of Other Stars*, and shared some of the extraordinary progress made by the exoplanet research community in the last few years.

But before getting into the science, Professor Charbonneau said it was an honour to be in South Africa, sharing a personal story about why he had always wanted to visit the country. As a 15-year-old Scout in Ottawa, Canada, in 1990, he had been part of a Scout Honour Guard greeting Nelson Mandela when he visited Canada just four months after being released from prison. He even showed a picture of Nelson Mandela walking with the then Canadian prime minister, Brian Mulroney, pointing out his younger self in the crowd.

Professor Charbonneau also acknowledged the pioneering work of Professor Seager, with whom he shares the Kavli Prize, and who was among the first people to work on modelling exoplanet atmospheres, despite being told when she was in graduate school that no-one would ever be able to test or confirm her theories.

Moving on to the main part of his lecture, Professor Charbonneau defined that the work he was presenting concerned exoplanets belonging to a specific subset of stars – a complete list of 413 M Dwarfs between 10% and 30% the mass of the Sun, within a distance of 15 parsecs of Earth, compiled by Dr. Jennifer Winters. The reason for this focus is because these are the conditions under which future observations with JWST and the ELT should be able to detect molecules in the atmosphere of a transiting exoplanet.

With the complete list of 413 stars, Professor Charbonneau presented some statistical findings on the occurrence of Earth-like planets, including Dr. Kristo Ment's discovery that there are around 0.6 Earth-like planets per low-mass M Dwarf up to an orbital period of 7 days.

Interestingly, however, studies by Dr. Emily Pass have shown that gas giants near the snowline appear to be very scarce in these systems, which could have implications for the rocky worlds. Early on in our own Solar System, Jupiter and Saturn are thought to have

(Top) Professor David Charbonneau

(Above) Professor Sara Seager

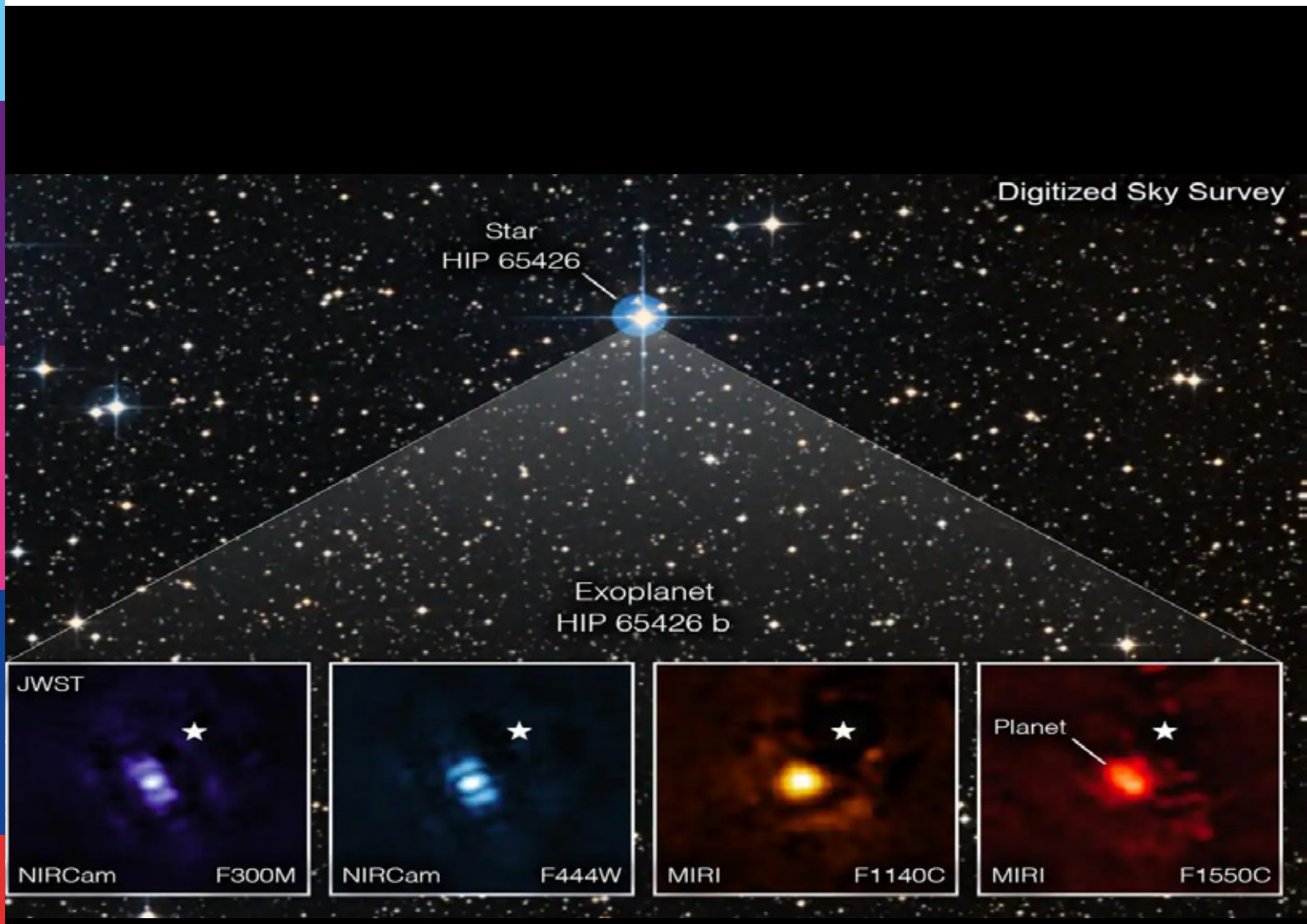
(Next page)Photo of exoplanet by James Webb Space Telescope. The exoplanet is 10 000 times fainter than its host star in near-infrared. Image: NASA/ESA/CSA, A Carter (UCSC), the ERS 1386 team, and A. Pagan (STScI).

