

CHAPTER I

THIRTIETH GENERAL ASSEMBLY

INAUGURAL CEREMONY

Monday, 20 August 2018, 16:30-18:00

Austria Center, Vienna

1. Opening Event

The XXXth General Assembly was opened by Anneliese Haika from the Local Organizing Committee and National Organizing Committee at the Austria Center, following a musical introduction by the Habe Quartett.

Welcome Addresses were given by the following dignitaries:

Alexander Van der Bellen, Federal President of the Republic of Austria (by video)

Heinz Fassmann, Austrian Federal Ministry of Education, Science and Research

Ladies and gentleman,

It is a great pleasure to welcome the General Assembly of IAU to Austria. Astronomy and astrophysics have a long history in Austria and current developments are very dynamic. This is especially due to Austria's inclusion in ESO 10 years ago. This dynamics is also true on a European and global scale. With competent and enthusiastic people all around the world and a variety of state-of-the-art instruments ranging from telescopes to satellites, an impressive amount of new knowledge and insight into the universe is gained at a really breath-taking speed.

On the day this note was written, *Nature* published a lead article about long-standing research on the massive centre of our galaxy and its impact on nearby stars. It's a fascinating piece of work as we cannot see the real thing, but measure it and its gravitational impact. This is yet another impressive result and shows what the combination of scientific theory and experiment is capable of.

I am very happy that Austria has established itself as a competent partner in the global scientific landscape and I am sure the years ahead will continue to produce many more interesting results.

Heinz Engl, Rector of the University of Vienna

Dear Colleagues, Ladies and Gentlemen,

As Rector of the University of Vienna, I welcome you to the International Astronomical Union General Assembly in Vienna. The International Astronomical Union (IAU) is the largest association of professional astronomers. It currently has 9623 members from 86 countries. And the University of Vienna is the largest University in the German speaking countries with 93000 students and around 10000 employees (6500 of them academic teachers and researchers) and 19 faculties. Astrophysics is located at a Faculty which we call informally “the Faculty of Exploration,” namely the Faculty of Earth Sciences, Geography and Astronomy. The IAU was founded in 1919 in Brussels. Every 3 years, 3000–4000 IAU members convene for a “General Assembly” (GA). There have been 29 GAs since the foundation of the IAU. The present, the 30th IAU GA, is the first one ever to take place in Vienna following the ones in Prague in 2006, in Rio in 2009, in Beijing in 2012, and finally in Hawai’i in 2015. Very different places indeed, each with its own character; we hope Vienna can compete well both scientifically and as a pleasant town.

The University of Vienna was founded in 1365, 17 years after Prague. Already in the first century of its existence, astronomy (and mathematics) flourished at the University of Vienna: Johannes von Gmunden, Georg von Peurbach, Regiomontanus were all professors here just to mention a few famous ones. Thus, Vienna was important in preparing the Copernican view of the world. And we should also remember that Johannes Kepler was active in cities not far from Vienna, namely Graz, Linz (where the current University is named after him) and finally Prague.

To jump over a few centuries, let me mention that astronomy and astrophysics is a quite active and successful department, which the University is proud of. A big boost to astrophysics, which also enabled us to make a few excellent hirings, was given by Austria joining ESO a few years ago. As a mathematician, I was involved in the negotiations and also initiated a large mathematical project on adaptive optics. Hence, I am closer to the field of your conference than at usual welcome speeches by a Rector.

Thus, I give you a special welcome, thank the IAU for holding their GA here and especially thank the local organizers under the leadership of Prof. Gerhard Hensler for all the hard work they have done and will still be doing. Have a nice stay in Vienna.

Manuel Guedel, President of the Austrian Soc. of A&A

Welcome to Austria, welcome to Vienna, and welcome to the General Assembly of the International Astronomical Union!

The Austrian Society for Astronomy and Astrophysics (OeGAA) is the proposing organization for the IAU GA 2018; we are proud of seeing a large international community of astronomers meeting in Vienna to exchange new astronomical results.

