

# Kai'aleleiaka ☀ THE MILKY WAY

Wally Pacholka / [AstroPics.com](#)

## TABLE OF CONTENTS

Exploring the Young Universe .....	<a href="#">2</a>	Stars and Stellar Physics .....	<a href="#">13</a>
Gathering Heritage, Education, and Outreach.....	<a href="#">2</a>	Bringing Present Astrometric Accuracy to Glass Plates of the Past.....	<a href="#">13</a>
Small Objects, Mighty Role in Planetary Science .....	<a href="#">3</a>	Honolulu Weather Forecast.....	<a href="#">14</a>
New Horizons for the James Clerk Maxwell Telescope .....	<a href="#">5</a>	Getting All Wet (or Not) in Hawai'i.....	<a href="#">15</a>
School Days at the General Assembly .....	<a href="#">6</a>	Perambulating Among the Posters.....	<a href="#">16</a>
What Do You Think About Public Outreach in Astronomy? .....	<a href="#">7</a>		
Getting Down to Business .....	<a href="#">8</a>		
Coordinating the Sky.....	<a href="#">10</a>		
Gravitational Wave Astrophysics.....	<a href="#">11</a>		
Honolulu Almanac.....	<a href="#">12</a>		



## INVITED DISCOURSE 2

# Exploring the Young Universe

By YOSHIAKI TANIGUCHI

When was the Milky Way born? How has our galaxy evolved since its formation 10 billion years ago? These are big questions. In order to obtain the answers, we have to explore galaxies in the very young — and hence very remote — universe.

Until the early 1990s, no galaxy beyond redshift  $z = 1$ , corresponding to a light-travel time of about 8 billion years, was found. This posed a serious problem for our understanding of galaxy formation and evolution. Then came two big breakthroughs: the Hubble Space Telescope was launched into orbit, and a new generation of giant telescopes — including the Keck and Gemini twins, the VLT foursome, and Subaru — were constructed on the ground. By the early 2000s, various deep surveys with these new instruments opened a window on the young universe beyond redshift  $z = 5$ , pushing back to within a billion or so years of the Big Bang.

Now we are able to study the global star-formation history in galaxies from very early times to the present day. In my Invited Discourse I will summarize our current understanding of the



### Invited Discourse 2: Exploring the Young Universe

Speaker	Yoshiaki Taniguchi (Ehime University)
Date	Thursday, 6 August
Time	6:00 to 7:30 pm
Location	Ballroom B, Hawai'i Convention Center

formation and evolution of galaxies and offer some thoughts on the fate of the universe.

Aloha and mahalo! ☺

**YOSHIAKI TANIGUCHI** is a Professor at Ehime University in Tokyo, Japan, where he studies star formation in high-redshift galaxies using 8- to 10-meter telescopes, including the National Astronomical Observatory of Japan's Subaru Telescope on Maunakea.

## DIVISION C

# Gathering Heritage, Education, and Outreach

By MARY KAY HEMENWAY

Division C, Education, Outreach and Heritage, has an extensive, multifaceted program planned for its Division meeting. Our first session begins with an invited talk by Virginia Trimble on

the Impact of World War I on astronomy, a topic of broad appeal to this Division. From

### Kai'aleleiaaka THE MILKY WAY

#### EDITORIAL

*Editor in Chief* Rick Fienberg

*Managing Editor* Sarah Reed

*Writers/Editors* Gina Brissenden, Pamela Gay, Inge Heyer, Susanna Kohler, Larry Marschall, Iris Nijman

#### DESIGN & PRODUCTION

*Design Director* Leslie Proudfit

*Designer* Crystal Tinck

#### NEWSPAPER OFFICE

Hawaii Convention Center, Room 302; open Monday to Friday, 8 am to 6 pm (closing at 2 pm on Friday, 14 August).

Email: [newspaper@astronomy2015.org](mailto:newspaper@astronomy2015.org)

Phone: +1 (808) 792-6638. Download PDFs at <http://astronomy2015.org/newspaper>.

 Kai'aleleiaaka (*The Milky Way*) is the official newspaper of the XXIX General Assembly of the International Astronomical Union, 3–14 August 2015, Honolulu, Hawai'i. It is published for the IAU by the American Astronomical Society, which thanks the following organizations for providing staff to work on the newspaper: Astronomical Society of the Pacific, Stratospheric Observatory for Infrared Astronomy, and Universe Awareness at Leiden University. © 2015 AAS, all rights reserved.



2015 is the [International Year of Light](#), and the IAU is spearheading the [Cosmic Light](#) theme. [IAU]

Trimble's presentation, the session moves on to address IAU sponsored projects, including [astroEDU](#) and the [Galileoscope](#). The next session is devoted to outreach projects and is followed by two sessions on education programs and research ranging from preschool to university level.

The Division Meeting continues on Monday, 10 August, with an invited talk by Rajesh Koschhar on the history of astronomy. This session is followed by one on cultural astronomy, which includes presentations from around the world. The Division Meeting will then move on to interdisciplinary themes that span two (or more) Commission topics, such as outreach and history.

Our final session has two invited talks by the leaders of the [IAU Office of Astronomy for Development](#), Kevin Govender, and the

## Division Meeting: Division C Education, Outreach and Heritage

Start date	Friday, 7 August
End date	Monday, 10 August
Oral sessions	Room 312, Hawai'i Convention Center
Posters	Exhibit Hall 1, Hawai'i Convention Center

*For details on presenters, topics, and times see the [online program](#) or [mobile app](#).*

[IAU Office for Astronomy Outreach](#), Sze-leung Cheung. There will also be a talk on the IAU's [Cosmic Light](#) program for the International Year of Light 2015 and a panel discussion to allow the new officers and new Commission presidents of Division C to share their goals and agendas for the future. We are especially interested in describing potential areas of cooperation and partnership to IAU members who are not currently affiliated with a Division, Commission, or Working Group. ♡



MARY KAY HEMENWAY is the outgoing President of IAU Division C. Following her retirement in 2012 as a Senior Lecturer at the University of Texas, Austin, she is currently a Research Fellow at the University. She served six years as Education Officer of the American , 11 years as Secretary to the Board of the Astronomical Society of the Pacific, and a term on the IAU Executive Committee Working Group for the International Year of Astronomy 2009.