migrated, influencing smaller bodies and perhaps leading to a considerable amount of water being delivered to Earth.

For planetary atmospheres, stellar magnetic activity is also a crucial factor. A fascinating insight from work by Professor Elisabeth Newton is that the nearby low-mass M Dwarfs tend to have an orbital period of fewer than 10 days or more than 100 days, with few in between. This indicates that they rotate rapidly for a long time before suddenly losing their angular momentum, perhaps through a coupling between the magnetic field and stellar wind.

However, by studying dynamically associated pairs of stars, Dr. Emily Pass found that lower-mass stars seem to take longer to spin down, with the 0.1-solar-mass stars remaining active for around 5 billion years. This has important implications for their planets; if stellar activity outlasts a planet's volcanism and outgassing, then the gases will likely be stripped away, leaving the planet without an atmosphere.

A study of temperature variations by Dr. Laura Kreidberg has corroborated this, finding that the hottest terrestrial exoplanets are indeed airless worlds. Looking towards the future, Charbonneau anticipated that JWST will soon tell us if the same is true of cooler terrestrial exoplanets. In fact, he said that this is "probably the most interesting question in exoplanet atmospheres that JWST will answer in the next two years." The future is certainly bright for this field of astronomy.



Plenary IAUS 393: Planetary science and exoplanets in the era of JWST

By Christina Thöne

The James Webb Space Telescope keeps on giving

JWST has proven not only to be beating records in the high redshift Universe, but is also an extremely useful tool in our own Solar system. One would think a telescope would be obsolete since we can study the Solar system directly with space probes, but Geronimo Villanueva, from NASA Goddard showed us why JWST is crucial for this science, calling JWST the "Guiness book of astronomical observations" with lots of "firsts".

JWST detected the water in the atmosphere of an inner Solar System comet, but no CO_2, which was probably lost. CO_2 on the other side was detected in Centaurs, the pre-cursor of Jupiter-family comets. JWST took take spectra of the material ejected hitting the moonlet of an asteroid in the DART mission, since the mission itself only delivered images. All these measurements are crucial to study how our solar system was formed. For larger objects, JWST has proven to be "Ring machine", better than an orbiter around the planet can do, and such is the case for Jupiter. So they started to look for rings on Mars, unfortunately unsuccessful. Solar System observations have the opposite issue than high redshift objects by saturating the detector in no time.

But does have Mars bio-signatures? Ground-based telescopes and the rover on Mars have detected methane, which could be produced by bioactivity or remnant geology. JWST has still not detected methane in spectra, but hard work is being done to confirm it. He finished with results from the ocean worlds of Europa and Enceladus with its huge plume of water that seems to be rather stable. Dr. Villanueva has also developed public tools to analyse remote sensing spectra from any phone (www.psg.gsfc.nasa.gov) and an open access spectroscopy book.

Then Andrew Szentgyorgyi from CfA talked about the difficulties in detecting biosignatures on other planets. One of the most obvious signatures to detect would be oxygen and ozone. Detecting it in emission has been tried but failed, so nowadays scientists aim at detecting it in absorption. The first exoplanet weather was measured in 2007 - spectra of an exoplanet atmosphere were taken in 2009 (all hot Jupiters). Transit spectroscopy of a rocky planet around a G-star would require over 37 years of transits and almost 500 hours of observing time with a GMT sized telescope, it is somewhat more feasible for M-dwarfs with planets, although there is controversy that the activity of those stars might have sterilised their planets.

