

Kai'aleleiaka 🌌 THE MILKY WAY

Issue 7 🌌 11 August 2015

Wally Pacholka / AstroPics.com

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World's First International Dark Sky Sanctuary in Chile

By INGE HEYER, *Kai'aleleika*

During a public event at the Bernice Pauahi Bishop Museum in Honolulu on Sunday, 9 August, the [International Dark-Sky Association \(IDA\)](#) announced that the site of the [Associated Universities for Research in Astronomy Observatory \(AURA-O\)](#), in the Elqui Valley of Northern Chile, will be designated as the world's first International Dark Sky Sanctuary. The site will be known as the Gabriela Mistral Dark Sky Sanctuary, named after the famed Chilean poet and Nobel laureate, who grew up in the Elqui Valley and whose poetry reflects a love and tenderness towards these wonderful skies.

About 200 people attended the Open House at the museum, organized as part of the public program of the IAU General Assembly — a mix of both local people and conference delegates. [International Dark Sky Places](#) Program Manager John



Moonrise over the telescope domes on Cerro Tololo, with the Large and Small Magellanic Clouds visible and the galactic center rising. [AURA]

Barentine said, “Dark-sky sanctuaries are the rarest and most fragile dark places left on the planet. The Sanctuaries designation fills a need for the recognition and protection of examples of how the world appeared before the introduction of electric lighting.”

The new IDA designation reflects the need for special protection for the world's darkest places that are threatened. In certain cases, the public may be excluded from these sites in order to prioritize dark-sky conservation.

This new sanctuary site contains more than 90,000 acres (360 square kilometers) of mountainous terrain and hosts four major research facilities: the Cerro Tololo Inter-American Observatory (CTIO), the southern branch of the National Optical Astronomy Observatory; the Gemini South Telescope; the Southern Astrophysical Research (SOAR) telescope; and the Large Synoptic Survey Telescope (LSST), which is currently under construction.

This is the first instance in which a professional observatory has received IDA recognition for its dark-skies stewardship and provides a model for many other ground-based astronomical research facilities. [Associated Universities for Research in Astronomy \(AURA\)](#) has worked

Kai'aleleika 🌌 THE MILKY WAY

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closely with the Chilean government, which has passed a number of outdoor lighting regulations designed to save energy and preserve the night skies in Northern Chile.

The IDA's Executive Director, J. Scott Feierabend, said: "The Gabriela Mistral Dark Sky Sanctuary will serve as an example of how collaboration among governmental and non-governmental stakeholders can preserve one of the most special places on the planet."

Ambassador Gabriel Rodriguez, of the Chilean Ministry of Foreign Affairs, added, "The Chilean government has prioritized the protection of the dark skies of Northern Chile through both regulation and education, but more importantly through its recognition that Chile's night skies are a natural resource to be preserved and passed on from generation to generation."

Over the past 50 years, U.S. and international partners have invested more than a billion U.S. dollars in astronomical telescopes and advanced instruments on the AURA-O site — facilities that are planned to be operational for at least another five


decades. Securing the integrity of natural night at one of the most famous astronomical research sites in the world requires educating nearby communities and adopting good outdoor-

lighting practices. AURA-O has committed to a long-term program preserving these dark skies through a lighting-management plan coupled with extensive education and public outreach efforts. The Chilean institution responsible for the protection of the quality of the night skies, the [Oficina de Protección de Calidad de los Cielos \(OPCC\)](#), is also involved.

The Dark Sky Sanctuary designation is only the beginning for the region. "If our collective efforts around the Elqui Valley are successful, we will have further protections for the incredible resource of Chile's dark skies," said R. Chris Smith, Director of the AURA observatories in Chile. "Not only will this area attract further world-class professional observatories — it is becoming a world destination for eco-tourism with its incredible array of tourist-oriented observatories and night-sky viewing sites." 🌸

**Lift up your face, child,
and receive the stars.**

— Gabriela Mistral,
Carro Del Cielo



Lucia Kleint!

You have won a
\$50 gift card to
Down to Earth Organic & Natural
at 2525 S. King St.

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

Honolulu Almanac 🌸 11 August 2015

| | |
|-----------------------------------|-------------------------------|
| Sunrise / set | 6:09 am / 7:04 pm |
| Twilight ¹ start / end | 4:50 am / 8:23 pm |
| Moonrise / set | 3:42 am / 5:04 pm |
| Moon phase ² | 🌙 Waning crescent (8% illum.) |
| Evening planet ³ | Saturn (SSW) |
| Morning planet ³ | Mars (E) |

¹Astronomical twilight (Sun 18° below horizon). ²At meridian crossing ³Naked-eye planets. Source: timeanddate.com

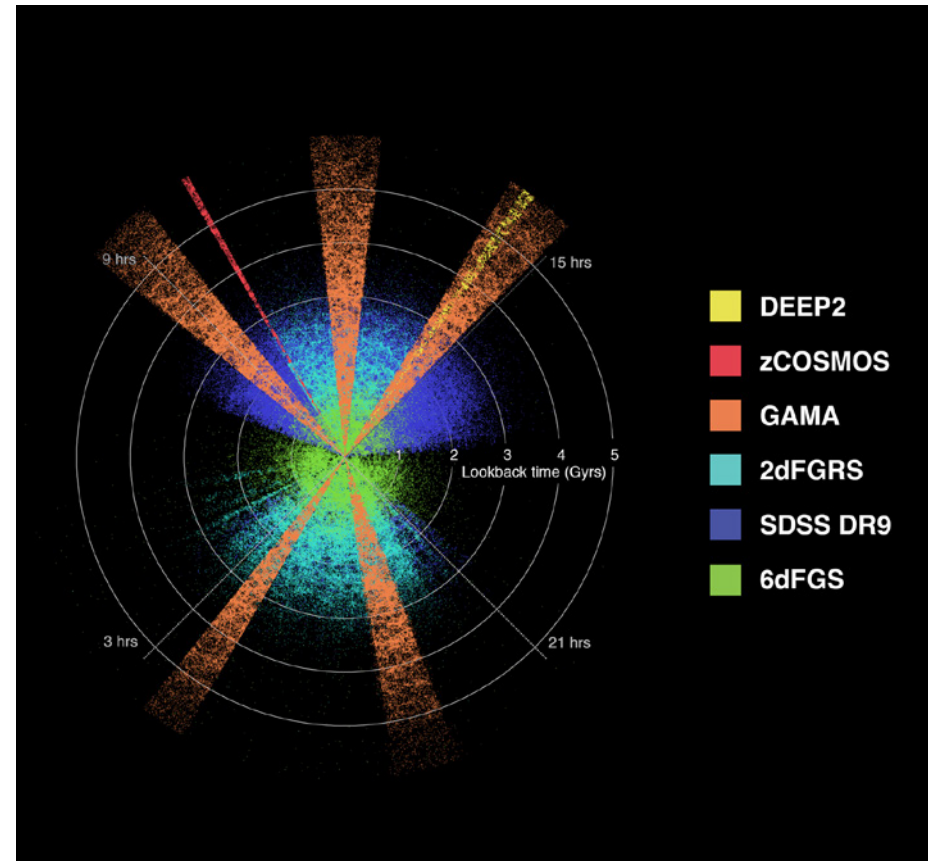
Max Star Count & the Slow Death of Everything

By PAMELA L. GAY, *Kai'aleleiaika*

Our universe has seen a lot of ups and downs during its 13.8-billion-year history. From inflation to recombination, and from reionization to today, the rate of energy production has varied while energy densities have steadily declined. While many details of this story are still only vaguely known, the [Galaxy And Mass Assembly \(GAMA\) Survey](#) has made great strides in elucidating the changes of the past two billion years. GAMA has studied more than 200,000 galaxies in five regions of the sky using 10 telescopes spanning 21 bandpasses from the ultraviolet to the far infrared. As a Monday-morning press conference at the IAU General Assembly, members of the GAMA team reported that we live in a universe in decline.