## IAU COMMISSION F1

# Small Objects, Mighty Role in Planetary Science

By JIRI BOROVICKA

They are the smallest objects in the solar system, but meteoroids, meteorites, and interplanetary dust particles are important to the planetary sciences. Researchers engaged in meteor

observations, laboratory analysis of meteorites and cosmic dust, and impacts on the Moon and satellite surfaces are a separate community from astronomers observing comets and asteroids.

In recent years, several events occurred that increased the awareness of meteor and meteorite studies. They include the large Chelyabinsk meteor airburst in 2013, which caused widespread damage; the predicted impact of asteroid 2008 TC<sub>3</sub> in Sudan, which produced anomalous, heterogeneous Almahata Sitta meteorites; and the formation of the Carancas impact crater in Peru in 2007.

IAU Commission 22 was established in 1922 to bring together scientists working in this field. Following the restructure of the IAU, its activities will now continue under the auspices of Commission F1, Meteors, Meteorites & Interplanetary Dust:

1. Organization of the Meteoroids conference every three years. The next one will be held in 2016 in Noordwijk, the Netherlands.
2. Maintaining the [IAU Meteor Data Center](#). The center maintains the data on meteor orbits and trajectories and the list



The Chelyabinsk superbolide of 15 February 2013 was not only the most significant meteor event of the last triennium but also the largest impact of a cosmic body on Earth for at least several decades.  
[Aleksandr Ivanov, Kamensk Uralsky]

of recognized meteor showers.

3. Creating scientific nomenclature related to meteor astronomy.
4. Assisting local researchers in the study of important meteor events and small asteroid impacts. Very bright meteor events (superbolides) are relatively rare phenomena, but if they occur in populated areas they cause wide attention, media coverage, and sometimes even panic.
5. Co-organizing meteor-related sessions in larger and more general conferences like URSI, AGU, EPSC, or EGU.
6. Continuing to encourage collaboration between professional and amateur astronomers in the field of meteor and meteorite research. \*



JIRI BOROVICKA is the incoming President of IAU Commission F1, Meteors, Meteorites & Interplanetary Dust, and Chairman of the Council of the Astronomical Institute of the Academy of Sciences of the Czech Republic. He received the honorary Kopal Lectureship from the Czech Astronomical Society in 2014.

## SPLINTER MEETING

# New Horizons for the James Clerk Maxwell Telescope

By HARRIET PARSONS and JESSICA DEMPSEY

The [East Asian Observatory \(EAO\)](#) has forged a new path for the James Clerk Maxwell Telescope (JCMT) following the successful transfer of operations from the United Kingdom's Science and Technology Facilities Council to EAO in March 2015.

Observations immediately resumed with an extremely successful VLBI run with six other telescopes across the globe to form the [Event Horizon Telescope](#). This project aims to observe nearby supermassive black holes to better understand the Schwarzschild radius. During the initial science semester the response from the new EAO regional community, alongside partners in the U.K. and Canada, was beyond expectations — oversubscription rates were better than a factor of five.

Partners in the U.K. and Canada, was beyond expectations — oversubscription rates were better than a factor of five.

The EAO has ambitious plans for the JCMT, starting with bringing additional elements for its SCUBA-2 instrument online as soon as possible and embarking on new long-term legacy science programs at the end of 2015. Today's Splinter Meeting will conclude with a panel discussion on future instrumentation, and we will talk about the plans that EAO and its partners have for continuing to keep the JCMT at the cutting edge of submillimeter science. 

Congratulations  
to

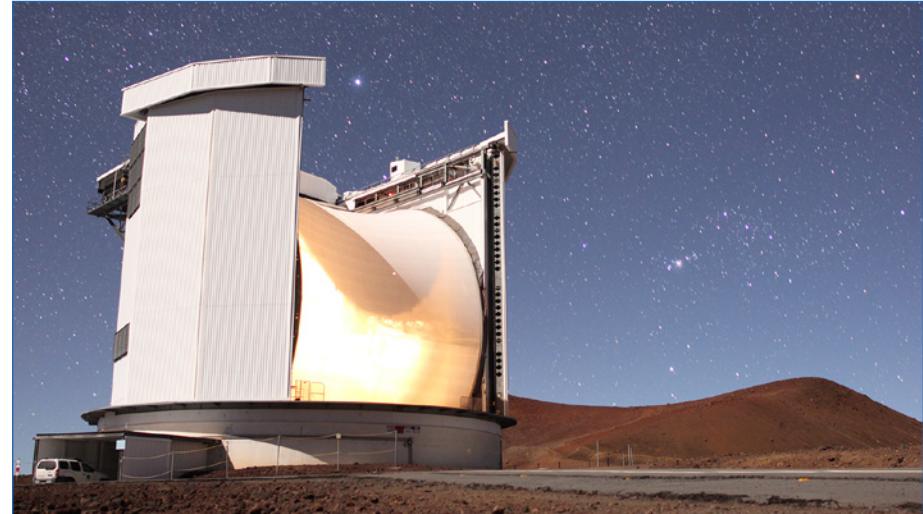


Amanda Heiderman!



You have won a dinner buffet for two (value: \$104) at Prince Court at the Hawai'i Prince Hotel 100 Holomoana St.