Currently, we have not found any Earthlike bodies around a Sunlike G star, which is purely an observational issue: detecting it with the radial velocity method would require an accuracy of 10m/s. This will only be available with new instruments at 30m class telescopes such as G-CLEF for the GMT with expected first light in 2032. High contrast and high resolution observations are crucial, requiring AO observations. JWST can now resolve planets lower than Jupiter masses around stars, but will not be able to resolve O_2 or O_3 even around Proxima Cen B. We might have to wait for the HWO, the next planned major NASA mission.

(Top) Artisist impression of James Webb Space Telescope. Image Credit: NASA GSFC/CIL/Adriana Manrique Gutierrez.

(Above left) Andrew Szentgyorgyi

(Above right) Geronimo Villenueva

Good-bye Cape Town, see you in Rome!

By by Giulia Mantovani & Claudia Mignone

work has already started for the 33rd IAU

Today, after an unforgettable ten days in Cape Town, the 32nd IAU General Assembly comes to a close with the handover to INAF, the Italian National Institute for Astrophysics, in charge of organising the next gathering that will take place in Rome from 9 to 19 August 2027. During the closing ceremony, the South African Local Organising Committee and departing IAU President, Debra Elmegreen, officially pass the flag to the Italian delegation led by INAF president Roberto Ragazzoni.

Roberto Ragazzoni, INAF president, presenting the IAU GA 2027 that will be organized by INAF in Rome. Credits: IAU

Rome and Italy have a special relationship with the IAU, having hosted the first General Assembly in 1922, and then again the eighth edition in 1952. The Italian astronomical community has greatly evolved since then, with around 2 000 active researchers, and is currently involved, under the leadership of INAF, in all major international projects observing the sky across the electromagnetic spectrum and beyond, through gravitational waves.

"From the very first General Assembly in Rome in 1922," comments IAU President-Elect Willy Benz, "the IAU and Italy have enjoyed more than a century of excellent cooperation at all levels. We look forward to our new joint venture of hosting the 2027 General Assembly in Rome".

The 33rd IAU General Assembly will take place at the Auditorium Parco della Musica, a modern public culture venue in the centre of Rome, designed by Italian architect Renzo Piano and home to the vibrant Italian music scene. The congress will offer scientists from all over the globe the opportunity to not only discuss and present the latest achievements of astronomical research, but also to explore the rich Italian cultural and science heritage.

"I am deeply grateful to all the colleagues of South Africa for this handover of the next IAU GA," comments INAF president Roberto Ragazzoni. "I am also delighted to welcome you to Italy, the land of Galileo Galilei, where we will come together to promote and share the groundbreaking discoveries from the latest advancements in astronomical research".

Besides its many classical attractions, from the Colosseum and Roman forum to the St Peter's Basilica and Vatican Museums, the Italian Capital is an open air museum weaved with sundials and other ancient tools to observe the sky and measure time. A featured that is shared by many of Italy's art cities, and a testament to the long history of astronomy in the country that saw the first astronomical observations using a telescope, by Galileo Galilei, in 1609. It will also be possible to visit INAF's network of historical observatories and museums, as well as the institute's cutting-edge research infrastructure across the country.

"IAU and Rome have an exceptional relationship," adds Angelo Antonelli, chair of the 2027 IAU GA Local Organising Committee. "Rome also has had a very long special relationship with astronomy, from the Roman

(Top) Colosseum under a starry sky. Image: INAF

period through the Medieval age to the Renaissance, and today, with our modern institutes."

Along with the scientific programme, the IAU General Assembly 2027 will include an extensive programme of side events to engage the local public as well as the tourists crowding the streets of Rome in August with the beauty of the cosmos. This follows the commitment that INAF has in engaging the society and schools as an institutional duty. This is why INAF has a very large network of astronomers and communicators who work full time in public engagement, with a high level of professionalism.

Press briefing at the INAF booth presenting the IAU GA 2027. From left to right: Livia Giacomini, INAF science journalist; Roberto Ragazzoni, INAF president; Caterina Boccato, INAF national public engagement coordinator and IAU NOC Italy; Willy Benz, IAU president elect; Luca Tiano, science attaché, Italian Embassy in South Africa; Angelo Antonelli, chair of the LOC of the IAU GA 2027; Piero Benvenuti, IAU interim general secretary. Credits: IAU

Caterina Boccato, INAF national public engagement coordinator and IAU NOC Italy, presenting the astronomical tour guide to Rome. Credits: IAU

"Among all the activities of education and public engagement in which INAF is involved, I would like to highlight the project called 'Second Star to the Right', an INAF cultural project linking art, tourism, heritage and astronomy in historic cities" says Caterina Boccato, INAF national coordinator of public engagement and IAU National Outreach Coordinator for Italy. "With this small but precious book in your hands, you will be able to visit squares, churches, monuments in our cities that are important not only from a historical point of view, but also because of their strong link with astronomy, with the sky (and the cosmos). They are evidence of the strong link between humankind and the sky."

