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CHAPTER II

THIRTY-FIRST GENERAL ASSEMBLY

INAUGURAL CEREMONY

Tuesday, 2 August 2022, 17:00–18:30

Busan Convention Center, Busan, South Korea

1. The International Astronomical Union

The International Astronomical Union (IAU) was founded in 1919. Its mission is to promote and safeguard the science of astronomy in all its aspects (including research, communication, education, and development) through international cooperation. Its individual members – structured into Divisions, Commissions, and Working Groups – are professional astronomers from all over the world, at the Ph.D. level and beyond, who are active in professional research and education in astronomy. As of June 2020, the IAU has 13,398 members.

The key activity of the IAU is the organisation of scientific meetings. Every three years, the IAU holds a General Assembly, which offers six IAU Symposia, some 15 Focus Meetings, and individual business and scientific meetings of Divisions, Commissions, and Working Groups. Among the other tasks of the IAU are the definition of fundamental astronomical and physical constants; unambiguous astronomical nomenclature; promotion of education activities in astronomy; and informal discussion on the possibilities of future international large-scale facilities. The IAU also serves as the internationally recognised authority for assigning designations to celestial bodies and surface features on them.

2. Agenda for "Astronomy For All" Opening Ceremony

The XXXIst General Assembly (GA) was opened by Prof. Hyesung Kang, Chair of the IAUGA 2022 National Organising Committee, hosted at BEXCO in Busan, Republic of Korea between August 2 and 11, 2022. It was the first time that the GA was organised as a hybrid meeting.

Welcome Addresses were given by the following dignitaries:

Tae-seog Oh, vice Minister of Science ICTS
Heong-joon Park, Mayor of Busan (by video)
Myeong-Gu Park, KAS President

A traditional Korean dance performance followed.

Debra Elmegreen, IAU President gave an opening address, and brief reflections on the past triennium were given by Ewine van Dishoeck, outgoing IAU President, and Teresa Lago, outgoing General Secretary.

Figure 1. General Assembly 2022 National Organising Committee. credit: IAU/GA2022 NOC

Awardees were announced for the Gruber Prize, The Gruber Fellowships, the prizes for Outreach, Development, and Education, and the PhD prizes. Debra Elmegreen concluded the inaugural ceremony, summarized in this chapter. Additionally, we highlight a segment of the host country's illustrious astronomical heritage.

3. Opening Address by President Debra Elmegreen

Prof. Debra Elmegreen, President

Greetings to our honored guests and to our IAU community here and around the world! I'm Debra Elmegreen, President of the IAU. It is such a delight finally to be able to hold the XXXIst General Assembly of the IAU. We have witnessed too many global tragedies since the XXXth General Assembly in Vienna, and our thoughts are with all of those who have been affected. For the next two weeks, it will be a welcome change to focus on astronomical discoveries and endeavors, to honor achievements, and to share the many efforts in which astronomy is used in development, education, and outreach.

A transition of IAU Officers takes place after General Assemblies, held every three years according to our Bye-laws. We held the XXXIst General Assembly Business Sessions virtually in August 2021, and celebrated the terms of then-outgoing President Ewine van Dishoeck and General Secretary Teresa Lago. Because of the pandemic delay of the Scientific Sessions until now, it is appropriate for me and the current General Secretary, José Miguel R. Espinosa, to share the Opening Ceremony with them.

This is the first General Assembly to be held in the Republic of Korea in the 103-year history of the IAU. The Republic of Korea has been a National Member of the IAU since 1973. It has a vibrant astronomical community, with over 200 Individual Members. It hosted the 7th Asia-Pacific IAU Regional Meeting (APRIM) in

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1996, the 12th APRIM in 2014, and IAU Symposium 197 on Astrochemistry in 1999. I thank the National organising Committee and its chair, Professor Hyesung Kang (who is Korea's first IAU Vice President) for their many years of preparation for this gathering, including their additional efforts to make it the first hybrid General Assembly.

We have over 1700 registered participants for the meeting. I'm also happy to welcome over 500 new Individual Members and Junior Members to the IAU. We have an exciting schedule planned, with lectures from international prize laureates plus talks and posters including many by early career astronomers. The plenary talks, invited discourses, Symposia, Focus Meetings, including one with our new Center for the Protection of the Dark and Quiet Sky from Satellite Constellation Interference, Meetings of the Offices, Executive Committee Working Groups, Division Days, and Women in Astronomy and Young Astronomer Lunches encompass all aspects of IAU activities.

These events reflect the goals as laid out in our 2020–2030 Strategic Plan presented at the General Assembly in Vienna, which are well underway; namely: to coordinate research efforts and communicate astronomical knowledge among professional astronomers, to promote the inclusive advancement of astronomy in every country, to promote the use of astronomy as a tool for development in every country, to engage the public in astronomy through access to and communication of astronomical information, and to stimulate the use of astronomy for teaching and education.

I hope you will find this meeting engaging and enlightening, whether you are online or in person. And if you are here, I am sure you will enjoy beautiful Busan!

4. Brief Reflections on the Past Triennium: Ewine van Dishoeck

Prof. Ewine van Dishoeck, Past-President

Your excellency, Mr. Mayor, Presidents of KAS and KASI, dear colleagues and friends, dear students. Even though I handed over the Presidency last summer at the first ever virtual GA Business meeting, it is my pleasure to reflect on the past triennium for a few minutes. What a rollercoaster triennium it was!