Prizes can be redeemed, and raffles can be entered, at Exhibit Hall Booth 336



The East Asian Observatory's James Clerk Maxwell Telescope. [EAO/Will Montgomerie]



HARRIET PARSONS is Support Astronomer for the JCMT. Her research focuses on massive star formation, particularly in the environments within giant molecular clouds. JESSICA DEMPSEY is EAO/JCMT Operations Manager. She specializes in submillimeter site characterization and calibration and in large-scale CO surveys of the Milky Way.

## Splinter Meeting

### New Horizons with the East Asian Observatory: Latest Science from the James Clerk Maxwell Telescope

Date Thursday, 6 August

Time 6:00 to 8:00 pm

Location Room 312, Hawai'i Convention Center

## EDUCATION & PUBLIC OUTREACH EVENT

# School Days at the General Assembly

Students, parents, and teachers explore astronomy in the IAU Exhibit Hall.

By GINA BRISSENDEN, *Kai'aleleiaka*

On Wednesday, 4 August, more than 200 local students, along with their parents, teachers, and councilors, visited the IAU Exhibit Hall to meet astronomers and explore the universe through hands-on activities. Participants came from primary and secondary schools, homeschools, and camps across O'ahu. Some children of General Assembly attendees also participated.

During the 90-minute event, students circulated in small groups through a dozen different activity stations at exhibitors' booths. At each stop, students and grown-ups alike participated in engaging activities exploring a variety of astronomy topics, including different types of light, making pulsars, playing with polarization, and more. Students also learned about many different telescopes and observatories, as well as careers in astronomy. Importantly, students were able to talk with real scientists about the work they do.

Ana, a 7th-grade student at St. Anthony School, was visiting with her grandmother. When asked the favorite thing she learned, she said, "I didn't understand the universe was so old!" She learned about the Big Bang during a Hubble-expansion activity conducted at the Gemini Observatory booth. Her grandmother, Jane, added, "We're getting some great ideas for Ana's science fair."

Nicole, a homeschool student, said the favorite thing she



Ana, a 7th grader, explores the expansion of the universe. [IAU/B. Tafreshi, [twanight.org](http://twanight.org)]



Excited students show off their newly acquired Galileoscopes, which all participants were given at the end of the event. [IAU/B. Tafreshi, [twanight.org](http://twanight.org)]

learned was that "supernovas can result in neutron stars — I just thought they exploded!" She picked up that new kernel of knowledge at the NASA Fermi/Swift booth, where she made a model of a pulsar.

Anderson, a parent accompanying a group of students from Kapolei and Kaiser High Schools that included his son, said he already knew quite a bit of astronomy but still learned something new at the National Optical Astronomy Observatory's "Painting with Polarized Light" activity. "I work with polarized filters," he said, "and I didn't understand how they worked till now!"

Melan Hebert-Terleckyj of [Associated Universities, Inc.](#), which sponsored the event, said that interacting with the visiting students "was the most fun part of being an exhibitor."

Look for more students in the Exhibit Hall next Wednesday! ☀

# What Do You Think About Public Outreach in Astronomy?

By LISA DANG, MARTA ENTRADAS & PEDRO RUSSO

Throughout human history, astronomy has had significant impact on the way we view our world, and it continues to influence our everyday life today. It is therefore important to share our advancing knowledge about our universe with the general public.

There have been several studies exploring the factors that motivate or discourage scientists from taking part in public-engagement initiatives. Yet, to date, there has been no global study on astronomers' views on public engagement. This year's IAU General Assembly, gathering more than 3,000 astronomers from around the world, is an ideal opportunity to do so.

Leiden Observatory in the Netherlands, ISCTE–Lisbon University Institute in Portugal, and the London School of Economics in the U.K. are running an [online survey](#) to investigate different factors that influence professional astronomers in participating in public-engagement activities, the methods that they use, and the relationship between astronomers and public-information officers. Due to the

Congratulations  
to

**Amri Wandel!**



You have won  
dinner for two (value: \$150) at  
Azure Restaurant at the Royal Hawaiian  
2259 Kalākaua Ave.

Prizes can be redeemed, and raffles can  
be entered, at Exhibit Hall Booth 336



## WHAT DO YOU THINK ABOUT PUBLIC OUTREACH IN ASTRONOMY?

LET'S MAKE PUBLIC OUTREACH AN EFFECTIVE PRACTICE IN OUR COMMUNITY!



Please take part in the survey:  
[www.unawe.org/outreach/](http://www.unawe.org/outreach/)

[Universe Awareness]

importance of encouraging scientists to take part in engagement activities, this study will serve to target the main barriers that are holding people back. It will also inform actions that may need to be made by policy makers and others in authoritative positions in order to better facilitate public engagement.

In August 2012, during the IAU General Assembly in Beijing, [Universe Awareness \(UNAWE\)](#), in partnership with [the IAU Office of Astronomy for Development \(OAD\)](#), performed individual interviews with 61 delegates selected at random. The objective was to investigate when they first became interested in astronomy and their views on education and public outreach. Additional participants were solicited by email using the Canadian Astronomical Society's (CASCA) membership mailing list between December 2012 and January 2013. A total of 155 responses were collected. This [explorative study](#) revealed that the majority of the respondents first developed an interest for astronomy at primary-school age, but the decision to undertake

a career in astronomy often came during late adolescence. The study also revealed that many astronomers think there should be a larger percentage of their research funding invested into outreach activities, calling for a change in grant policies.

From this explorative study, we now wish to have an extensive study focusing on the cause of participation in public-engagement initiatives among the astronomy community, and the methods that are used and seen to be effective. Let's make public outreach an effective practice in our community. Your participation in the survey is important! \*



LISA DANG is an undergraduate physics student at McGill University in Montreal, Canada, and an intern at Leiden University, the Netherlands. MARTA ENTRADAS is a postdoctoral researcher at ISCTE–Lisbon University Institute, Portugal, and a visiting scholar at the London School of Economics, U.K., and Cornell University, U.S. PEDRO RUSSO is International Project Manager for UNAWE at Leiden University and incoming President of IAU Commission C2, Communicating Astronomy with the Public.