The GAMA Survey's five regions drill through space and time, taking "core samples" of our universe that allow us to trace cosmic evolution with new levels of detail. The 10-terabyte [Panchromatic Data Release](#) of 10 August probes to look-back times greater than 5 billion years, giving GAMA one of greatest depths among modern surveys.

In the [paper](#) associated with the data release, Simon Driver (ICRAR – University of Western Australia) and his collaborators study the cosmic spectral energy distribution across three epochs — 0.3 to 1.1 Gyr, 1.1 to 1.8 Gyr, and 1.8 to 2.4 Gyr — and find the universe is producing declining amounts of energy. The energy of the universe is tied up in various forms. Regular mass represents energy made tangible, and everything from light to motion is an expression of energy transport. Roughly 2.3 billion years ago, galaxy interactions and mergers were more prevalent, star-formation rates were higher, and energy was produced at up to twice the rate seen in the universe today. While stars continue to form in the present epoch, we are at a point in



The distribution of galaxies as mapped by various Australian, American, and European survey teams in the GAMA collaboration. [ICRAR, GAMA]

time when the maximum number of stars has been achieved. As we move past peak star number, the universe lumbers slowly toward heat death. As Driver puts it, "The universe has basically sat down on the sofa, pulled up a blanket, and is about to nod off for an eternal doze." ❀

Formation, Evolution, and Survival of Massive Star Clusters

By CORINNE CHARBONNEL & ANTONELLA NOTA

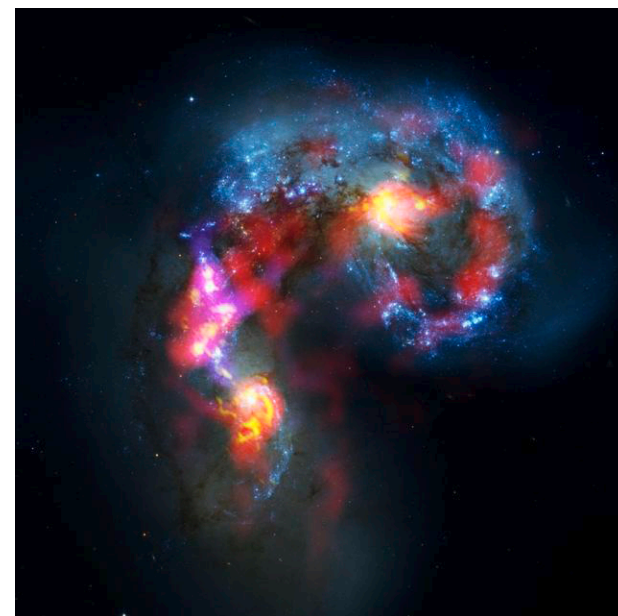
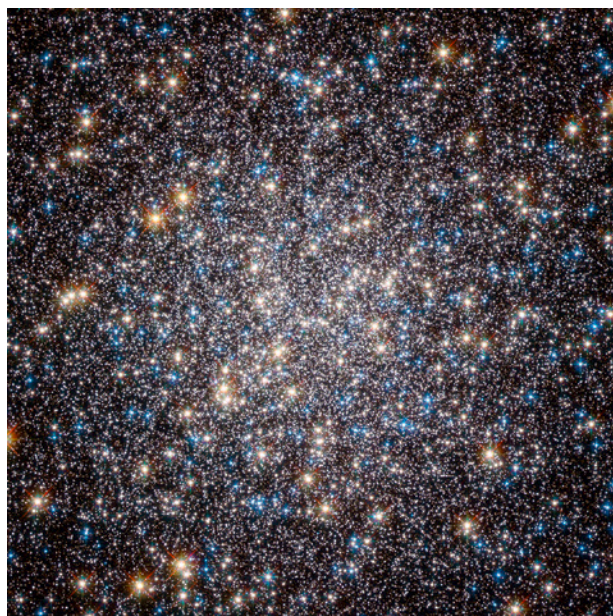
Unprecedented high-resolution observations have recently revealed the complexity of massive star clusters, young and old. This has led to an important surge of theoretical developments and numerical simulations aimed at understanding the formation and evolution of these objects not only in the local universe, but also at high redshift. Acquiring a complete understanding of these systems, and of the multiple stellar populations they host, is very challenging. It requires the exchange of ideas, and collaboration, among astrophysicists with observational, theoretical, and numerical expertise in a variety of fields: stellar evolution, interstellar matter, magnetohydrodynamics, stellar dynamics, formation and evolution of galaxies, cosmology, multidimensional numerical simulations, N-body simulations, and multiwavelength high-precision photometry, spectroscopy, and astrometry.

The scientific program of [IAU Symposium 316](#) is built to ensure cross-fertilization and networking among specialists in all these fields. We hope the discussions will help define coordinated, innovative, and cutting-edge theoretical, numerical, and observational developments in order to tackle interrelated open issues. This Symposium is particularly timely since our community has to prepare the groundwork for future observations with the [Atacama Large Millimeter/submillimeter Array \(ALMA\)](#), as well as the [Square Kilometre Array \(SKA\)](#), the [James](#)

[Webb Space Telescope \(JWST\)](#), and the next generation of extremely large telescopes. These facilities will soon open new windows on super star clusters, as well as on galactic and extra-galactic stellar systems and globular clusters.

The sessions of the Symposium will focus on the following:

- State-of-the-art multiwavelength observations of massive star clusters and of their progenitors, from zero to high redshift;
- Links between massive star clusters and their host galaxies, from currently forming ones to cosmological relics;
- Physics and modes of massive-star-cluster formation, from the early to the present-day universe;



IAU Symposium 316 will explore connections between the crowded hearts of old globular clusters (left) and recently formed massive star clusters in colliding galaxies (right). [Left: ESA/Hubble, NASA; Right: ALMA (ESO, NAOJ, NRAO)]

- Dynamical and chemical evolution, disruption, or survival of massive star clusters in different environments and at various cosmic times;
- Formation of multiple stellar populations, their impact on the dynamics of their host clusters, and their connection to the galactic stellar populations.

We invite you to attend Symposium 316 and hope to see you there! 🌸



CORINNE CHARBONNEL, Co-Chair of IAU Symposium 316, is a professor at the University of Geneva, Switzerland, and a senior researcher at the French National Centre for Scientific Research in Toulouse. Additionally, she is incoming President of IAU Division G. **ANTONELLA NOTA**, Co-Chair of Symposium 316, is the ESA Hubble Project Scientist and Mission Manager and Associate Director of the Space Telescope Science Institute in Baltimore, Maryland.