Let me start by saying that it is great to be back in Korea. My first visit was in August 1999 to beautiful Jeju Island, where – as Secretary of the IAU working group on Astrochemistry, we had organised the first ever IAU Symposium in Korea, IAU Symposium 197 "Astrochemistry: from molecular clouds to planetary systems", a quite forward looking title at that time. There were an impressive 262 participants, many of them junior scientists, and the organisation and book editing was in the very capable hands of professor Young Chol Minh. Now, 20+ years later, having the GA here in Korea under the excellent leadership of professor Hyesung Kang highlights the impressive growth of Korean astronomy.

The 2018–2021 period was an unusual, and also an unusually busy, triennium with the peak of activities in 2019 centred on the IAU 100 years celebrations, then coming "down to Earth" with the onset of the global pandemic in early 2020, and finding a new equilibrium and way of working together ever since.

One of my early goals as President-Elect in 2015 was to update the IAU Strategic Plan, which was done in 2016–2017 together with now President Debra Elmegreen and

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resulted in a comprehensive overview of all of the IAU goals, activities and plans. The Strategic Plan 2020–2030 was approved at the GA 2018 in Vienna, so the main goal for this triennium was its implementation. Significant progress has been made thanks to the hard and capable work by many people, in particular the (past) general secretaries Teresa Lago and Piero Benvenuti. Most notably, the IAU now has four well-functioning Offices, those for young astronomers (OYA), development (OAD), outreach (OAO), and education (OAE), with each of them having their Regional Offices and national contacts. This family of Offices is proving to be an increasingly strong and global network. Other achievements include the revival of the global coordination of ground and space astronomy working group, the establishment of the junior member category, and the strengthening of actions to make our field more diverse and inclusive, including the first-ever IAU Symposium on this topic.

The 2019 IAU 100th anniversary celebrations were undoubtedly the highlight of the triennium. As President, it was my privilege to help develop and experience them. A goal of IAU100 was to show not just to our fellow scientists, but also to policy makers, teachers, educators and the general public, what a century of astronomical discoveries has brought to society. It also allowed to reflect on its future. The IAU100 theme "Under One Sky" emphasised the global nature and the role that the IAU plays in bringing people together. It was a very busy year: IAU100 hosted over 5000 activities that engaged 5-10 million people directly and over 100 million people total in 143 countries, see www.iau-100.org. High points included the Flagship meeting in Brussels on *Astronomy with and for Society*, the open source *Above and Beyond* exhibition in 75 countries, and the *NameExoWorld* contest across the world in which each country got to name one star and one planet in a contest involving the entire population (check out your country!); South Korea named the 8 UMi system Baekdu and Halla. *Star parties* were highly popular, both at the start of IAU100 and around the time of the 50 yr Moon landing. *Telescopes for All* enabled many children around the world to see the wonders of the night sky through a telescope. The *Inspiring Stars* itinerant exhibition highlighted initiatives to enhance inclusion, most notably for those visually challenged. The *Centenary of the 1919 Solar Eclipse* that validated Einstein's Theory of Relativity was celebrated on Principe Island and in Sobral, and included many educational activities. There were also two books written on the IAU's history: *The IAU uniting the Community for 100 years*, by Andersen, Baneke and Madsen, and IAU Symposium 349 *Under One Sky: the IAU centenary symposium*, edited by Sterken, Hearnshaw and Valls-Gabaud: check them out! I also highly recommend browsing through the beautifully conceived *IAU100 Final Report,* available in hardcopy at the IAU booth, to get an impression and overview of that special year. IAU100 ended with the 30 year celebration of the iconic *Pale Blue Dot* picture, driving home the message to society, especially children, that our planet is small and fragile in space and that we should take well care of it.

Just weeks later, the pandemic hit, turning everyone's life upside down and causing hardships across the globe. Office and scientific meetings moved online. This clearly has the advantage that researchers from around the world can join and present their work at almost no cost. Indeed, IAU Symposium 367 on *Astronomy Education in the Era of Big Data*, organised virtually from Argentina, and *Communicating Astronomy to the Public* (CAP 2021) had record attendances and were very successful. Some IAU Commissions also held popular virtual meetings: they have the right size (few hundred people) and focus to do so. My strong recommendation is that Commissions and Working Groups continue such virtual meetings regularly, to stay connected worldwide and to give young

scientists a platform. However, most IAU-sponsored symposia chose to postpone until they could be in-person again, offering the benefits of people getting to know each other and triggering new ideas and collaborations through unstructured discussions. Hybrid meetings now seem the new norm, also for environmental reasons, but how well they will work for large intercontinental meetings like the GA with thousands of participants is yet to be explored: a main purpose of the IAU GA is, in fact, to bring people together from across the world.

As with any organisation, new challenges emerge at any time. The IAU's mission includes protection of the dark and radio-quiet skies. During 2019, it became clear that our skies are now being threatened not just by huge increases in urban lighting and radio interference due to telecommunication, but notably by the launch of swarms of small satellites. The IAU and its partners organised major online workshops in 2020 and 2021 resulting in detailed reports that describe the impact of human activities and make recommendations for mitigating actions. This included tabling and pushing the issue at the UN Committee on the Peaceful Uses of Outer Space (COPUOS). The IAU subsequently issued a call to establish a new *Centre for the Protection of the Dark Sky from Satellite Constellation Interference* to coordinate actions internationally; the selection of the Centre was announced in early 2022.