The 'Second Star to Right' project started in 2014 with the tour guide of Padua, the Italian city from which Galileo Galilei changed forever human knowledge of the universe. The following ones were dedicated to Florence, in Tuscany, Palermo, in Sicily, and now, very recently, a few weeks ago, the astronomical guide to Rome was presented. And more cities will follow, so stay tuned!

IAU
33rd GENERAL ASSEMBLY
9-19 AUGUST 2027 | ROME•ITALY

Cultural evening

By Christina Thöne

!ke e: |xarra ||ke

Kevin Govender called this event “The brain child of the organizing committee”, the event that absolutely needed to be there. It follows the motto of the coat of arms of South Africa “!ke e: |xarra ||ke” (Diverse people unite). Over 2 000 people from over 100 countries came together in South Africa, an already very diverse society. As Nelson Mandela said in his speech, displayed on the big screen, “Today it feels good to be an African”.

The audience was entertained with many excellent presentations from all over Africa. The iThemba youth choir singing in Xhosa amazed us with songs featuring sounds from the Xhosa language - probably no other participant has even a clue on how to produce. They also told the many stories of their people related to astronomical objects, the Pleiades serving as the marker for the boy’s initiation rites and Venus telling a girl when and how to meet her boyfriend at the river. The full moon is a woman in the Xhosa culture. The choir received standing ovations on their way out.

Not any less impressive was the choir from the University of Pretoria, having traveled through the night to come here. Their performace was absolutely stunning, not only the voices but also their dancing talents. Their presentation of two Christian songs translated made the connection to many participants having grown up in Christian societies. Again, standing ovations from the audience. Groups from Ghana, Madagascar and Ethiopia brought the audience to its feet to dance and participate. In between, Gcina Mholope amused the audience with her story about the deep love between the Moon and the Sun and the Ocean, that visited their house (that they had to “biggify” to allow such a large guest to visit) and on the way back left all the water on Earth. Sun and Moon cannot meet, but when they do and kiss it gets dark on Earth - a solar eclipse! Think about it next time you see one. What an amazing, colorful and eventful evening!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In the right place at the right time in exoplanet discovery journey

By Maria Stone

A recap of the invited discourse with Natalie Batalha

As a student at the San Jose State University in California, from time to time I ran across Professor Natalie Batalha's name due to her involvement with the nearby NASA Ames. So I was glad to do a report for the IAU newsletter because it gave me a chance to learn more about her work. Listening to Natalie's presentation blew my mind, because not only Natalie has an impressive record and exuded humility, but her story captivated my attention from beginning to end, and even the technical bits were accessible to me as a non-specialist.

Professor Natalie Batalha (University of California Santa Cruz), a prominent astronomer and leader in science of our day, took the audience on a whirlwind journey to experience with her the "front row seat" view in the exploration and discovery of the exoplanets through various surveys, programs, and fantastic missions of Kepler, TESS, and JWST, which are weaving the tapestry of exoplanet characterization. She explained her involvement in the discovery process and in leadership roles as being in the right place at the right time. Plus, we got a glimpse into Natalia's life outside of science as

(Top) Professor Natalie Batalha'

she shared that she is a mother of four children, one of them also an astronomer. Many stories revealed how unexpected the discoveries were, as the beginnings were often very small, such as a white bucket used for flat fielding or a relatively obscure poster presentation which foreshadowed a Nobel Prize decades later.

"You have to be ready for a lot of disappointments and failures before you get these discoveries to bear fruit"

Natalie used the platform to highlight her vision about the future of science. She argued that open science, grass roots science, and community involvement effort are keys to driving the discoveries around exoplanets forward in an efficient way. She illustrated it with the example of the frenzy associated with Kepler's data, where teams competed to get the first discovery. On the other hand, with the James Webb programs, the tone of work was completely different, where it was organized so to have scientists work together, with 'no scooping', and with many ERCs leading papers. She emphasized that apparent barriers, such as 'fear of scooping' are false barriers in reality.