PLANETARY-SYSTEM NOMENCLATURE

Pluto System Names: The New Horizons Team's Perspective

By S. ALAN STERN

In Issue 6 of [Kai'aleleiaika](#) the New Horizons team was criticized for “promulgating nicknames” for surface features on Pluto and Charon. We welcome this opportunity to respond.

The names on our [informal Pluto system maps](#) are being used to facilitate our ability to do and report early science results about Pluto and its moons. They were obtained via an open, international naming campaign that the IAU endorsed. This “Our Pluto” campaign was unprecedented in its scope: The website was available in 17 languages, and an illustrated children’s ballot encouraged participation by the very young. We received more than 75,000 nominations and votes from all over the world. The campaign yielded a culturally diverse set of names that is rich in history, literature, and mythology. We carefully sifted through the list to enforce IAU naming standards, including conformance to a predefined set of themes and avoidance of duplication with named features elsewhere in the solar system.

Then, just as the campaign was about to go live in March, the [IAU Working Group for Planetary System Nomenclature \(WGPSN\)](#) asked us to restrict feature names on Pluto to a set of themes primarily focused on death deities and the underworld. The New Horizons science team agreed unanimously that those themes

were too limited, too depressing, poorly suited to a public campaign, and potentially offensive to some religious believers. Because New Horizons was about to complete the first era of planetary reconnaissance by exploring Pluto, we also agreed that it was appropriate to honor the history of exploration in general, and space exploration in particular, with feature names on Pluto.

Our team has been delighted by the many exploration-related and other ideas for feature names that the public has put forward via the Our Pluto campaign, from great explorers like Tenzing Norgay and Jacques-Yves Cousteau to pioneering space missions like Sputnik. We look forward to nominating them to the WGPSN at a later date.

People worldwide are talking about the names on our informal maps of Pluto and Charon and are genuinely excited about planetary nomenclature. The IAU should celebrate and capitalize on this accomplishment. The IAU should approve the themes and sources that the mission team has proposed and that the public loves. That would demonstrate that the IAU truly welcomes the public’s participation in planetary exploration, as it has often stated but has never demonstrated on a large scale. It would recognize the major accomplishment that the explora-

tion of Pluto represents in a highly visible and positive way. We look forward to collaborating with a Working Group that operates in the open and that recognizes its accountability to both scientists and the broader public. 🌸



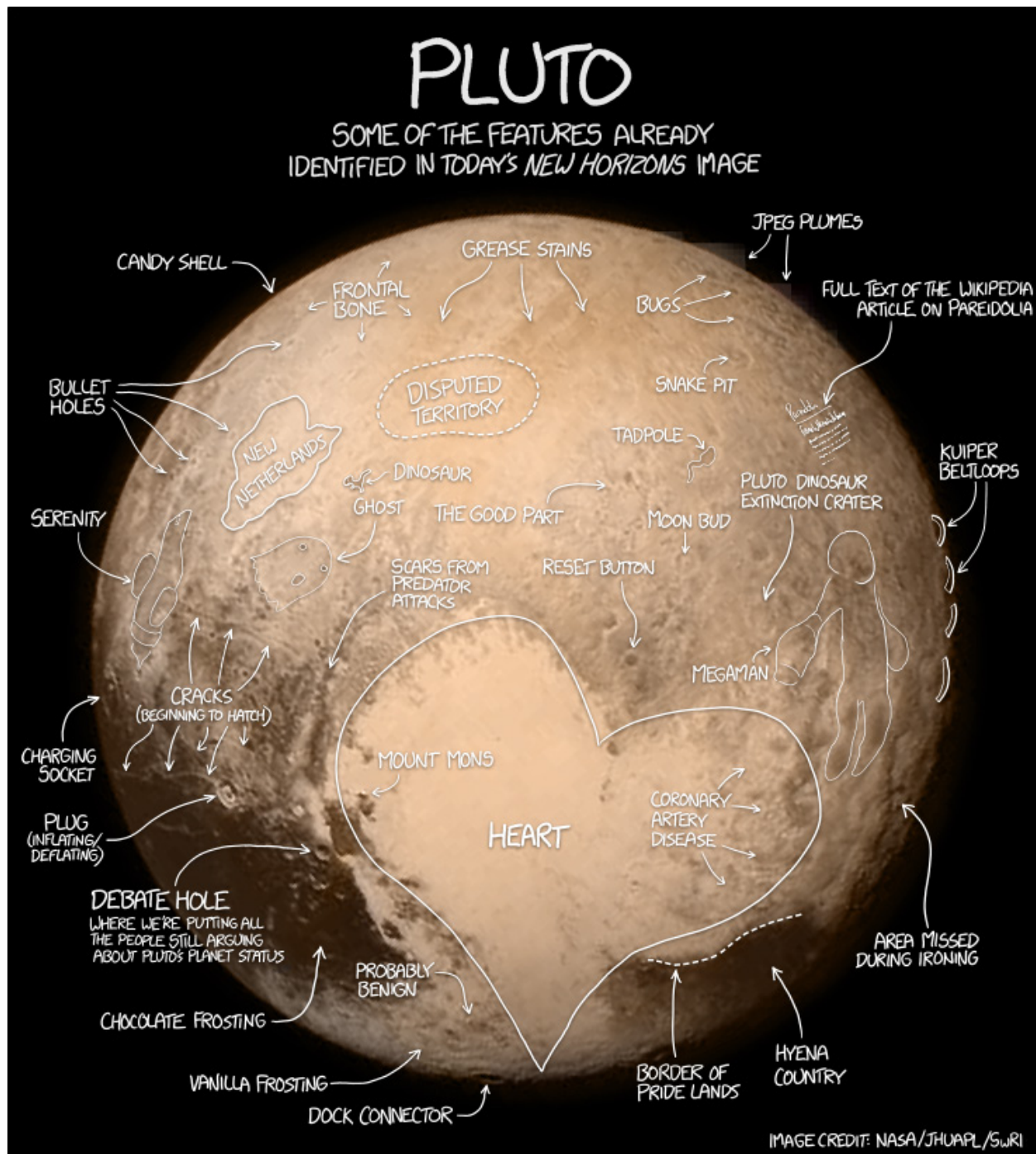
ALAN STERN is Associate Vice-President for Research & Development at the Southwest Research Institute in Boulder, Colorado, and Principal Investigator of the New Horizons mission to Pluto and the Kuiper Belt. This response is written on behalf of the entire New Horizons Pluto System Nomenclature Working Group, which, in addition to Stern, includes Mark Showalter, Will Grundy, Jeff Moore, Cathy Olkin, Paul Schenk, and Amanda Zangari. [SwRI]

Congratulations to

Daniela Opitz!

You have won a
\$50 gift card to
678 Hawaii Korean Restaurant
at 1726 Kapiolani Blvd.