To deliver on its mission and the ambitions set out in the Strategic Plan, the IAU needs to find financial support from other organisations to add to the – much appreciated - funding from its member states. Fundraising has therefore become a growing activity with a number of significant successes in this triennium. Most notably, new funding has enabled the annual Shaw-IAU *Education Workshops*, the new IAU *Hands-On workshops* (I-HOW) supported by the Gordon and Betty Moore Foundation to train young astronomers in the use of large and complex data sets, an annual multidisciplinary Kavli-IAU symposium and support for the CAP conference, and coordination of the annual *Women and Girls in Astronomy* week by the Heising-Simons foundation.

I ended my online speech last year with bubbles. Thanks to Covid, everyone is familiar with the concept of bubbles: small groups of people that only interact with each other but not with rest of the world. Alas, they are becoming more common in science and society, whether at the national, regional and/or scientific topic level. The importance of the IAU, and especially its General Assembly, is that it takes you outside your bubble, giving you the full perspective of the field and letting you make worldwide connections. With an increasing number of conflicts around the world, such international relations are more important than ever to build respect, trust and support for each other.

Hence, let's uncork some bubbles to the IAU as it embarks on its next century, and let me re-iterate the quote of Sejong the Great (1397–1450) that was included in the LOC opening video: *Your status does not matter as long as we share the same dream under the same skies.*

Last summer, I also quoted the African-American abolitionist and activist Harriet Tubman (1822–1913): *Every great dream begins with a dreamer. Always remember, you have within you the strength, the patience and the passion to reach for the stars to change the world.* Unlocking this strength in everyone through the very appropriate "Astronomy for All" GA 2022 motto is exactly what the IAU aims to do.

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A million thanks to my fellow Officers, the IAU Office, Vice and Division Presidents, IAU100 team, and IAU family of Offices for a great triennium. Enjoy GA 2022!

5. Brief Reflections on the Past Triennium: Teresa Lago

Prof. Teresa Lago, past-General Secretary, August 11, 2022

Your Excellencies the Ministry of Science and Information and Communication Technologies, the Mayor of Busan, dear colleagues,

For the IAU the past three years were unique in many ways. When I started as General Secretary of the IAU in September 2018, I was thrilled at the prospect of an exciting triennium for the Union. At the XXX General Assembly in Wien the previous month, the first global strategic plan for the Union was approved. It clearly states the IAU's mission and ambitious goals for the decade, 2020–2030. Preparing for its implementation would require timely action.

Once in office, I soon realised that much more was needed than just implementing the strategic plan. There was also an urgent need for key management initiatives that are essential for an international organisation. Several relevant policy documents were missing and others already in use required a thorough review.

There was no time to waste in preparing the Union for the challenges ahead. So I focused on organising.

1. The IAU Code of Conduct;
2. The IAU Communication Policy, to ensure its consistency with Union policy, particularly on Social Media;
3. Clear Mission Rules that define the conditions and procedures for the reimbursement of expenses incurred by any member of the Union on missions authorised on behalf of the IAU;
4. Concise "Rules and Guidelines for Scientific Meetings" to help applicants prepare proposals for organising Union-sponsored scientific meetings, including information on the evaluation criteria and on the subsequent publication of conference proceedings.

At the same time, an in-depth review of the IAU website was carried out, in terms of structure and contents, to enhance the institutional brand.

The Strategic Plan clearly sets out the Union's priorities: above all to promote astronomical research, but also to use astronomy as a tool for education, communication with a wider audience, and development. This is done through the IAU offices:

– The IAU Office of Astronomy for Development, established in 2012, is a partnership between the IAU and the National Research Foundation of South Africa, and focuses on the use of astronomy to stimulate global development.

– The IAU Office of Young Astronomers - since 2015 a partnership between the IAU and the Norwegian Academy of Science and Letters, aims at training astronomers at university level; the agreement revised in 2019 provides for a substantial upgrade of the office.

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– The IAU Office of Astronomy Outreach, a partnership between the IAU and the National Astronomical Observatory of Japan since 2012, addresses communication and engagement of the public; the revised agreement, in 2021, provides for a deep restructuring and enhancement of the office.

A new office for education had to be created. The international call for Letters of Intent to host the IAU Office of Astronomy for Education was published in October 2018 and received an enthusiastic response from 23 member countries, on all continents, and even additional inquiries from countries that were not members of the IAU. The best proposal was selected in September 2019, and in December the IAU signed an agreement with the Max Planck Society for the Advancement of Science to host the IAU Office of Astronomy for Education at the House of Astronomy in Heidelberg.

The IAU Information Bulletin needed to be revived after a hiatus of several years. A new concept was developed and the new "Catalyst" was launched in June 2019.

Catalyst aims to be a tool for direct communication between the various structures and members of the Union, and with other international partners and scientific organisations.

Also in December, the IAU invited the authors of the 23 letters of intent to a meeting in Paris to jointly discuss the strategy envisaged by the IAU for a World Office of Astronomy for Education.

The new Office started activities in January 2020, has been very successful, and its global network already includes 5 Centres (China Nanjing, Cyprus, Egypt, India, Italy) and 3 Nodes (France, Nepal, Republic of Korea). With its 4 Offices working together the IAU is, since 2020, fully operational to accomplish its mission.

The triennium was also very successful in terms of relations with the sponsoring organisations, and in particular, I would like to mention the Kavli Foundation, the Gruber Foundation, and the Shaw Prize Foundation.

I cannot conclude without mentioning that this triennium was also unique due to the pandemic and its impact on our lives and practices.