Astronomy in Austria has seen a rapid growth over the past two decades; its researchers work at the cutting edge of science, in areas such as solar physics, solar system research, exoplanets, star formation and stellar evolution, or galaxy formation and evolution. The OeGAA acts as the umbrella organization representing the interests of our scientists. A first culmination and in fact a top priority of OeGAA was the accession of Austria to ESO a decade ago, in 2008; our new membership in turn motivated universities to announce several new astronomy professorships, and the government and our universities to support the joint initiative of our astronomical

institutes to contribute to three instruments for ESO's Extremely Large Telescope (ELT), two first-light instruments among them.

Austria also enjoys a long tradition in developing payload components for space missions and observatories, both for solar-system research and astrophysics. ESA is our closest partner for such projects, and national collaborations in payload development have become a standard. But apart from professional astronomers, OeGAA equally takes amateur astronomers and their associations on board. And likewise, it functions as an active link between the government, the public, academic research, and international organizations.

And so the loop closes: After our successful initiative and preparations led by our member Gerhard Hensler, we are glad to finally reach the culmination of the largest astronomical gathering this country has seen, the IAU GA 2018. I thank the IAU for a productive partnership over the past several years, and I wish you all enjoyable days in Vienna and fruitful scientific discussions!

A musical interlude followed.

2. Opening Address

Dr. Silvia Torres-Peimbert, IAU President

Dr. Heinz Fassmann, Austrian Federal Minister of Education, Science and Research, Dr. Heinz Engl, Rector of the University of Vienna, Prof. Manuel Guedel, President of the Austrian Soc. of A&A, Prof. Gerhard Hensler, Head of the National Organizing Committee, National Representatives, Dr. Heide Heckman, International Science Council, Mrs. Patricia Gruber, Gruber Foundation, IAU members and invited participants: Dear colleagues and friends, I have the honor of welcoming you to the XXX General Assembly of the International Astronomical Union. We have come to meet in Vienna in this wonderful city and its rich cultural heritage. It is inspiring to be in the same place where so many talented artists and scientists flourished and are presently active.

In this meeting where more than 3,000 participants have registered from 89 countries, we re-unite again, of course to meet old friends and make new acquaintances. Key topics in contemporary astronomy will be addressed, and the latest scientific progress in a number of specialised areas will be presented. There will be an exciting exchange of scientific knowledge. This conference will, no doubt, stimulate discussion in cutting-edge astronomy in the different fields where it is being advanced; and more importantly it will encourage: international communication, exchange of ideas and consolidate collaborations resulting in important advancements for the astronomical community and beyond.

This meeting is about an IAU which is very actively creating for itself a future relevant for its next 100 years of existence. The community of astronomers is indeed an international community. We can move with enormous freedom around the world, work in different countries, and the national barriers are not strong limitations to what we do. This is a wonderful privilege that we have in this time and in our area of research.

The program includes seven Symposia and fifteen Focus Meetings that cover a wide spectrum of contemporary astrophysics. There will be Division Meetings to facilitate

participants to share their work with the rest of our colleagues, as well as Commissions and Working Groups meetings where members will continue their scientific and organizational dialogs. Please be aware that each of these activities has secured time slots for Poster sessions which we encourage you not to miss.

In addition to the Special Session on the General relativistic effects in stellar orbits around the Galactic Center black hole that has just taken place, there will be other plenary sessions where all of you are invited to attend; there will be three Invited Discourses, and the Gruber Prize talk. These plenary sessions have been designed to cover different topics of current development. Furthermore, for each Symposium its scientific organizing committee has selected plenary talks to share with us the exciting new results in its field of interest. Among the general activities there will be lunch meetings devoted to issues of interest to Young Astronomers and to Women in Astronomy.

We met 3 years ago, and in this period many changes have taken place in the organization: we will propose a set of modifications to the Statutes, Bye-laws and Working Rules that try to capture the ever-changing needs of this society. There are 10 new National Members, and about 1000 new Regular Individual Members from around the world that will join the Union. And as is customary in these meetings, a set of Resolutions will be presented to you for approval.

We have been very concerned about including younger astronomers in our organization. For this purpose, among the changes in statutes we have proposed to create a new category of membership, Junior Member, to include astronomers that have recently obtained their PhD, for a duration of up to 6 years in this class. By the way, this increment on membership will not represent an increase in dues.