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



[xkcd]

Binary and Multiple Stars

By BRIAN MASON

On Tuesday, 11 August, from 2:00 to 6:00 pm, a joint Splinter Meeting of (old) Commissions 26 and 42 and (new) Commission G1 will be held in Room 327.

Following the Business Meeting of the three commissions we will address some issues relevant to binary- or multiple-star astronomy not included in other sessions and meetings of the XXIX General Assembly. In addition to these interesting presentations there will be oral presentations of posters from the first week, Working Group reports, and presentations from two investigators on different optical interferometers. We will

also include double-star work within the purview of other commissions, including Commissions 8 (Astrometry), 30 (Radial Velocities), and 54 (Optical and Infrared Interferometry) that relates to binary and multiple stars.

Current members of Commissions 26 and 42 and current or prospective members of the new Commission G1 are encouraged to attend, along with anyone interested in current research in binary and multiple star systems. 🌸



Kyle Augustson!



You have won
two standard-seat tickets (value: \$100) to
Fouever Fab: Best of the Beatles
at the Sheraton Princess Kaiulani
at 120 Kaiulani Ave.

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

Splinter Meeting: Commissions 26, 42, and NC-14/G1

| | |
|--------------------------|---|
| Organizer | Brian Mason (U.S. Naval Observatory) |
| Date | Tuesday, 11 August |
| Time | 2:00 to 6:00 pm |
| Location | Room 327, Hawai'i Convention Center |
| Agenda | History of Commission 42 (Virginia Trimble) The Final Kepler Eclipsing Binary Catalog (Andrej Prsa) The Visual Double Star Catalogs (Brian Mason) Coordinate System Issues in Binary Star Computations (George Kaplan) Direct Distance Estimation to Eclipsing Binaries in Star Clusters (Eugene Milone) θ^1 Ori B: a Quintuple (Sextuple?) System Less than 30,000 Years Old (Christine Allen) Two Bright Eclipsing Binaries in the Orion Trapezium (Rafael Costero) Advances in Spectroscopy and Implications for Stellar Research (David Soderblom) Recent Binary Star Science at the CHARA Array (Theo Ten Brummelaar) SB9 to Gaia (Dimitri Pourbaix) Double Star Work with the DCT, the NPOI and/or the End of Commission 54 (Gerard van Belle) |
| Coordinating Commissions | Commission 26: Double & Multiple Stars Commission 42: Close Binary Stars Commission G1: Binary and Multiple Star Systems |



BRIAN D. MASON works in the Astrometry Department at the U.S. Naval Observatory in Washington, D.C., where he specializes in interferometric studies of binary and multiple stars.

Short-Period Eclipsing Binaries: Ideal Targets for Undergraduates

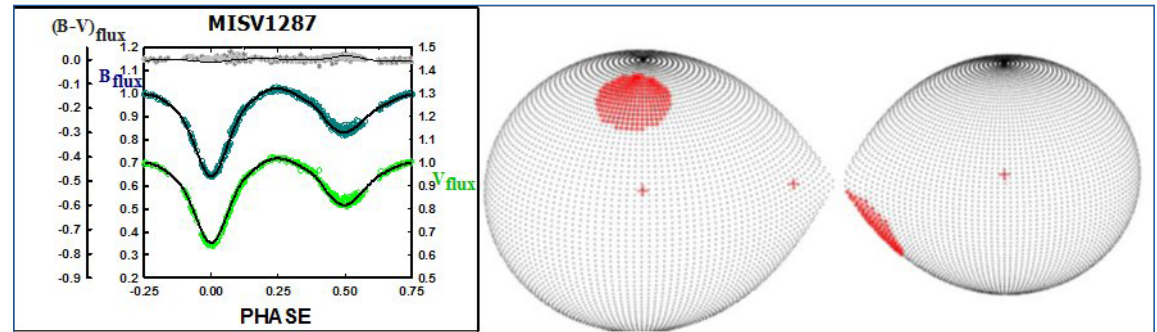
By RONALD G. SAMEC

Research in astronomy is often considered the sole domain of graduate students and Ph.D. scientists, but at the current IAU General Assembly, my undergraduate students and I are presenting four papers. Undergraduate research can be immensely rewarding for students and faculty and can provide important results for the astronomical community as well — as long as one chooses appropriate objects that enable students to complete their projects in a relatively short period of time.

In my 28 years working with students at undergraduate institutions, I have had great success studying short-period eclipsing binaries. We choose newly discovered systems of interest to the astronomical community and observe them through modest-sized telescopes using four or five filter bands to obtain publication-quality light-curves. Since 1987 I have worked closely with more than 30 individual students, many of whose research earned them admission into Ph.D. programs across the U.S. and Canada.

Students are not just passive observers in this research; they participate fully in observations and analysis from start to finish. Many of them accompany me on observing runs, where they have a major role in taking images. The students and I travel to a distant site (often in Arizona) and share experiences from meal time to observing time. Students take images and calibration frames, work in shifts throughout the night, and experience both the tedium and the excitement of real astronomical research. We also observe remotely using the Internet-enabled facilities of the [Southeastern Association for Research in Astronomy \(SARA\)](#).

A week's worth of data from a 1-meter-class telescope can yield enough information for a thorough analysis of one or two short-period binaries. Once the data have been collected, my



B and *V* synthetic light-curve solutions overlay the normalized flux curves and Roche-lobe surfaces from a *BVR* solution of MISV 1287. Students involved in this research were James R. Digana, Paul Smith, Travis Rehn, and Bruce M. Oliver. [Ron Samec]

students extract magnitudes and analyze the resulting time-series data to determine periods. Using this information, they build a preliminary model with David Bradstreet's [Binary Maker software](#), then complete a detailed model using the [Wilson-Devinney Program](#). Once they have an acceptable model, they develop a scenario for the probable evolution of the system.

Like real astronomers, the students do their work under the

Meet the Mentors

The IAU Executive Committee [Working Group on Women in Astronomy](#) and the AAS [Committee on the Status of Women in Astronomy](#) are offering early-career members a chance to meet with leaders in the field to discuss work-life balance, networking strategies, and other issues of concern. Meet-the-Mentor sessions will occur twice daily, at 10:00 am and 2:00 pm, through Wednesday, 12 August. We invite students who haven't already signed up for one to visit the Student Pavilion in the Exhibit Hall to choose an available slot. See the conference website for a [PDF list](#) of participating mentors, their areas of career expertise, and which sessions they'll attend. Questions? Contact [Francesca Primas](#) or [Christina Richey](#).

time constraint of an upcoming meeting, such as the [Meeting of Astronomers in South Carolina \(MASC\)](#), followed by a trip to an American Astronomical Society meeting or IAU General Assembly. As part of their project, students produce a slide deck summarizing the analysis of their particular system and thoroughly practice an oral presentation. We then write a paper for publication in a professional journal.

This procedure is remarkably productive: Over the years my students and I have produced 250 professional publications

and abstracts. I invite you to join us in our journey to determine the nature and evolution of close binaries. It's fascinating and rewarding work. 🌸



RON SAMEC recently retired as Professor of Physics and Astronomy at Bob Jones University. He is a former professor and department chair in physics at Millikin University, Decatur, Illinois, and professor and observatory director at Butler University in Indianapolis, Indiana.