For the IAU, which is all about cooperation, networking, knowledge sharing and public engagement, it was a big challenge: the Paris Office was closed for over a year, most scientific meetings and other activities planned for 2020 and even 2021 have been postponed, or cancelled, including this General Assembly scheduled for August 2021.

Even so, the IAU did not stop and react to the circumstances. We knew that the IAU was created in difficult times. We now also know that it is capable of continuing and even thriving in very difficult and unusual circumstances.

My final words go to my colleagues at Korean Astronomical Society and Korean Astronomy & Space Institute, and to the members of the National organising Committee of this General Assembly, in particular to the chair Prof. Hyesung Kang. And I ask you to join me in a sincere applause for their work, enthusiasm and resilience.

6. Prizes

6.1. Gruber Prize Foundation

Participants:

Sarah Hreha, Executive Director, The Gruber Foundation
Ewine van Dishoeck, Immediate Past President, IAU
Teresa Lago, Immediate Past Secretary General, IAU
Paul Ho, Member, Cosmology Prize Selection Advisory Board
Frank Eisenhauer, 2022 Cosmology Prize Recipient
Kunyang Li, IAU Fellow
Itai Linial, IAU Fellow
Piyush Sharda, IAU Fellow

Prof. Ewine van Dishoeck, Past-President:
We now move to the second part of the GA 2022 Opening Ceremony, one in which we honour a number of people for their outstanding contributions to our field. We start with the Gruber Foundation Prizes. The IAU has had the honour and pleasure to partner with the Gruber Foundation since 2000 with the joint goal to promote the science of cosmology and other branches of astronomy at the highest possible levels. This is done by honouring those that made significant discoveries and contributed to fundamental shifts in our knowledge of the Universe through the prestigious Gruber Cosmology Prize. In addition, the Gruber Foundation Fellowships stimulate the up and coming young stars in our field. Our deep thanks go, as always, to the founders Peter and Patricia Gruber for making this possible.

I now warmly welcome the Gruber Foundation Executive Director, Sarah Hreha, to the podium.

Sarah Hreha, Executive Director of the Gruber Foundation:
Welcome to the presentation of the 23rd annual Gruber Cosmology Prize honouring leading cosmologist, astronomer, astrophysicist or scientific philosopher for theoretical, analytical, or conceptual discoveries leading to fundamental advances in our understanding of the universe. On behalf of all of us at the Foundation, we are pleased to be here in Busan to present this Prize at the 31st General Assembly of the International Astronomical Union. Thank you, Ewine van Dishoeck, for your warm welcome.

The Cosmology Prize is presented annually in conjunction with the International Astronomical Union whose support and partnership has guided our efforts since the earliest days. It is my pleasure to introduce Teresa Lago immediate Past General Secretary of the IAU, who will say a few words about this fruitful collaboration.

Teresa Lago, Past General Secretary:
The IAU is pleased to have collaborated on the Gruber Cosmology Prize since the Prize's inception. The IAU has an advisory role in the constitution of the selection advisory board and as part of our collaboration we are fortunate to receive an annual grant of $50,000 to be awarded to postdoctoral fellows from around the world, so they may pursue education and research at a centre of excellence in their fields.

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6.1.1. The Gruber Fellowship

The fellowship has been awarded to young scientists from Algeria, Chile, Poland, Taiwan, India, Spain, Italy, Israel, Greece, Belgium, the Netherlands, the Russian Federation, Mexico, the UK, Colombia, Egypt and the United States.

The 2022 Fellows are: **Kunyang Li, Itai Linial, and Piyush Sharda**.

Sarah Hreha, Executive Director of the Gruber Foundation:
Congratulations to Kunyang Li, Itai Linial, and Piyush Sharda!

The Gruber International Prize Program, established in 2000, recognises achievements and discoveries that produce fundamental shifts in human knowledge and culture. While we are here to honour the achievements of Frank Eisenhauer, let me mention that The Genetics Prize will be presented at the Germ Cells conference at Cold Spring Harbour Laboratory on October 8, to Ruth Lehmann, James Priess, and Geraldine Seydoux, and On November 13th, at the annual meeting of the Society for Neuroscience, the Neuroscience Prize will be presented to Larry Abbott, Emery Neal Brown, Terrence Sejnowski, and Haim Sompolinsky.

Please note that nominations to the 2022 Gruber Prizes will be open until Dec. 15, and that we encourage nominations that reflect the breadth of the fields and the diversity of those working within them.

Before we return to Cosmology, I would like to acknowledge our co-founders, Peter and Patricia Gruber, whose combined vision and leadership established the International Prize Program and whose care in doing so gave it the legs to stand on its own. Peter has passed but Pat is still the heart of the program and a lifetime member of the Board of Directors.

Returning to Cosmology... we are proud of our illustrious laureate roster and pleased to be adding to it today. The 2022 Prize recipient was selected by a distinguished selection advisory board. We deeply appreciate the knowledge, commitment, and enthusiasm that the advisors bring to the judging process. Let me now invite a member of the selection advisory board to the Prize, Paul Ho, to present the official citation and introduce the scientific accomplishments of our recipient....

6.1.2. Recipient of the Gruber Foundation Prize

Paul Ho, Cosmology Prize Selection Advisory Board

The Gruber Foundation is pleased to present the 2022 Cosmology Prize to **Frank Eisenhauer** for his innovative design and construction of the GRAVITY instrument, a near-infrared interferometric beam combiner for the ESO Very Large Telescope Interferometer in Chile. GRAVITY has opened up near-infrared interferometry to help us understand a wide range of astrophysical and cosmologically important phenomena, including black holes, and exoplanets.