## GA BUSINESS MEETING I

# Getting Down to Business

By PAMELA L. GAY, *Kai'aleleiaka*

The first Business Meeting of the IAU XXIX General Assembly took place on Tuesday, 4 August. The Union's more than 70 National Representatives were seated together and provided green paper to use when voting, while other members scattered themselves about the room. Hosted by IAU President Norio Kaifu and IAU General Secretary Thierry Montmerle, this members-only session addressed the activities of the past three years and highlighted upcoming votes that will affect the next triennium and beyond.

The only vote held during this meeting confirmed Colombia as the IAU's newest National Member. Only nations that had paid their dues in full were eligible to vote, and those that had not were encouraged to pay before the second Business Meeting on Thursday, 13 August.

Montmerle reflected on the IAU's "aloha" spirit and on how the organization dares to engage with our community's challenges, cares through its support of education and global development, and shares through its public communications. This "we dare, we care, we share" attitude is personified by the highly successful [IAU Office of Astronomy for Development](#), the [IAU Office for](#)

[Astronomy Outreach](#), and the new Office for Young Astronomers, established by the IAU and the Norwegian Academy of Science and Letters.

Additional activities included examining the budget, reviewing the website overhaul, and discussing Commission reform. Regarding the latter, 40 existing Commissions are being transformed into 35 dynamic new Commissions. Henceforth, members will also be able to join and leave Commissions freely.

Looking ahead to next week's second Business Meeting, National Representatives were reminded that they'll be electing new members of the Executive and Nominating Committees. They'll also select the site for the XXXI General Assembly in



The Republic of Colombia is the IAU's newest – and 74th – National Member. [Photo-illustration: Leslie Proudfit]

2021. Candidates are Montreal, Canada; Santiago, Chile; Busan, Korea; and Cape Town, South Africa.

These votes are separate from the general membership's votes on Resolutions. For more information about those, see "General Assembly Resolutions Finalized" in *Kai'aleleiaka* Issue 3, page 11. To learn more about role and work of the IAU National Representatives, see "Votes, Rules & Dues: A World of Policy" in Issue 2, page 7.✿



Honolulu at dusk. [IAU/B. Tafreshi, [twanight.org](http://twanight.org)]

### Business Meeting of the General Assembly II (IAU Members Only)

Date	Thursday, 13 August
Time	4:00 to 6:00 pm
Location	Ballroom B, Hawai'i Convention Center

# Coordinating the Sky

By ANTHONY G. A. BROWN

Commission A1, Astrometry, coordinates research related to the celestial coordinate system and the positions, proper motions, and parallaxes of celestial objects. The determination of accurate distances — the basis for astrophysical science — is one of the most fundamental and important tasks of astrometry.

C.A1 coordinates ground- and space-based observing programs and promotes education in astrometry. This spans a vast range of objects, from the Earth-Moon system to quasars at cosmological distances, as well as a large range of techniques with

the common goal of enhancing our understanding of the motions of celestial objects and their measurement in coordinate systems.

The International Celestial Reference Frame (ICRF) defines coordinates on the sky. Currently in its second version, the ICRF2 is based on the positions of 3,414 compact extragalactic radio sources as observed with very-long-baseline interferometry (VLBI). Work on the ICRF3 is currently under way.

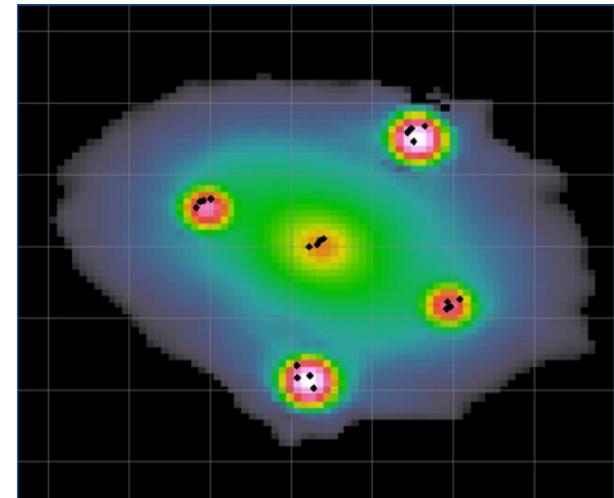
The European Space Agency's astrometric [Gaia](#) satellite began regular survey observations in mid-2014. The mission, which

will last at least five years, will revolutionize the entire field of astronomy, providing trigonometric parallaxes to about a billion stars. Linked to galaxies and quasars, the Gaia coordinate system will be inertial, providing absolute parallaxes and proper motions.

However, the Gaia coordinate system has three degrees of freedom for its orientation. A link to the current ICRF system is mandatory to maintain the continuity of celestial coordinates. A major task of the Commission A1 will be to coordinate efforts for this radio-optical coordinate-system alignment, with the goal of providing language for an IAU Resolution to define the future coordinate system on the sky.

C.A1 will be involved in obtaining more closely spaced, fainter objects in the celestial coordinate system, and in extending the celestial coordinate system to other wavelengths, such as infrared and X-ray.

Of particular importance is the [Large Synoptic Survey Telescope \(LSST\)](#). Our Commission will assist in providing the best coordinates on the sky from all astrometry-related projects



Gravitationally lensed quasar Q2237+030, the Einstein Cross, is shown with Gaia astrometric positions placed over Hubble Space Telescope images. The grid spacing is 0.5 arcsecond, and the astrometric accuracy is around 0.1 arcsecond. [ESA]

**Keep  
in  
Touch!**

Enhance and share your experience at the IAU General Assembly via social media!

Use the hashtag #IAU2015 on Twitter, Facebook, and Instagram.



#IAU2015

to benefit all astronomers requiring reference stars on the IAU-adopted coordinate system.