Upon approval of this proposal, we can welcome 352 Junior Members to the Union. We propose to establish a Young Astronomers Working Group to address their concerns. To further encourage interest from young astronomers to the IAU we established in 2016 a new prize, called the IAU PhD Prize, to recognise outstanding scientific achievement in astrophysics around the world. Each IAU Division will, once a year, have the opportunity to award its own prize to the candidate it feels has carried out the most remarkable work in the previous year. In addition, a separate prize is available to be awarded to applicants from developing countries. So far, 19 outstanding young astronomers have been selected to receive this award.

As you all know, this General Assembly is very special, we commemorate the first 100 years of existence of the International Astronomical Union which was founded in 1919. The Union is an old organization that has renewed itself continuously and has extended its activities to preserve and increase its value to the community. To mark this important milestone one of the seven symposia is dedicated to review the history and accomplishments of the IAU. On Monday 27, following the Symposium 349 Plenary talk, a Centennial Ceremony will take place to which all of you are invited. In this building an extraordinary exhibit has been set up highlighting the last one hundred years of astronomical progress, Under one sky, Above and Beyond. This exhibit is designed to be transported to various locations over the next year, starting with the opening of the anniversary celebrations in Brussels on 11 and 12 of April. To commemorate this achievement, the IAU is organising a year-long jubilee under the central theme "IAU 100 years - Under One Sky". It includes an extensive set of activities to be carried out around the world, for the purpose of increasing awareness of a century of astronomical

discoveries as well as for supporting and improving the use of astronomy as a tool for education, development and diplomacy. We invite you all to participate and extend this celebration in your home country.

Since 2009 the IAU transformed itself from an organization with a largely internal focus emphasizing meetings and events for its members to one more involved in education and outreach to the general public. To this effect the Astronomy for Development Strategic Plan for 2010–2020 approved in 2009 and extended in 2015 gave rise to the Office of Astronomy for Development in Cape Town; similarly, the Office of Astronomy Outreach in Tokyo, was established and the virtual Office for Young Astronomers that encompasses the International School of Young Astronomers was formalized in Oslo. In these three cases, we receive generous support from the host countries. On this occasion we are proposing an integral project, the Strategic Plan 2020–2030. It is not just an update of the existing “Astronomy for Development Strategic Plan 2010–2020,” rather it is an attempt to promote all the activities of the Union in the next decade.

In the exhibition areas there are displays from our institutions and from the instrumentation companies that sponsor this event. Also, there is the travelling international exhibition Inspiring Stars to be inaugurated on Wednesday, designed to highlight, support, and promote inclusive initiatives to encourage equality of participation in outreach and teaching, and at a professional level in the field of astronomy.

Outside of this Convention Center, in different parts of the City of Vienna a large array of different astronomical activities for the general public have been organized: Stargazing Parties; a Public talk at the Austrian Academy of Sciences; Public Talks at the Vienna Planetarium; an International Teacher Training Workshop; Astronomy Youth Day; Gazing into the Cosmos; Exhibition Our Place in Space; Exhibition and Talk on Light Pollution.

The mobile app and the on-line newspaper “Keplersche Nachrichten” or “Kepler’s News” will provide us with the latest news, useful information, including the daily schedule and updates needed for business meetings.

On behalf of the International Astronomical Union, let me thank most heartily the National and Local Organizing Committees that have secured for us this beautiful convention center which provides a very convenient environment to carry out our scientific discussions; and also, for the very exciting social activities that have been organized for us to enjoy. I am sure that all the participants will find in this XXX General Assembly many stimulating activities that altogether will make it a memorable experience. Let me wish you a very fruitful scientific meeting.

3. Welcome Remarks

Dr. Piero Benvenuti, IAU General Secretary

Dear Colleagues,

My warmest welcome to the XXXth General Assembly of the International Astronomical Union!

The General Assemblies offer a great opportunity to learn about the most recent and interesting results in all the fields of our beautiful Science, but they are also an

occasion to meet old friends, get to know new colleagues – especially the young ones – to exchange ideas and to strengthen or start international collaborations.