Eisenhauer also led the construction of the SPIFFI/SINFONI, the first adaptive optics integral field spectrometer on an 8m class optical telescope. These instruments enabled the detection of general relativity effects close to a black hole by defining the orbit of the star S2 around the Galactic Center Massive Black Hole SgrA* with unprecedented and exquisite angular resolution.

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Sarah Hreha, Executive Director of the Gruber Foundation:

Please note that Dr. Eisenhauer will give a lecture entitled "A New Era of High Angular Resolution Astronomy" at 12:15 pm tomorrow, Wednesday, in this room. Thank you all for attending the 2022 Gruber Cosmology Prize. Congratulations again to our recipient! This concludes our presentation.

Dr. Frank Eisenhauer is senior staff scientist at the Max Planck Institute for extraterrestrial Physics (MPE), Garching near Munich, where he is leading the development and science exploration of large astronomical instruments and experiments. The Gruber Cosmology Prize 2022 recognises Frank Eisenhauer for the development of the GRAVITY and SINFONI instruments that collected seemingly irrefutable evidence for the existence of a black hole at the centre of our galaxy. The results include the precise measurements of Sgr A*'s general relativistic influence on the orbit of the star S2, and the observations of gas orbiting close to the "last stable orbit" – the point before which it succumbs to the gravitational tug of Sgr A*. Following his studies of physics at the Technical University of Munich (TUM), he started his Master- and PhD theses with Reinhard Genzel at MPE, where he continued his scientific career to date. Frank Eisenhauer is also Adjunct Teaching Professor at TUM. Over the years his experimental focus moved from adaptive optics imaging, to integral field spectroscopy, and now optical/IR interferometry, always with the goal of ever better understanding of the physics of black holes and their environment.

6.2. ODE Prize

Prof. Ewine van Dishoeck, Past-President

One of the goals of the new IAU Strategic Plan 2020–2030 is to diversify its portfolio of prizes. As an astronomer, we have the privilege of doing very exciting research with the most sophisticated instruments, but we should never forget the obligation this brings us to science and society. Hence, outreach, development and education (ODE) are increasingly important aspects of our field as well, and we should honour those that do particularly well in this area. The IAU therefore announced last year the creation of three new ODE prizes to be awarded every triennium at the General Assembly, as an appropriate "ode" to these efforts. The first set of winners was announced in June 2022 and we can now celebrate them in person here in Busan.

What is an ode? According to the poet John Keats (1819), "The ode is one of the oldest and most noble forms of poetry. There are several ways to write odes, but everyone is written in praise of something or someone. Some odes celebrate great deeds, while others honour great people. . . .". The ode was originally developed by the Greek writer Pindar (522–443 BC), the greatest lyric poet of his day. We are all familiar with odes, including John Keats' *Ode to a Nightingale* and Ludwig van Beethoven's *Ode to Joy*.

A few more words on the prizes. The three ODE awards are open to individuals and organisations, who have made outstanding contributions to the fields of astronomy education, outreach or development. The eligible recipients are professional scientists, educators, science communicators or capacity-builders. Individual IAU members and non-members are eligible, as well as small teams or organisations. The prizes can recognise both life-time achievements and major one-off projects. Particular consideration is

given to people who are less known but have performed excellent service in the domains of the awards. More information can be found in the IAU press release of June 9 2022.

The procedure was as follows. Each of the three areas has a selection committee consisting of 3–4 members from across the world that evaluated the nominations that were received following an open call in early 2022. An overarching "super-committee" consisting of an independent chair (in 2022 Ewine van Dishoeck) plus the chairs from each of the three committees (Susana Deustua, Ajit Kembhavi, Peter Barthel) reviewed the rankings and made the final recommendation to the IAU Executive Committee, who decided at its April 2022 meeting.

It is now my pleasure to call to the stage the inaugural group of ODE prize winners. The 2022 ODE Outreach Prize is awarded to **Astronomy Picture of the Day**, APOD, represented here by its founders **Robert Nemiroff** and **Jerry Bonnell**. APOD was launched July 1995, and is now available in nearly 30 languages, thanks to more than 40 volunteers, with an estimated 7.7 billion views total over the lifetime of the project. Viewers are logged from every country: this is an outreach program that truly "reaches out". APOD has been influential in encouraging interest in astronomy around the world: each of the images is accompanied by explanatory captions which is one reason it is widely adopted in primary/secondary school and university-level courses. Pictures are contributed by professional and amateur astronomers, and increasingly also by astro-photographers, for whom an APOD publication is a gold standard. Robert and Jerry have sustained APOD for more than 25 years. In their words "Why do we do it? To share the love we have for our subject."

The 2022 ODE Development Prize is awarded to **Michèle Gerbaldi** for her exceptionally wide and sustained contributions to development and capacity building using astronomy as a tool during her long career. She has had a special focus on the developing world, where her efforts have legacy value. Particularly notable is her leading role in the organisation of, and hands-on teaching at, numerous *International Schools for Young Astronomers* (ISYA) for MSc students in developing countries. The *AstroLab* program that she has co-founded and developed has been much used around Africa and South America. This program links students and teachers to tutors and professional astronomers, and introduces them to creative thinking, research skills and methodologies by means of remote observing with real telescopes. Michèle Gerbaldi's work goes beyond astronomy education, bringing about capacity building and development in a sustainable way.