SPLINTER MEETING

Good-bye Commission 4, Hello Commission X2

By GEORGE KAPLAN & CATHERINE HOHENKERK

The IAU was founded in 1919, and Commission 4, Ephemerides, was among the first Commissions formed within the new organization. Its purpose was to encourage international cooperation in the computation and distribution of information on the coordinates of celestial objects, as well as related information such as rise and set times, Moon phases, and eclipse predictions. The cooperation extended to actually sharing the labor-intensive work involved. This information was needed — and still is — to facilitate astronomical observations, timekeeping, surveying, the comparison of dynamical theory with observations, and celestial navigation.

At the time, “computers” were people doing arithmetic, the most accurate clock was the rotating Earth, the only distribution mechanism for data was print, and celestial navigation was the only means of determining position at sea. None of that is true today, but the basic mission of Commission 4 is remarkably unchanged. Today we would add spacecraft navigation and attitude control to the list of applications, and software and web services as means of distribution.

There are two broad kinds of work that the Commission has supported. The first is the computation of fundamental solar-

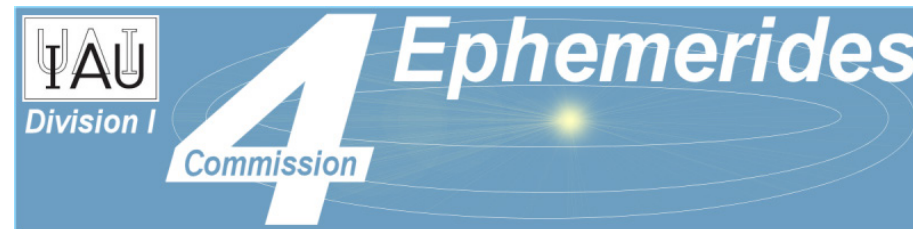
system ephemerides, that is, using gravitational theory along with observations of many types to determine the orbits of bodies in the solar system. The second uses these fundamental ephemerides to compute practical astronomical data, such as the coordinates of the Sun, Moon, planets, and stars for any given time; the prediction of times of astronomical phenomena such as eclipses, occultations, and Moon phases; the parameters that describe the apparent orientation and illumination of solar-system objects at specific times; and various quantities that allow knowledgeable users to transform quantities between standard reference systems.

Among the most active institutions in Commission 4 are the Jet Propulsion Laboratory (JPL) in the U.S., the Institut de Mécanique Céleste et de Calcul des Éphémérides (IMCCE) in France, the Institute for Applied Astronomy (IAA) in Russia, Her Majesty's Nautical Almanac Office (HMNAO) in the U.K., the National Astronomical Observatory of Japan (NAOJ), the Spanish Naval Observatory, and the U.S. Naval Observatory (USNO).

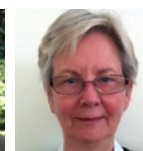
True to the purposes of Commission 4, there has been quite a bit of cooperation and data exchange among all these institu-

Splinter Meeting: Commissions 4 and NC-85/X2

| | |
|-----------|--|
| Organizer | C4: Catherine Hohenkerk (U.K. Hydrographic Office) C.X2: Andrea Milani Comparetti (University of Pisa, Italy) |
| Date | Tuesday, 11 August |
| Time | C4: 8:00 to 9:00 am C.X2: 9:00 to 10:00 am |
| Location | Room 326A, Hawai'i Convention Center |



of historical differences in observational and orbit-computation methods that are no longer relevant. There has always been a significant overlap of members and a free exchange of data, and our new organizational unity will, we are confident, benefit both our science and our services to the astronomical community. 🌸



GEORGE KAPLAN was a staff astronomer at the U.S. Naval Observatory in Washington, D.C. for more than three decades. He is a former President of Commission 4. CATHERINE

HOHENKERK is a Senior Analyst, H. M. Nautical Almanac Office / U.K. Hydrographic Office, Taunton, United Kingdom, and the current (outgoing) President of C4.

tions. A working group within Commission 4 has just completed a study recommending a common data format for fundamental solar-system ephemerides so that users can easily switch among various sources. On the almanac-production side of our activities, USNO and HMNAO recently celebrated a century of cooperation.

As part of the IAU's reorganization, old Commissions 4 and 20 (Positions & Motions of Minor Planets, Comets & Satellites) are joining together to form [new Commission X2](#), Solar System Ephemerides, which will be part of Divisions A and F. Commissions 4 and 20 were separate entities mainly because