If we look back to previous GAs, we can say that each one has been characterised by something special for which it is remembered. Although we should wait for the conclusion of the XXXth GA to know how it will be labelled in the history of the IAU, we can anticipate some features that will definitely make the Vienna General Assembly unique.

First of all, the XXXth GA will mark the admission in the Union of more than 300 Junior Members, the new category of individual members – to be approved by the Assembly – that formally allows fresh PhD researchers to actively participate in the life of the IAU. To highlight the special attention that the Executive Committee and the Division Presidents has given to the young generation of astronomers, the GA will salute the 19 winners of the IAU PhD Prize – an award that began in 2016.

Together with the Junior Members, we will welcome more than 1000 new Individual Members, and it is encouraging to note that the gender balance of the new cohort is as high as 30%: a sign that our efforts to promote an egalitarian participation in Astronomy has begun to show its effects. Our community is continuously growing and in the right direction!

I believe the Vienna GA will also be remembered for the exceptionally high number (10!) of new National Members that will join the Union: some of them are re-entering after having been suspended for some years, but the majority are indeed new ones.

An additional element of interest will be the approval of the IAU Strategic Plan 2020–2030: it is not just an update of the existing “Astronomy for Development Strategic Plan 2010–2020,” rather it is an attempt to project all the activities of the Union in the next decade. Among the noteworthy new goals of the Plan is the fostering of inclusiveness in the advancement of Astronomy and the proposed creation of the Office for Astronomy Education.

I am confident that all these points, together with great scientific meetings and the foretaste of the celebrations for the 100 years of the IAU (1919–2019) – better described in the welcome address of our President – will make the XXXth a memorable event!

4. Gruber Foundation Presentations

General Secretary Piero Benvenuti introduced representatives from the Gruber Foundation for the Gruber Prize celebrations. The primary goal of the IAU is the development of astronomy worldwide, and so the IAU is pleased to collaborate with the Gruber Foundation on the Cosmology Prize. The Cosmology Prize was established in 2000 as the first Gruber international prize. The Foundation’s prize program now presents three annual \$500,000 prizes in the fields of: Cosmology; Genetics; and Neuroscience. Each prize recognizes achievements and discoveries that produce fundamental shifts in human knowledge and culture.

The 2018 Cosmology Prize was awarded to the Planck Team and to Jean-Loup Puget and Nazzareno Mandolesi, the leaders of the High Frequency Instrument and Low Frequency Instrument consortia, for mapping the temperature and polarisation

of the cosmic microwave background (CMB) radiation using the ESA Planck spacecraft. The winners were presented their gold medals and gave their thanks for the awards.

The collaboration between the Gruber Foundation and the IAU consists not only of the Cosmology Prize, but also an annual \$50,000 Fellowship. The fellowship is administered by the IAU and awarded competitively to a postdoctoral researcher, with the stipend to be used to further his or her research.

The Gruber Fellow postdoctoral awards were announced for the following winners:

2016: Maria Nikolayevna Drozdovskaya and Laetitia Delrez

2017: Khaled Said

2018: Dary Alexandra Ruiz-Rodriguez and Néstor Espinoza

5. PhD Prize Presentations

President Silvia Torres-Peimbert and General Secretary Piero Benvenuti introduced the PhD prizewinners from 2016 and 2017 selected by each Division, and awarded them Certificates. The winners are:

2016:

Division B: Adrian Sven Hamers

Division D: Eric Robert Coughlin

Division E: Shinsuke Takasao

Division F (shared): Laura Kreidberg and Caroline Morley

Division G: Morgan MacLeod

Division H: Long Wang

Division J: Fabio Pacucci

Non-OECD Country: Yang Huang

2017:

Division A : Gisela Ortiz Leon

Division B : Barak Zackay

Division D : Guillaume Voisin

Division E : Christopher Moore

Division F : Megan Ansdell

Division G : Gaël Buldgen

Division H : Georgia Virginia Panopoulou

Division J : Max Gronke

Non-OECD Country : Siyao Xu

The IAU applauds their excellent work.