The 2022 ODE Education prize is awarded to **Rosa Doran** for her powerful, inclusive, innovative, inspirational, far-reaching, even transformational astronomy education achievements over more than three decades. She set up, secured funding for, helped coordinate and led numerous small- and large-scale projects (e.g., Nuclio, Galileo Teacher Training Program, . . .) in developed and developing countries, projects which have reached many thousands of teachers and kids all over the globe. She is a powerhouse and has become a global leader. As one nominator wrote: *her goal is to change the world through astronomy education.*

Please join me with a big applause for our ODE winners, and don't forget the ODE prize winners talks on Thursday August 4 2022.

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6.3. PhD Prizes

The PhD prizes are awarded annually by the 9 IAU Divisions in recognition of outstanding dissertation work. At this General Assembly, we honor the recipients from the years 2018, 2019, 2020, and 2021. Honorable Mentions (HM) were first awarded in 2021. The winners are:

Division A Fundamental Astronomy: 2021 Chris Hamilton, 2020 Etienne Savalle, France, 2019 Joseph O'Leary, Australia
Division B Facilities, Technologies and Data Science: 2021 Francisco Javier Bailen Martinez, Spain, 2020 Danna Qasim, the Netherlands, 2019 Luke Pratley, UK, 2018 Niels Ligterink, Netherlands
Division C Education, Outreach and Heritage: 2021 David Barrado Navascués, Spain, Saeed Salimpour, Australia, 2020 Magdalena Kersting, Norway, 2019 Maria Giulia Andretta, Italy
Division D High Energy Phenomena and Fundamental Physics: 2021 Riccardo Arcodia, Germany, HM Benjamin Crinquand, France, Kishalay De, USA, 2020 Ziggy Pleunis, Canada, 2019 Guang Yang, USA, 2018 Laura Becerra, Colombia
Division E Sun and Heliosphere: 2021 Souvik Bose, Norway, HM Wenzhi Ruan, Belgium, 2020 Camilla Scolini, Belgium, 2019 Munehito Shoda, Japan, 2018 Jenna Samra, USA
Division F Planetary Systems and Bioastronomy: 2021 Megane Mansfield, USA, HM Chloe Fisher, Switzerland, Rafael Luque Ramirez, Spain, 2020 Jane Huang, USA, 2019 Przemyslaw Mroz, Poland, 2018 Tim Lichtenberg, Switzerland
Division G Stars and Stellar Physics: 2021 Kareem El-Badry, USA, 2020 Lisa Bugnet, France, 2019 Simon Blouin, Canada, 2018 Adam Jermyn, UK
Division H Interstellar Matter and Local Universe: 2021 Anirudh Chiti, USA, HM Rebecca Levy, USA, 2020 Cecilia Bacchini, Italy, 2019 Jennifer Bergner, USA, 2018 Meriem El Yajouri, Morocco
Division J Galaxies and Cosmology: 2021 Zhijie Qu, USA, HM Martyna Chruslinska, Germany, 2020 Solène Chabanier, France, 2019 Anna-Christina Eilers, Germany, 2018 Jorryt Matthee, Netherlands
PhD at-large Prize: 2021 Reetika Joshi, India, 2020 Raissa de Lourdes Freitas Estrela, Brazil, 2019 Prantika Bhowmik, India, 2018 Gopal Hazra, India

7. End of the Opening Ceremony

President Debra Elmegreen closed the Inaugural Ceremony.

8. Astronomy in Korea

8.1. Ancient Astronomy

Korea venerates a profound heritage of astronomy that spans millennia. The roots of ancient Korean astronomy trace back to the prehistoric era, where celestial markers resembling stars were etched as cup-marks on the surface of dolmens. It is evident that ancient Korean kingdoms established their own dedicated bureaus for astronomy, constructed observatories, and appointed officials tasked with observing celestial events. The initial documentation of astronomical occurrences dates back to the 1st century BCE, with a rich repository of over 20,000 historical records and relics passed down

King Sejong the Great (1418–1450)
was the fourth king of Joseon Dynasty who invented Hangul, the native phonetic alphabet system for the Korean language.

Cheonsang Yeolcha Bunyajido
is a planisphere originally carved in 1396, four years after the inauguration of the first King of Joseon Dynasty. According to the preface written in the bottom part of the chart, it was based on a sky map observed in the early Goguryeo Dynasty.

Angbu Ilgu
"pot-shaped Sun clock staring at the sky" is a sundial made by Jang Yeong-sil, a Korean astronomer lived under the King Sejong's reign.

Figure 2. Ancient astronomy in Korea. Credit: IAU GA2022/NOC

through the generations. Notably, the Cheomseongdae Observatory, erected in 633 CE, stands as one of the world's oldest observatories.

Even today, Cheomseongdae, a 7th century astronomical observatory, proudly graces the city of Gyeongju, once the capital of the Shilla dynasty.

8.2. King Sejong the Great (1418–1450) and Joseon Dynasty

In general, Korean kings and nobilities were in favour of supporting astronomy. The reign of King Sejong the Great, between 1418 and 1450 is known as the unprecedented Golden Age of Korean science and culture, with particular attention to astronomical instruments and technologies. King Sejong the Great commissioned a substantial revision of Western, Islamic and East Asian traditional sciences and placed Korea as one of the frontrunners leading the calendrical science, astronomical observation, and invention of related instruments in the region.