Astrometry impacts many areas of astronomy, from our solar system, to the detection and characterization of exoplanets, to the dynamics of our galaxy — especially near the supermassive black hole in the galactic center. The determination of mass — another key astrophysical property — relies on astrometric observations, e.g., by following the orbits of minor planets or multiple stars. Accurate observations today enable the detection of motions of stars within globular clusters and the motion of individual members of our Local Group of galaxies, forming the basis for related dynamical studies.

## IAU COMMISSION D1

# Gravitational Wave Astrophysics

By NEIL GEHRELS

The next 10 years will see major steps forward in the search for, and detection of, gravitational waves, as the field transitions from one dominated by instrumentation development to one focused on astrophysics.

The Laser Interferometer Gravitational-Wave Observatory (LIGO) and the VIRGO interferometer will begin operating their advanced detectors by 2017 with sensitivity to detect neutron-star binary mergers to 150 megaparsecs (Mpc) and by 2020 to 200 Mpc. At the same time, the International Pulsar Timing Array will be observing a sufficient number of millisecond pulsars with sufficient accuracy to begin detecting binary supermassive black holes in very-low-frequency gravitational waves.

The Laser Interferometer Space Antenna (LISA) Pathfinder mission will launch in 2015 and demonstrate the drag-free control and laser-interferometry technologies needed for the European Space Agency's eLISA mission, which will detect gravitational waves from a host of galactic and extragalactic objects.

C.A1 will coordinate synergy with other areas of astronomy, such as ephemerides and dynamical astronomy, fundamental physics, and geodesy. Astrometry is a source of astrophysical information, and coordinating the synergy between primary astrometric data and applications relevant for astronomy and physics in general is a major goal of the Commission. ☺



ANTHONY BROWN, who calls another tropical paradise (Aruba) home, is a staff member at Leiden Observatory, the Netherlands. He chairs the European consortium responsible for processing and publishing data from the Gaia mission. Brown thanks Norbert Zacharias for assistance with this article.

iKon XL NEW  
Very large area CCD cameras  
Extreme performance, no hassle

Proprietary NEW technology

- 90°C TE cooled large area sensors
- NO liquid nitrogen
- NO cryo-cooler
- NO re-pumping

Also featuring:

- 16 Megapixel back-illuminated sensors
- Extended Dynamic Range technology
- Lowest available read noise
- User-replaceable shutters

[andor.com](http://andor.com)

ANDOR  
an Oxford Instruments company



Aerial view of the LIGO interferometer at Hanford, Washington, USA. [LIGO Laboratory]

There is great benefit in observing gravitational-wave sources in all bands of the electromagnetic spectrum with both ground- and space-based telescopes, and already astronomers are preparing for joint observations with the various gravitational-wave detectors. The process of integrating gravitational-wave observations into mainstream astronomy will require both sides to learn about the other's capabilities and needs.

New [IAU Commission D1, Gravitational Wave Astrophysics](#), will provide a forum to bring these diverse communities together to share their expertise and to plan for future observations and interactions. Specific milestones and work plans for C.D1 include these:

1. To expand knowledge of gravitational-wave astrophysics to the broader IAU community.
2. To stimulate and support cross-disciplinary exchanges and discussions among astronomers and gravitational wave physicists, in order to share expertise and to maximize the science return of the gravitational wave detections.
3. To develop and strengthen the connection between gravitational wave detectors and electromagnetic observatories

by supporting common programs of observations, and information and data sharing.

4. To support education and development of young researchers working on or interested in gravitational wave astronomy.
5. To start initiatives with the goal to increase the participation of gender and under-represented minorities in the field of gravitational wave astronomy.
6. To promote broad participation in the Commission.✿



NEIL GEHRELS is Chief of the Astroparticle Physics Laboratory at NASA's Goddard Space Flight Center in Greenbelt, Maryland; College Park Professor of Astronomy at the University of Maryland; and Adjunct Professor of Astronomy & Physics at Pennsylvania State University. [NASA]

## Honolulu Almanac 6 August 2015

Sunrise / set	6:07 am / 7:08 pm
Twilight <sup>1</sup> start / end	4:47 am / 8:27 pm
Moonset	12:33 pm
Moon phase <sup>2</sup>	● Waning gibbous (55% illum.)
Evening planet <sup>3</sup>	Saturn (SSW)
Morning planet <sup>3</sup>	Mars (E)
Special event	Last-quarter Moon (exact at 4:02 pm)

<sup>1</sup>Astronomical twilight (Sun 18° below horizon). <sup>2</sup>At meridian crossing <sup>3</sup>Naked-eye planets. Source: [timeanddate.com](#)

## DIVISION G

# Stars and Stellar Physics

Learn how to make the most of IAU Division Days and how to get involved in Division G.

By CORINNE CHARBONNEL

I am pleased to welcome the newly elected and returning members of the [2015-2018 Steering Committee](#) of [IAU Division G, Stars and Stellar Physics](#), and to thank those members who are stepping down.

The involvement by IAU members in the restructuring and election process was very important, but Division G needs your participation to help make our ongoing discussions active, lively, and useful. Only then will the Division have a real impact on the scientific life of our community and be able to promote new developments in stellar physics and their far-reaching influence in all domains of astrophysics. We welcome your contribution to the activities of the Division's Commissions and Working Groups.

For example, if you identify a field that you wish to strengthen, an excellent and easy option is to propose a Working Group to undertake certain well-defined tasks for a limited time period. We also count on you to submit strong proposals for future IAU Symposia, and we will do our best to help you in making your applications successful.