6. Presentation by the International Science Council

Dr. Heide Hackmann gave a brief presentation on the International Science Council (ISC), created in 2018 as the result of a merger between the International Council for Science (ICSU) and the International Social Science Council (ISSC). The IAU is a member organization of the ISC, which aims to act as the global voice for science and to advance science as a global public good.

7. Close of Ceremony

Following another musical performance, Gerhard Hensler moved to end the Opening Ceremony and welcomed the General Assembly to the reception that followed.

8. Presentation of Organizers, Supporters, Sponsors and Exhibitors

The IAU and Organising Committees gratefully acknowledge the invaluable support of the following institutions and organisations:

Organisers

International Astronomical Union
University of Vienna
Austrian Academy of Sciences
Austrian Society for Astronomy and Astrophysics

Supporters

Lufthansa
Stadt Wien
Austrian Federal Ministry of Education, Science and Research

Sponsors: Platinum

Vienna Convention Bureau

Sponsors: Gold

Astronomy & Astrophysics
German Astronomical Society
Naturhistorisches Museum Wien

Sponsors: Silver

Korean Astronomy and Space Science Institute
National Academy of Sciences
Chandra X-ray Observatory
National Science Foundation
IOP Publishing
National Astronomical Observatory of Japan
Oxford University Press
Royal Society Publishing

Sponsors: Bronze

The Norwegian Academy of Science and Letters
Nature Astronomy
QYHCCD
Korean Astronomical Society
RadioNet

Sponsors: Friend

Kuffner Sternwarte
Vienna Snowglobe

Exhibitors

DSI - SOFIA
European Solar Telescope
National Radio Astronomy Observatory

International Virtual Observatory Alliance
 Korean Astronomical Society
 Korean Astronomy and Space Science Institute
 Mexico
 European Space Agency
 MeerKAT
 Australian Astronomy
 National Science Foundation
 Cherenkov Telescope Array Observatory
 National Astronomical Observatory of Japan
 Long Baseline Observatory
 SARAO
 European Southern Observatory
 Association of Universities for Research in Astronomy
 Institute of Space and Astronautical Science & Japan Aerospace Exploration Agency
 Square Kilometer Array Telescope
 Green Bank Observatory
 IPAC at Caltech
 Chinese Astronomical Society
 Gravitational-Wave Astronomy
 International Astronomical Union
 Chandra X-Ray Observatory
 Southern African Large Telescope
 AAO - SCAR AAA
 Astronomy & Astrophysics
 Cambridge University Press

9. Additional Welcome Speeches

Besides the Welcome Speeches during the Opening Ceremony, there were also greetings in the IAU GA Newspaper from the following dignitaries.

Gerhard Hensler, Chair of the Local Organizing Committee of the IAU XXXth General Assembly

Dear friends and colleagues,

Dear participants at the XXXth General Assembly of the IAU, welcome to Vienna, welcome to the General Assembly of the IAU. These GAs are by far the largest international meetings of astronomers and astrophysicists. Therefore, the Austrian astronomers were delighted and are proud that the Executive Committee of the IAU decided in 2012 at the XXVIIIth GA in Beijing to award the GA 2018 to Vienna.

While the Austrian astronomy has a long tradition beginning at the University of Vienna in the 15th century and highlighted continuously by famous astronomers and by outstanding physicists who contributed substantially to our understanding of the Universe, this GA is special for the contemporary Austrian Astronomers, because it coincides with the 10th anniversary of Austria's accession to ESO. Moreover, this GA is unique to all astronomers as it is closest to the centennial birthday of the IAU next year, so that its pre-celebration includes special events such as the Symposium 349, the centennial ceremony, and an exhibition of astronomical detections and development over this past century.

Although this GA hosts 7 symposia, 15 Focus Meetings and the 9 Division Days, it was impossible to cover the whole spectrum of astronomical topics equally and to fulfill the taste of the entire astronomical community. The IAU Executive Committee and the Division Presidents have done their best to select the most promising of almost 70 meeting proposals. And we, the local organizers, are doing our best to accommodate the meetings and make sure you have the best means to present your scientific research and enjoy the GA. As a special measure to popularize astronomy, for the first time an Inclusion Day is added to the scientific GA. Moreover, several public outreach activities will attract a wide range of people from teacher training to the KinderUni, public talks and night-sky observations.