One of the outstanding astronomical heritages during the Joseon Dynasty is a star chart carved on a stone plate in 1395. The stone star chart contains 1,467 stars with various sizes. According to the modern calculations, it is known that the location of the star was found to be located in the 1st century and the 14th century.

The astronomical instruments and calendars during the Joseon Dynasty are well examined by Needham et al.'s book entitled "The Hall of Heavenly Record: Korean Astronomical Instruments 1380–1780," published by Cambridge University Press in 1986. Needham et al. label Korean astronomy as "a true national variant of the East-Asian astronomical tradition" and note, "The instruments and written records are a valuable legacy to the history of science everywhere."

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Figure 3. Logo of the Korean Astronomical Society. Credit: KAS

9. Korean Astronomical Society

Established in 1965, the Korean Astronomical Society (KAS) stands as the preeminent professional astronomy organisation in the Republic of Korea, with a membership of 914 individuals. The primary objective of the KAS is to foster the advancement of astronomy within the Republic of Korea by facilitating member interactions, supporting astronomical research endeavours, disseminating the latest astronomical knowledge and discoveries, and educating future generations of astronomers and the general public. In 1973, the KAS became a member of the IAU and currently holds a category III membership with 159 individual members. The Society has garnered recognition for its substantial contributions both within the country and internationally, evidenced by its expanding membership base, outstanding research initiatives, and dedicated activities. The KAS is also the publisher of the peer-reviewed research journal, the Journal of the Korean Astronomical Society.

Regularly attended by over 300 members, the KAS hosts biannual meetings in the spring and fall. Over the past five decades, the Society has initiated and organised symposia, workshops, research projects, and public programs in collaboration with the IAU, regional and national societies, companies, and other partakers.

10. Korean Astronomy & Space Science Institute

The Korean Astronomy & Space Science Institute (KASI) has been home to astronomical research activities, establishment and operation of the medium and large sized observational facilities and laid an important foundation for the ultimate advancement of the basic science in Korea. This national astronomical observatory and institute has played an underpinning role in the advancement of astronomical science and technology in close association with the KAS, employing the long-term strategic schemes. The KASI has been involved in the major projects including Korea Microlensing Telescope Network (KMTNet), Korean VLBI Network (KVN), Giant Magellan Telescope Project (GMT), as well as Atacama Large Millimeter/Submillimeter Array (ALMA).

11. Main Sponsors of the General Assembly

- **Ministry of Science and ICT**, Korea Astronomy and Space Science Institute, Busan Metropolitan Government
- **Korea Tourism Organisation**, Busan, Tourism Organisation

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11.1. Other Sponsors and Supporters

- **National Astronomical Observatory of Japan**
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- **Simplatform**
  http://www.simplatform.com
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  http://www.nationalacademies.org
- **Norwegian Academy of Science and Letters**
  Young Astronomers Lunch
  https://dnva.no/norwegian-academy-science-and-letters

11.2. Sponsors of Public Lectures

- **Kaos Foundation**
  https://ikaos.org/
- **In-Kind**
- **Jeju Special Self-Governing Province Development Co.**
  https://www.jpdc.co.kr
- **IAUGA 2024 NOC**

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12. Exhibitors

- **National Astronomical Observatory of Japan**
  https://www.nao.ac.jp/en
- **SLLAB, INC.**
  http://sllab.co.kr/
- **Metaspace**
  http://metaspace.co.kr/
- **SETsystem,Inc.**
  http://www.setsystem.co.kr
- **Center for High Energy Astrophysics (CHEA)**
  http://sirius.unist.ac.kr/SRC-CHEA
- **Federation of Busan Science and Technology**
  http://www.fobst.org
- **ASTRO 3D (ARC Centre of Excellence for All Sky Astrophysics in 3D)**
  http://www.astro3d.org.au
- **Astronomical Society of India**
  https://www.astron-soc.in/
- **South African Astronomical Observatory**
  http://www.saao.ac.za
- **Southern African Large Telescope**
  http://www.salt.ac.za
- **The Center for The Gravitational Wave Universe**
  http://gwuniverse.snu.ac.kr
- **Astralis**
  https://astralis.org.au/
- **NSF's NOIRLab**
  https://noirlab.edu
- **UST-KASI School**
  https://ust.ac.kr
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- **Korea Astronomy and Space Science Institute**
  https://www.kasi.re.kr
- **SKA Observatory**
  https://www.skatelescope.org
- **International Gravitational Wave Network: LVK (LIGO-Virgo-KAGRA), LISA and NANOGrav**
  https://www.ligo.org
- **Istituto Nazionale di Astrofisica**
  https://www.inaf.it

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Figure 4. Logo of the IAU2022 General Assembly. Credit: IAU GA2022/NOC

- **Gwacheon National Science Museum**
  https://www.sciencecenter.go.kr/scipia/

13. IAU22 General Assembly logo

The logo designed for Busan 2022 has an upper wavy pattern and the red and white circles depict the five mountain peaks, the Sun, and the Moon, respectively, in the painting of https://en.wikipedia.org/wiki/Irworobongdo from Joseon dynasty (1392–1897). Here the Sun and Moon symbolise the king and queen, respectively, while the five peaks denote mythical places.

The lower bridge design represents the Gwangan bridge in Busan, which symbolises the main theme of the Busan GA, "connecting astronomers from all around the world".