FOCUS MEETING 5

Science from Here to the Cosmic Microwave Background

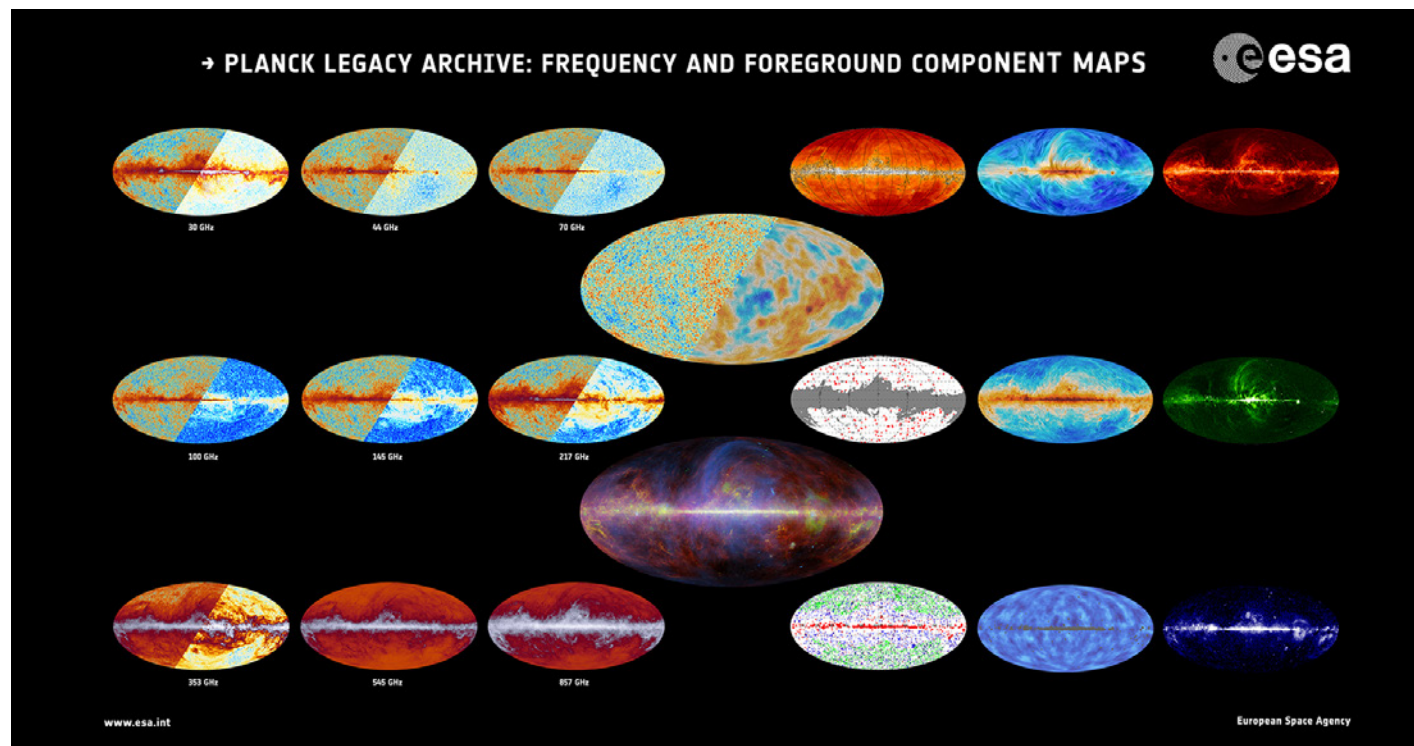
By JAN TAUBER

Launched in May 2009, [ESA's Planck satellite](#) has produced our highest-quality surveys of the microwave sky. Across multiple passes, between August 2009 and Planck's deactivation in October 2013, it mapped the sky's intensity and polarization in nine channels that span radio (40 GHz) to submillimeter (857 GHz) frequencies. Captured in this survey data is a wealth of information about the cosmic microwave background (CMB) and intervening sources. During [Focus Meeting 5 \(FM 5\)](#), the Legacy of Planck, we will discuss the satellite's continuing influence on astronomy and cosmology.

Focus Meeting 5: The Legacy of Planck

| | |
|---|--|
| Start date | Tuesday, 11 August |
| End date | Thursday, 13 August |
| Oral sessions | Room 316C, Hawai'i Convention Center |
| Posters | Exhibit Hall 1, Hawai'i Convention Center |
| Coordinating Divisions | Division H: Interstellar Matter and Local Universe Division J: Galaxies and Cosmology |
| For details on presenters, topics, and times see the online program or mobile app . | |

This compilation shows some of the images drawn from the 2015 Planck data release. The large image at top center shows the 2015 CMB temperature and polarization anisotropies, and the bottom center image is a composite of synchrotron, free-free, spinning dust, CO, and thermal dust components. At left are nine all-sky frequency maps, showing temperature (left half) and polarization (right half) fluctuations. At right are some of the individual physical components extracted from the Planck maps, including catalogs of cold clumps, Sunyaev-Zel'dovich sources, and compact sources (left column); visualizations of the direction of the galactic magnetic field as traced by synchrotron radiation at 30 GHz, by dust radiation at 353 GHz, and the CMB lensing potential (center column); and polarized dust emission, polarized synchrotron emission, and free-free emission (right column). [ESA, Planck Collaboration]



The Planck data have a wide set of applications. Within the mission's frequency coverage, the Milky Way radiates intensely in synchrotron and free-free emission, and dust radiates thermally as well as via other mechanisms (e.g., the spinning of very small grains). At least two of these sources (synchrotron and thermal dust) are significantly polarized, and Planck provides us with our first all-sky maps of this polarized dust emission from the interstellar medium. In addition to the diffuse emission from our own galaxy, thousands of extragalactic objects appear in the maps.

Additionally, Planck's channels allow us to detect galaxy clusters via the Sunyaev-Zel'dovich effect, thus providing the first unbiased view of these largest building blocks in our universe. Through decomposition, the survey can be distilled into highly accurate maps of each kind of physical source, giving a remarkably complete view of both the near and distant universe.

During the first half of 2015, all the Planck data were made

publicly available. The program of FM 5 is designed to give a broad overview of the data's many scientific applications, including summaries of recent analyses and examples of future use. You are warmly invited to come to the talks and poster presentations to check out the latest science based on the Planck data. Furthermore, if you visit the European Space Agency (ESA) booth in the Exhibit Hall, you will be able to directly access the [Planck Legacy Archive](#), download data products, and get one-on-one support from experts. Finally, we welcome your feedback on how we can further improve the Planck data products as we prepare for the final data release in 2016. 🌸



JAN TAUBER is ESA's Project Scientist for the Planck mission, based in the Netherlands, and Co-Chair of FM 5. He has lived, studied, and/or worked in Indonesia, Colombia, Scotland, Ecuador, and the United States.

Modern History of Astronomy in Hawai‘i

By GÜNTHER HASINGER

Polynesian voyagers were some of the best astronomers of their time and brought the ancestors of today’s Hawaiians to these islands using the best technology then available.

Modern astronomy in Hawai‘i begins with [King David Kalākaua](#), who invited an expedition of British astronomers to Hawai‘i in 1874 to observe the transit of Venus and establish the size of the solar system. In



[John D. & Catherine T. MacArthur Foundation]

September of that year, King Kalākaua wrote, “It will afford me unfeigned satisfaction if my kingdom can add its quota toward the successful accomplishment of the most important astronomical observation of the present century and assist, however humbly, the enlightened nations of the Earth in these costly enterprises.”

A few years later, in an 1880 letter to Captain R. S. Floyd, King Kalākaua expressed a desire to see an observatory established in Hawai‘i. A telescope was purchased for Punahou School in 1884 and later made it into the [Kaimuki Observatory](#) and finally onto the roof of the [Makapu‘u Point Solar Observatory](#), the first such facility established by the University of Hawai‘i. This laid the foundation for the [Haleakalā Observatories](#), which today house a precious collection of telescopes on Maui, including the [Pan-STARRS](#) telescopes and the [Daniel K. Inouye Solar Telescope](#) currently under construction.

After the devastating tsunami of 1960, the use of Maunakea for astronomy was championed, mainly for economic reasons, by [Mitsuo Akiyama](#), the Executive Secretary of the Hilo Chamber of

Commerce, and Howard Ellis, who would later become Director of the Mauna Loa Meteorological Observatory. They invited Gerard Kuiper of the University of Arizona’s Lunar and Planetary Laboratory to evaluate the mountain’s potential for studies of the solar system (Kuiper’s main interest) and beyond.

In 1964 the administration of Governor John A. Burns built a road to the summit of Maunakea, and soon the first seeing measurements were being done there by Kuiper’s assistant, Alikea Herring. Herring was a native Hawaiian and a master telescope maker. His main interest was to make a map of the Moon, as accurate as possible, to help identify possible landing sites for the Apollo astronauts. When Herring used his finest telescope on Maunakea, he realized that the summit might well be the best place in the world to do astronomy. In a sense, he prepared the next bold step for humans to go where no one had set foot before, in the same spirit as his Polynesian ancestors.

Shortly thereafter the University of Hawai‘i won a competition

Public Talks: Tuesday, 11 August Ballroom B, Hawai‘i Convention Center

| | |
|---------|---|
| Speaker | Günther Hasinger (Institute for Astronomy) |
| Topic | The Development of Modern Astronomy in Hawaii |
| Time | 7:30 to 8:15 pm |
| Speaker | Andrea Ghez (University of California, Los Angeles) |
| Topic | The Black Hole in the Galactic Center |
| Time | 8:15 to 9:00 pm |

Regular registered attendees of the IAU GA will be admitted upon showing their meeting badges. Registered guests, anyone with an Exhibit Hall Only badge, and unregistered members of the public must [register online](#).