The science presented focused on the topics of exoplanet demographics, composition, and atmospheres. Natalia Batalha conveyed the major discoveries about exoplanets, in particular also with the Webb's data. For example, sulfur oxide detection revealed that photons (of the host star) are breaking water molecules and it is actually the first photochemical molecule discovered in an exoplanet.

The state of exoplanet research at this moment in time, in essence, is similar to the task of cataloging stars, which was done by Cannon, Payne and other astronomers in the past, according to the brilliant astronomer. Thus, in the next decade or two, the space telescope will be busy bringing in data to enable a systematic approach to understanding exoplanet diversity.

The recording is available on youtube for viewing on IAU meeting account.

IAUS 394

08:30-10:00
Thursday, 15 August
CTICC Audi 1

Scenes from The Cosmic Savannah

PROGRAMME WEEK 2

	MON - Aug 12th	TUE - Aug 13th	WED - Aug 14th	THU - Aug 15th
08:30 – 10:00 Morning plenary	Offices plenary	IAUS 392 plenary	IAUS 393 plenary	IAUS 394 plenary
10:00 – 10:30 Morning e-poster & coffee break	Division e-poster	IAUS 392, 393, 394 FM4, FM8, FM9, FM10, WG1, WG2	IAUS 392, 393, 394 FM4, FM8, FM11, FM12, WG3	IAUS 392, 393, 394 FM9, FM10, FM11, FM12, WG6, WG4
10:30 – 12:00 Morning oral session	Parallel Division Oral Sessions	S 392-1 S 393-1 S 394-1 WG1-1 WG2-1 / FM4-1 FM8-1 FM9-1 FM10-1	S 392-4 S 393-4 S 394-4 WG1-4 WG3-2 / FM4-4 FM8-4 FM11-1 FM12-1	S 392-7 S 393-7 S 394-7 WG6-1 WG4-1 / FM9-4 FM10-4 FM11-4 FM12-4
12:00 – 13:30 Lunch		Kavli Prize Talk by David Charbonneau	Young Astronomers	
13:30 – 15:00 Afternoon oral session 1	Parallel Division Oral Sessions	S 392-2 S 393-2 S 394-2 WG1-2 WG2-2 / FM4-2 FM8-2 FM9-2 FM10-2	S 392-5 S 393-5 S 394-5 WG2-3 WG3-3 / FM4-5 FM8-5 FM11-2 FM12-2	S 392-8 S 393-8 S 394-8 WG6-2 WG4-2 / FM9-5 FM10-5 FM11-5 FM12-5
15:00 – 15:30 Afternoon e-poster & coffee break	Division e-poster	IAUS 392, 393, 394 FM4, FM8, FM9, FM10, WG1, WG2	IAUS 392, 393, 394 FM4, FM8, FM11, FM12, WG3	IAUS 392, 393, 394 FM9, FM10, FM11, FM12, WG6, WG4
15:30 – 17:00 Afternoon oral session 2	9 Parallel Division Oral Sessions	S 392-3 S 393-3 S 394-3 WG1-3 WG3-1 / FM4-3 FM8-3 FM9-3 FM10-3	S 392-6 S 393-6 S 394-6 WG2-4 WG3-4 / FM4-6 FM8-6 FM11-3 FM12-3	S 392-9 S 393-9 S 394-9 WG6-3 WG4-3 / FM9-6 FM10-6 FM11-6 FM12-6
17:15 – 18:30 Afternoon plenary	Gala Dinner	Invited Discourse: Prof Natalie Batalha	Business 2	Closing Ceremony Handover
18:30 - 21:30 Various		Public Talk: Prof George Ellis 18:15 - 19:15		
		Cultural Evening 19:30 - 21:30	The Cosmic Savannah Guest: Nobel Prize winner Prof Brian Schmidt 19:30 - 21:30	

Background: The Milky Way above the ATCA. Image courtesy of E. Lenc.

Exhibitors


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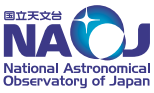
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Meet some of the team behind Umnyele wezulu

(Clockwise)
Gwen Sanderson; Guido Schwarz; Patrick Saunders; Sumari Faul; Bradley Urion; Daniel Cunnama; Christina Thöne; Laura Hiscott

The team behind the design, layout, content writing and editing of the XXXII[nd] IAU GA newsletter includes Patrick Saunders; Guido Schwarz; Laura Hiscott; Maria Stone; Christina Thöne; Shirley Aoko; Gwen Sanderson; Marcelina Kinyumu; Daniel Cunnama; Susan Caras, Sumari Faul, Bradley Urion

UMnyele weZulu

XXXII IAU GENERAL ASSEMBLY

6 - 15 AUGUST 2004

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