14. The Press

In August this year more than 1700 astronomers from more than 80 countries will head to Busan, South Korea, for the XXXI General Assembly of the International Astronomical Union (IAU). The meeting will take place from 2 to 11 August 2022 in a hybrid format, with hundreds more expected to join this assembly online. Alongside thousands of scientific presentations, there will also be numerous policy discussions and exciting media events. The IAU offers complimentary press registration to bona fide working journalists and public information officers.

The IAU General Assembly is usually held every three years, but the XXXI General Assembly was postponed from 2021 as a result of the COVID-19 pandemic. Each meeting invites astronomers from around the world to come together to advance the astronomical sciences through international collaboration. About 1700 academic presentations are scheduled for a total of 205 sessions at this IAU General Assembly. It is the first time that the IAU General Assembly will be held in Korea. Participants in the General Assembly in Busan will address key topics in contemporary astronomy and assess the latest scientific progress in a number of specialised areas.

Under the theme Astronomy for All, the General Assembly will include seven symposia and 10 multi-session focus meetings, as well as further dedicated meetings organised by the IAU Divisions, Offices, Commissions and Working Groups. There will also be poster sessions and prize lectures given by recipients of prestigious awards in astronomy. A detailed programme is available online.

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The XXXI General Assembly will take place in the Busan Exhibition and Convention Center (BEXCO), hosted by the Korean Astronomical Society (KAS) and the Korea Astronomy and Space Science Institute (KASI).

Journalists and public information officers are invited to sign up for the IAU General Assembly via the pre-registration form. A press office will be in operation on all weekdays.

The public outreach programme will feature numerous public lectures, including one on Imaging a Supermassive Black Hole given by Sheperd Doeleman, founding director of the Event Horizon Telescope. Another public lecture, on The State of the Universe, will be given by Brian Schmidt, who shared the 2011 Nobel Prize in Physics for the discovery that the expansion of the Universe is accelerating.

Besides the events at BEXCO, several additional public lectures are planned during the assembly at Busan National Science Museum to promote communication between astronomers and the local community. There will also be a star party in BEXCO hosted by the Korean Amateur Astronomical Society (KAAS, Busan branch), several tours of the local area, lectures organised by the Federation of Busan Science and Technology (FOBST), and a workshop for science educators organised by the Network for Astronomy School Education (NASE).

South Korea's long tradition in astronomy dates back to ancient times, with star-like marks carved in prehistoric structures, and over 20 000 records of astronomical observations having been passed down since the 1st century BCE. Cheomseongdae Observatory, built in 663 CE, is one of the oldest observatories in the world.

Although political turmoil hindered astronomy in South Korea at the start of the 20th century, it is now thriving again, and the country contributes to many global research efforts in the field. In 2015 KASI installed the Korea Microlensing Telescope Network (KMTNet), which offers 24-hour continuous monitoring of astronomical objects in the southern hemisphere, with a particular interest in Earth-like habitable planets. KASI also contributes to several international collaborations, including the Atacama Large Millimeter/submillimeter Array (ALMA), the International Gemini Observatory, and the Giant Magellan Telescope currently under construction in Chile.

In August 2022 astronomers from all around the globe will gather for two weeks for the IAU General Assembly in Busan, to discuss and evaluate their most recent discoveries and observations, to make decisions on fundamental issues facing astronomy, and to organise international cooperation. Over the course of the General Assembly, participants will also have an opportunity to experience a wide range of cultural activities in South Korea.

14.1. Media

- Jay Pasachoff – Cambridge University Press book
- William H. Waller – The Galactic Inquirer Free
- Young Ae Lee – Donga Science daily newspaper (Republic of Korea)
- Jaewon Ko – Donga Science Online (Republic of Korea)
- Minsoo KIM – Donga Science Online Media (Republic of Korea)
- Dirk Lorenzen – Deutschlandfunk, German Public Radio Radio (Germany)

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– Elizabeth Gibney – Nature (news and features)
– Alexandra Witze – Nature Magazine
– Byungchul Lee – Donga Science magazine (Republic of Korea)
– Chung Jong O – INEWS24 Internet Media (Republic of Korea)
– Soobin Shin – DongA Science Magazine (Republic of Korea)
– Jae Young Jeon – YTN TELEVISION (Republic of Korea)
– Lee Eun Jung – KBS Broadcasting (Republic of Korea)
– Marko Pekkola – Tähdet ja avaruus Popular astronomy magazine (Finland)
– Amanda Kocz – NSF's NOIRLab PIO/National Lab (USA)
– Han Sang-min – Donga Science Science monthly magazine (Republic of Korea)
– Mi-Kyung Kim – Sciencetimes Online Newspaper (Republic of Korea)
– Jung-yun Park – Donga Science online/newspaper (Republic of Korea)
– Moon Dayoung Yonhap –(YNA) News Agency (Republic of Korea)
– Kwon Young Gil – The Environment Daily News Daily Newspaper(On & Offline), Magazine, etc. (Republic of Korea)
– Suk Jung, Kim – IBN NEWS Web Busan (Republic of Korea)
– Bae JongTae – BreakNews On line (Republic of Korea)
– Won-cheol Choi – Nocutnews Online Media (Republic of Korea)
– Lars Lindberg Christensen – IAU/NSF's NOIRLab IAU Denmark
– Laura Hiscott – IAU/NSF's NOIRLab IAU (UK)
– Jiwon Kang – Pusan National University Journal (Republic of Korea)
– Jisoo Park – Ewha Media (https://ewha.biz/) online media (Republic of Korea)
– David Vaccaro – Excelsior Space (USA)

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