NameExoWorlds Ceremony

At about 7:10 pm Tuesday, 11 August, right before the public talks by Günther Hasinger and Andrea Ghez in Ballroom B of the Hawai'i Convention Center, the IAU will conduct a brief ceremony to open public voting for the [NameExoWorlds](#) contest. [Announced in October 2014](#), the contest aims to involve the public in the selection of names for [some of the most interesting planets](#) now known to be orbiting stars other than the Sun. Candidate names have been proposed by astronomy clubs and other nonprofit organizations registered with the [IAU Directory for World Astronomy](#). Voting will be managed by the [Zooniverse](#) citizen-science collaborative on behalf of the IAU.

— Rick Fienberg, Kai'aleiaka



[Jennifer Boyd]

to build the first telescope on Maunakea, with funds from NASA, in order to support solar-system exploration. This was also the foundation for the Institute for Astronomy under the leadership of its first director, John Jeffries, who will participate in a panel discussion today during the late-afternoon session of Focus Meeting 2 in Room 301.

Hawai'i really *is* one of the best places on Earth from which to observe the heavens. Nearly every astronomical breakthrough in the last 50 years has involved telescopes in Hawai'i in one way or another. One of these discoveries is the supermassive black hole in the center of the Milky Way, which will be described in the

public talk by Andrea Ghez immediately following my own talk expanding on the history briefly related here.

Astronomers are deeply grateful to the Hawaiian people for allowing access to the precious skies over Maunakea and Haleakalā. The next challenge, the “holy grail” of astronomy, is to find a habitable world nearby, to which future generations might set sail. Maunakea may very well be the gateway to this planet. 🌸

GÜNTHER HASINGER is Director of the Institute for Astronomy – University of Hawai'i at Mānoa. Before the IAU reorganized its Divisions, he was President of Division XI, Space & High Energy Astrophysics.



Visit the IAU Exhibit Hall to meet representatives from a wide variety of astronomical institutions and organizations and to thank them for supporting the XXIX General Assembly! [IAU/B. Tafreshi, [twanight.org](#)]

Story Time for Schools from Space

By JEFFREY BENNETT

One of the key goals of the IAU is to spread the word about astronomy to children and the public around the world. The International Space Station (ISS) offers a unique global platform for doing just that.

In a new educational program, called Story Time from Space, ISS astronauts take part in two activities: (1) reading aloud science-based stories for children that I have written, and (2) conducting specially built demonstrations designed to reinforce science lessons from the stories. Both activities are filmed, with

the videos posted freely online for access by schools and individuals worldwide. While the stories are suitable for primary-school children, the demos are more sophisticated and can be used for secondary-school and college students.

The first set of five books — all of which focus on astronomy and space science — was launched to the International Space Station in January 2014. A second set of books, including one focused on how we have learned about our place in the universe, is scheduled for launch in December.

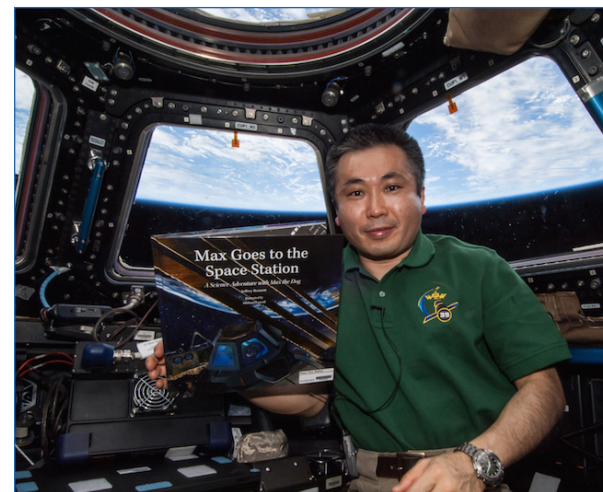
Book readings have been

filmed in English for all of the books (some of the videos are already [online](#)) and in Japanese for one of them.

Readings in Russian, and perhaps other languages, are being planned. The readings are done in the Cupola — an ESA-built observatory module — so

that Earth is visible through the windows as the astronauts read.

The first set of nine science demos covered topics including spectroscopy, energy transfer, orbital mechanics, center of mass, and effects of weightlessness. Unfortunately they were lost in the failed SpaceX launch of June 2015. They are currently being rebuilt and may launch again as early as this fall.



Japanese astronaut Koichi Wakata reads from the ISS. [NASA, JAXA]

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

Splinter Meeting — Story Time From Space: Astronomy and Astronauts Together in the Classroom

| | |
|------------|--------------------------------------|
| Organizer | Jeffrey Bennett (Big Kid Science) |
| Date | Tuesday, 11 August |
| Time | 12:45 to 2:00 pm |
| Location | Room 318B, Hawai'i Convention Center |
| Presenters | Patricia Tribe & Jeffrey Bennett |

Please join us for a presentation about Story Time from Space on Tuesday, 11 August. As an added incentive to attend, we will hold a prize draw for 10 copies of *Max Goes to Mars*, which is one of the five titles currently aboard the ISS. 🌸



JEFFREY BENNETT is the author of several bestselling college textbooks and numerous popular-science books. He was recently honored with the American Institute of Physics Science Communication Award.

FOCUS MEETING 9

Highlights in the Exploration of Small Worlds

By DOMINIQUE BOCKELÉE-MORVAN

The IAU XXIX General Assembly is celebrating the golden year of exploring small solar system bodies. With the European Space Agency's [Rosetta](#) mission surveying comet 67P, NASA's [Dawn](#) and [New Horizons](#) missions providing our first close-up views of dwarf planets Ceres and Pluto, and the [Cassini](#) mission sending back detailed images of Saturn's satellites, this year marks an important step toward further understanding small worlds.

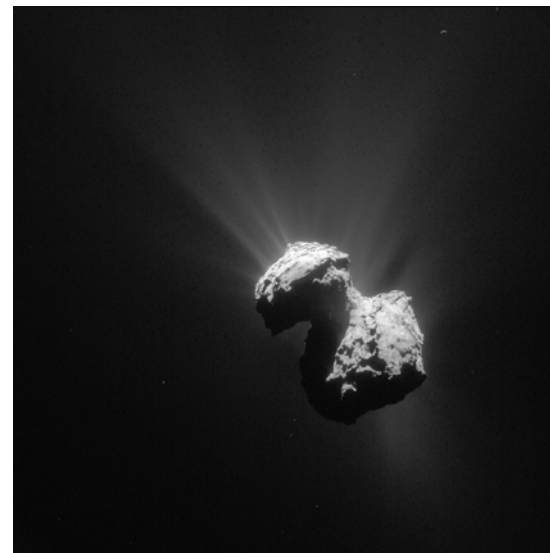
Focus Meeting (FM) 9 is gathering scientists from all corners of the globe to present and discuss the spectacular results obtained from these missions, as well as recent achievements obtained from past missions, comprehensive spectroscopic surveys from space (e.g., [Herschel](#), [NEOWISE](#), and [Gaia](#)), ground-based observations, and geochemical analyses. This meeting will be the opportunity to discuss the state of our understanding of the nature of the various populations of small bodies in the solar system, including icy satellites, from the perspectives of planetary physics and cosmochemistry.