One cannot foresee all kinds of pitfalls, but we can ensure you that all LOC members and the numerous volunteers are ready to help you solve any problem you might face. We are grateful for your visit and wish you not only fruitful scientific meetings with friends and colleagues in an exciting common atmosphere, but also an enjoyable stay in Vienna, probably with visits to the marvelous landscape of Vienna and Austria and to other attractive cities in Central Europe.

Anton Zeilinger, President of the Austrian Academy of Sciences

Professional astronomy in Vienna shares quite a long common history with the Austrian Academy of Sciences. The building that has served as the Academy's main base since 1857 used to be before the main building of the University of Vienna. On top of this building, the first state-owned astronomical observatory was erected in 1755 at the request of the Jesuit priest Maximilian Hell, who contributed to the measurement of the astronomical unit in 1769.

The Austrian Academy of Sciences has promoted research and outreach in astronomy for many years. It also established a commission for astronomy, and one of its largest institutes, the IWF (Institut für Weltraumforschung) in Graz, is devoted to space research, employing more than 100 researchers from many countries.

As a researcher in the field of quantum mechanics, I have been using telescopes including TNG (Telescopio Nazionale Galileo) and WHT (William Herschel Telescope), both on La Palma in the Canary Islands for several experiments on quantum entanglement. I became quite impressed by the technical achievements of astronomical instruments and by the skills of the scientists and engineers designing and operating them.

The General Assembly of the International Astronomical Union to Vienna will witness many novel achievements leading to an understanding of astronomy and astrophysics unimaginable at earlier times. I trust that the meeting will define a wealth of new opportunities which will lead to unprecedented vistas of the Universe in the future.

Simonetta Di Pippo, Director of the United Nations Office for Outer Space Affairs

Welcome to the XXXth General Assembly of the International Astronomical Union! In addition to hosting this year's General Assembly, Vienna is also the home of the United Nations Office for Outer Space Affairs (UNOOSA).

At UNOOSA, we work to bring the benefits of space to humankind by promoting international cooperation in the peaceful uses of outer space and the use of space science and technology for sustainable development.

When it comes to space, we must work together. International cooperation is vital for overcoming barriers and building bridges, and empowering everyone by sharing higher visions, objectives and information. UNOOSA and IAU share a commitment to this and collaborate on a number of initiatives. For example, UNOOSA is helping to make astronomy more accessible to the public through the Open Universe initiative, and IAU has been an active contributor to its preparatory activities. IAU works with UNOOSA in the field of near-Earth Objects and preservation of the “dark and silent” skies, for which we are jointly preparing a conference in 2019. UNOOSA is also the secretariat of the Committee on the Peaceful Uses of Outer Space, with which the International Astronomical Union (IAU) engages as an observer.

In short, IAU is a valued partner of UNOOSA, helping us to carry out our mandate to help everyone, everywhere, access space. I look forward to this partnership growing even stronger in the years to come, and I wish you a very successful and enjoyable General Assembly.

Michael Ludwig, Lord Mayor of Vienna

It is my great pleasure that the Austrian community of astronomers and astrophysicists has succeeded to bring the present XXXth General Assembly of the International Astronomical Union to Vienna, following an initiative of Prof. Dr. Gerhard Hensler. This two-week conference - by far the largest one in this field of research - represents also a highlight for Vienna as an international congress metropolis. The Department of Astrophysics of Vienna University plays a central role in organizing this event. Impressive research results are on the agenda of this General Assembly as well as the discussion of major international projects.

Since about 3,000 participants from 88 countries and from all continents are travelling to Vienna - some of them with their families - our city will gladly present itself as a host city with all its splendid sights, with a wide range of cultural and culinary offers, and will hopefully stimulate further visits to Vienna.

I wish the participants in the XXXth General Assembly of the International Astronomical Union 2018 an exciting and fruitful congress and a nice stay in Vienna.