To kick things off, we look forward to seeing many of you

## ANCILLARY SCIENCE

# Bringing Present Astrometric Accuracy to Glass Plates of the Past

By JEAN-EUDES ARLOT

Launched in December 2013, the [Gaia satellite](#) is building astrometric all-sky maps with unprecedented angular resolution. The mission's first data release will occur in 2016, and many in the

### Division Meeting: Division G: Stars and Stellar Physics

Start date	Friday, 7 August
End date	Monday, 10 August
Oral sessions	Room 316C, Hawai'i Convention Center
Posters	Exhibit Hall 1, Hawai'i Convention Center

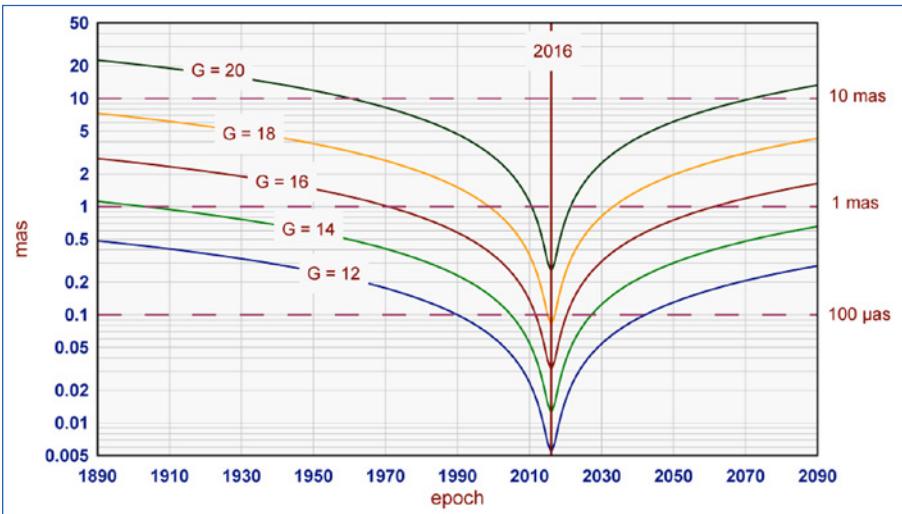
*For details on presenters, topics, and times see the [online program](#) or [mobile app](#).*

during Division Days. Our program is rich and interesting, with invited talks and contributions covering a broad range of scientific topics, such as the first stars, abundances, magnetism, binaries, and large-scale surveys including the one now under way by Gaia. And during our business session, we look forward to hearing your ideas and suggestions for the forthcoming triennium. ☺



CORINNE CHARBONNEL is incoming President of IAU Division G, Stars and Stellar Systems. She has dual appointments at the University of Geneva, Switzerland, and the French National Centre for Scientific Research in Paris.

astronomical community are eagerly awaiting the chance to use Gaia data for the calibration of their own data — including photographic plate data.



This plot depicts the anticipated astrometric accuracy as a function of time for stars with various Gaia magnitudes ( $G$ ), which are based on a passband of 400 to 1,000 nm. [Jean-Eudes Arlot]

During Gaia's 5-year mission, it will sweep across the sky roughly 14 times a year, mapping the positions of a billion stars to about 20 microarcseconds accuracy, while also capturing snapshots of the rapidly changing positions of solar-system objects. Gaia's observations are insufficient to completely describe the fast motions and complex dynamics of these local bits of rock and ice, but they will allow astronomers to better calibrate measurements from old photographic plates that serve this purpose. Modern astronomers continue to use plates made at the end of the 19th century in research, despite their low astrometric accuracy, because of the long baselines needed to fully characterize these objects.

The Gaia reference catalog will contain select stars with current-epoch positions known to 0.01 milliarcsecond (mas) and with well-defined proper motions that allow their positions to be known with 1-mas accuracy over a two-century window from 1890 to 2090. This catalog will allow a new reduction of old photographic plates that will provide modern plate scans with modern astrometric accuracies.

In tests using the [USNO CCD Astrograph Catalog \(UCAC\)](#),

we demonstrated that we can achieve the accuracy of present catalogues for old observations within the limits of the astrometry (we could not go older than the 1960s using UCAC due to proper motions). The new Gaia catalog will allow the reduction of photographic plates made since the end of the 19th century. This will breathe new scientific life into the one million glass plates taken during that period. Finding and scanning the plates and processing the data is a huge task that is certain to provide unexpected and interesting results. \*



**JEAN-EUDES ARLOT** is the Vice-President of Division A Commission 4, Ephemerides, and works at the Institute of Celestial Mechanics and Ephemeris Calculation (IMCCE) at Paris Observatory in France. His work on using Gaia data to reanalyze old photographic plates is supported by Paris Observatory; the U.S. Naval Observatory in Washington, D.C., and the Royal Observatory of Belgium in Brussels.

Honolulu Weather Forecast ☀ 6-7 August 2015		
THURSDAY, 6 AUGUST		High: 88°F/31°C Low: 76°F/24°C
Morning	Afternoon	Evening
Partly cloudy	Partly cloudy	Cloudy
10% chance of rain	45% chance of rain	35% chance of rain
FRIDAY, 7 AUGUST		High: 89°F/32°C Low: 76°F/24°C
Morning	Afternoon	Evening
Partly cloudy	Clear	Clear
25% chance of rain	20% chance of rain	10% chance of rain

**Extended forecast:** Tropical Storm Guillermo is weakening and is forecast to pass north of O'ahu on Thursday. Trade winds will return to the islands Friday night. Typical summertime weather is expected over the weekend and into next week. Source: [Weather Underground](#).

# Getting All Wet (or Not) in Hawai‘i

By PAMELA L. GAY, *Kai‘aleleiaka*

Don’t like the weather? Move. In Hawai‘i, the interplay of geography and wind creates weather patterns that make it possible to pick your preferred climate by moving up, down, and around these volcanic mountains.

Located at roughly 20°N latitude, the Hawaiian Islands experience sustained northeasterly winds that are driven by the Hadley cell, an atmospheric circulation pattern with little variation throughout the year. As these moist winds race across the islands, the volcanoes disrupt their flow. On the volcanoes’ windward side — the northeast side — clouds form and rain falls to create the lush tropical landscapes, such as those found around

Hilo, Hawai‘i Island (“the Big Island”). Just over the peaks, on the leeward side, the islands are significantly more arid. On Hawai‘i Island, rainfall amounts vary from more than 100 inches (2.5 meters) a year on the Hilo side of Maunakea to less than 20 inches (0.5 meter) of rain northwest of the volcano.

The volcanoes affect not only rainfall, but also temperature. In general, temperatures drop 3.5°F (2°C) for every increase of 1,000 feet (300 meters) in elevation. On the beaches of Hilo, summertime temperatures hover between 71°F (22°C)

## How to Say It in Hawaiian

- ‘Ae: yes
- ‘A’ole: no
- Hōkū: star
- Kahuna: expert
- Lani: sky, the heavens
- Mahina: moon

Vowels are generally pronounced as follows: a “ah,” e “eh,” i “ee,” o “oh,” u “oo.” If a vowel has a little horizontal line over it (a kahakō), it means you hold the sound an extra beat. A 6-shaped apostrophe, or ‘okina, signals a [glottal stop](#). Source: [Hawaiian Words](#).



Astronaut Samantha Cristoforetti posted this photo of Hawai‘i, taken from the International Space Station, to Twitter on 28 February 2015. [NASA, ESA]

and 85°F (29°C), while on Maunakea’s 14,000-foot peak, daytime temperatures may only reach 60°F, while nighttime temps may plunge below freezing!

For locals, it’s possible to pick your weather by choosing to live at an elevation and orientation that tunes the rainfall and temperature to your preferred conditions. This diversity of possibilities opens up highly varied ecological niches, creating conditions suitable for myriad plants and animals. The Hawaiian Islands are a biodiversity hotspot, with more than 25,000 unique species.

The IAU General Assembly is taking place on the Island of O‘ahu. On this older island, the highest peak is the diminutive 4,025-foot (1,200-meter) Mount Ka‘ala, part of a ridge formed by the Ko‘olau volcano. With this lower ridgeline, O‘ahu’s climate is more even across the island than that of Hawai‘i Island, though you can still experience lush tropics with a quick journey northwest to [Ahupua‘a ‘O Kahana State Park](#) near Ka‘a‘awa. \*

# Perambulating Among the Posters

By LAURENCE A. MARSCHALL, *Kai'aleleiaka*

Very few astronomers travel to meetings expressly to view poster papers, but almost everyone goes to meetings to present them. You've probably already recognized your fellow astronomers at the airport or on your plane by the black plastic tubes they were carrying.

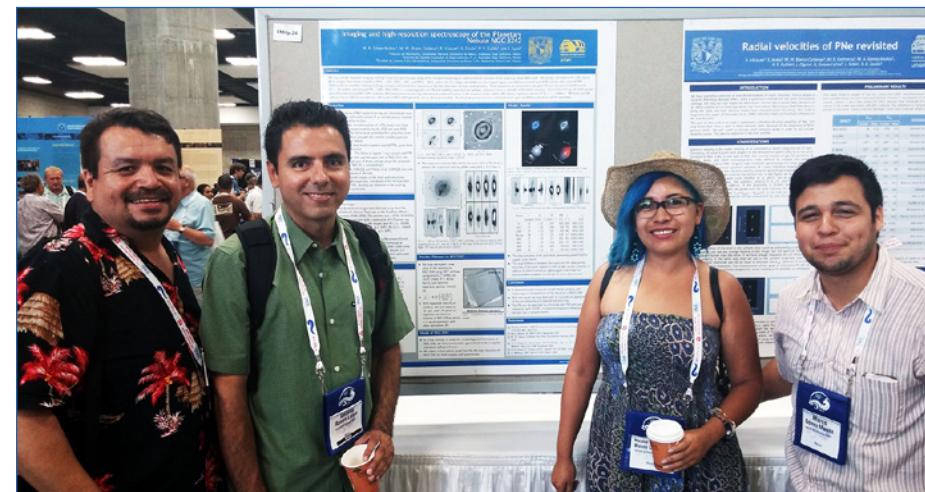
Here in Honolulu at the IAU General Assembly, long ranks of mounting boards crowd the Exhibit Hall to accommodate the roughly 1,900 scheduled posters, but most of the time the aisles are empty, with only a solitary reader here and there, or a little knot of people gathered in animated discussion. This changes, of course, during morning coffee breaks and evening happy hours, when the Exhibit Hall becomes a lively place. Wandering among the posters I noted a variety of presenters and readers, and it soon became clear that, while the poster paper is an important form of scientific communication, its function goes well beyond the mere transfer of information. Posters give notice of work in progress, provide justifications for travel, and thus serve as catalysts for the intellectual and social interactions that keep our science alive.

In one aisle Kazimierz Sliwa of McMaster University in Hamilton, Ontario, Canada, stood by a poster he'd prepared with collaborator Christine Wilson. He was discussing the analysis of molecular gas in merging galaxies with George Privon from the University of Concepción, Chile. Both are workers in the same field, and Privon, who models the mergers, was commenting on both the poster itself and on the further research it suggested. "George has already given me some ideas to explore on processes that light up the gas," noted Sliwa.

For young scientists, posters offer a first experience in academic publishing. Early Wednesday morning I met Nicholas Lopez-Canelas, a 2015 graduate of Marquette University in Milwaukee, Wisconsin. He was entering the Convention Center with a poster describing work he'd done as an undergradu-



Wendy Hagen Bauer explaining her poster on an "old friend," the star VV Cephei. [All photos: Larry Marschall, *Kai'aleleiaka*]

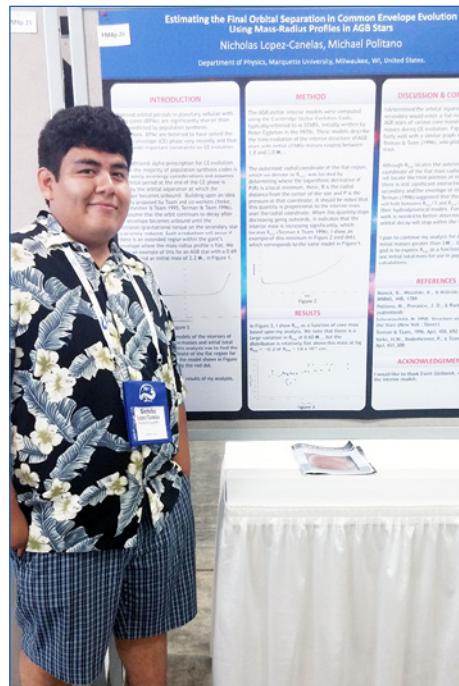


Marco Gómez-Muñoz and some of his collaborators at his poster paper. Left to right: Roberto Vasquez, Gerardo Ramos-Larios, Monica Blanco Cárdenas, and Marco Gómez-Muñoz.

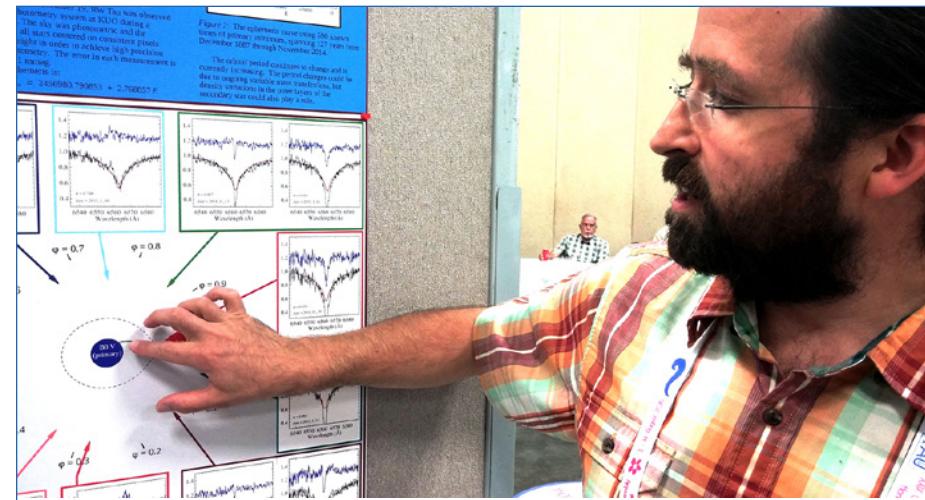
ate with Professor Michael Politano on modeling binary orbits of stars in planetary nebulae. This was his first opportunity to mingle with professional astronomers at an IAU meeting, a step on the way to a hoped-for Ph.D. in astrophysics, and, no doubt, a welcome change of climate from his native Chicago.

At another poster later in the day, Marco Gómez-Muñoz was talking shop with his collaborators Monica Blanco Cárdenas and Roberto Vasquez, all from the National Autonomous University of Mexico, along with Gerardo Ramos-Larios of the University of Guadalajara, Mexico. Gómez' poster reports his thesis work, an analysis of the structure of a planetary nebula, and this is his first IAU General Assembly, too, though his advisor, Vasquez, has been to many AAS meetings in the past.

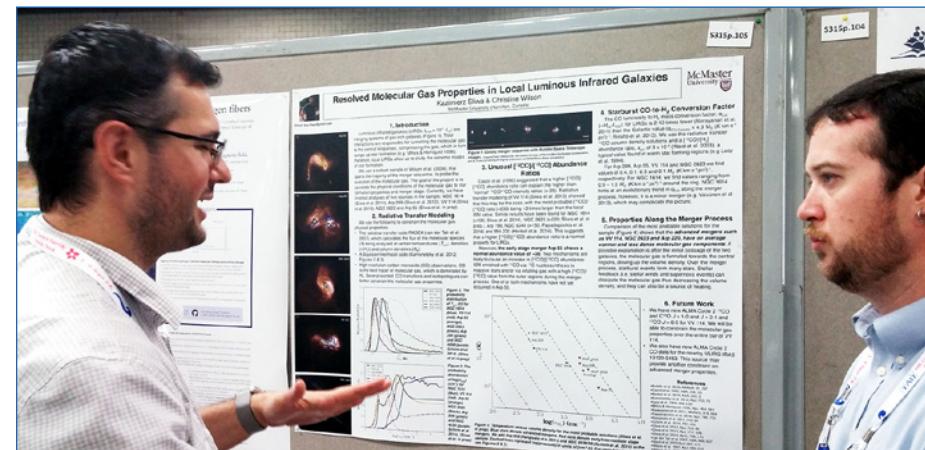
Phillip Reed, Associate Professor of Astronomy at Kutztown University in Pennsylvania, is further along in his career. He received his Ph.D. in 2008, and though he's at a primarily undergraduate institution he's established an active program of research and publication. Here at his first IAU GA, his two poster papers highlight work that he and his students have done using their on-campus 24-inch (60-cm) telescope, notably spectroscopy done with a newly installed fiber-fed spectrograph. "There's been a lot of response to my posters," Reed told me, "and many people are amazed that we can do such good spectroscopy using an on-campus observatory."



Nicholas Lopez-Canelas and a poster of his undergraduate research work at Marquette University.



Phil Reed describes spectroscopy results from the Kutztown State University Observatory.



Kazimierz Sliwa discusses galaxy mergers with George Privon.

At the other extreme of a career, Wendy Hagen Bauer, Professor Emeritus at Wellesley College in Massachusetts, was returning to the island where she did her graduate studies. She was presenting a poster on a star she's gotten to know intimately over many years: the eclipsing binary VV Cephei, but that wasn't the principal draw of the IAU General Assembly. "These meetings are wonderful," she commented, "because I get to see a whole career worth of colleagues, collaborators, and friends." ☺