Detailed investigations of the physical and chemical properties of asteroids, comets, trans-Neptunian objects, and dwarf planets are of tremendous importance for understanding the formation of the solar system and the overall process of star and planet formation. These bodies are the remnants — either fragments or survivors — of the swarm of planetesimals from which the planets were formed. They are thus primitive building blocks of the planet-formation process that can offer clues to the chemical

mixture from which the planets formed some 4.6 billion years ago.

It is now clear that there was a general mixing of different populations of small bodies at early stages of the solar system, as a result of planetary migration. Indeed, geochemical evidence obtained from analyses of extraterrestrial samples, and the recent discovery of active and icy asteroids, shows that differences between primitive asteroids and comets are much less sharp than previously thought. During FM 9 the interrelationships between the various populations of small bodies will be investigated through a detailed comparison of their physical and chemical properties. This will be an important step toward understanding how they formed and evolved.

The interpretation of the isotopic, molecular, and mineralogi-



Comet 67P/Churyumov-Gerasimenko imaged by the Rosetta navigation camera on 7 July 2015 from a distance of 154 km (96 miles). [ESA, Rosetta, NAVCAM]

Focus Meeting 9: Highlights in the Exploration of Small Worlds

| | |
|------------------------|---|
| Start date | Tuesday, 11 August |
| End date | Thursday, 13 August |
| Oral sessions | Room 313A, Hawai'i Convention Center |
| Posters | Exhibit Hall 1, Hawai'i Convention Center |
| Coordinating Divisions | Division B: Facilities, Technologies and Data Science Division F: Planetary Systems and Bioastronomy |

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

cal properties of primitive solar-system material is complex and can only be achieved through a multidisciplinary approach. A full session of FM 9 will discuss solar-system formation in the light

of protoplanetary disk models, experimental work, and recent insights on the composition of comets and protoplanetary disks. FM 9 will certainly spark the interest of those who are curious about the new worlds revealed by recent space exploration and what they reveal about our solar system and planetary systems in general. 🌸



DOMINIQUE BOCKELÉE-MORVAN is the outgoing President of IAU Commission 15, Physical Study of Comets & Minor Planets, and Research Director at the Observatory of Paris, France. She is deeply involved in the European Space Agency's Rosetta mission as Co-Investigator on both the Visible InfraRed Thermal Imaging Spectrometer (VIRTIS) and Microwave Instrument for the Rosetta Orbiter (MIRO).

ASTRONOMY EDUCATION RESEARCH

Building an International Database of Astronomy Education Research

By PAULO BRETONES, STEPHANIE SLATER & TIM SLATER

Astronomers continuously debate which strategies are the most effective for teaching students. In a field with such a long history, it is probably unsurprising that many systematic studies on astronomy teaching have been conducted over the years. Unfortunately many of these studies have been lost due to a lack of easily accessible publication archives.

As part of the new IAU Commission C1, Astronomy Education and Development, a Working Group on Theory & Methods in Astronomy Education is in the first phases of mounting an international effort to gather the methods and results of astronomy education research from across the globe. The end goal of this work is to identify knowledge gaps in order to present a new international agenda for research on astronomy education.

We believe that considerable scholarly effort exists around the world, but that much of it is “hidden,” therefore systematic surveys need to be conducted internationally to collect and synthesize this material to guide



Paulo Bretones (left), Stephanie Slater (center), and Tim Slater.
[Inge Heyer]

Splinter Meeting:
IAU Working Group on Theory & Methods in Astronomy Education

| | |
|-------------------------|---------------------------------------|
| Date | Tuesday, 11 August 2015 |
| Time | 10:30 am to 12:00 pm |
| Location | Room 318A, Hawai'i Convention Center |
| Coordinating Commission | C1: Astronomy Education & Development |

future work. Much of the work in these venues is certainly not known by researchers in astronomy, not only because they belong to a different theoretical and methodological framework, but also because they are related to teaching physics and general sciences rather than astronomy specifically.

To improve the present situation, we are proposing to hold a series of meetings around the world to encourage surveys of already published materials, studies, and new key lines of research. The first such conference is [IAU Symposium 326](#), "Research in Astronomy Education: Far Reaching Impacts and Future Directions," to be held 3 to 7 October 2016 in Heidelberg, Germany. We believe that this meeting and others like it will raise the visibility of authors and institutions and enable studies showing trends and gaps, allowing future developments and collaborations. 🌸

PAULO BRETONES is Chair of the new C.C1 Working Group on Theory & Methods in Astronomy Education; he is also a professor at the Federal University of São Carlos, Brazil. STEPHANIE SLATER is the Director of the Center for Astronomy & Physics Education Research (CAPER). TIM SLATER is the University of Wyoming Excellence in Higher Education Endowed Professor of Science Education and Editor of the [Journal of Astronomy & Earth Sciences Education](#).



AMERICAN ASTRONOMICAL SOCIETY

Advocating for Astronomy, Disseminating Knowledge, and Promoting Education and Outreach Since 1899.

Visit Us at Booth #336

Contact:

Diane Frendak
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   Join the Conversation & Share Your Photos! #IAU2015

Astronomy and Something More

Ricardo García wants to meet other people who do astronomy outreach.

By IRIS NIJMAN, *Kai'aleleia*

“Not to teach, but to motivate and excite people” — that’s the goal of [Ricardo García](#), an exhibitor at the booth of the [Chilean Astronomical Society \(SOCHIAS\)](#). García, who studied astronomy and audiovisual communication at the University of Chile in Santiago, loves outreach. “I want to touch and reach people, and give them a sense of wonder about the universe,” he says. “If people get motivated about astronomy, they get motivated about other things as well. Then they will start to learn new things themselves, through new technologies.”

As a child, García always wanted to be an astronomer, but at university he discovered he wanted to do outreach instead of research. He had been teaching astronomy classes for children at an [amateur astronomical association](#) in Santiago since he was 17 years old. “So I decided to study filmmaking, to gather new skills that I could use in outreach,” García explains. In 2011, when he was working at the Andean Astronomical Observatory in Santiago, he gave an audiovisual tour about the most beautiful objects in the



Ricardo García at Booth 345. [SOCHIAS]

southern sky to Charles Bolden, NASA Administrator and former Space Shuttle commander. Bolden was so touched that he invited García to the launch of the [Mars Rover Curiosity](#). “I realized that I was doing something right, and that outreach was my future,” says García.

This year García started to make his own online Spanish-language podcast series called [Astronomía y algo más](#), which translates as “astronomy and something more.” Every Thursday a new hour-long episode is uploaded, focused on one mind-blowing concept. “I have a newsletter in which I invite people to come up with questions and topics,” he says. “I got a lot of positive reactions. Families with kids listen to it. I now have around 5,000 downloads per episode.” García feels that there is a need

Congratulations
to

Peter Frinchaboy!

You have won a
dinner for two (value: \$100) at
[Tropics Bar & Grill at](#)
[Hilton Hawaiian Village](#)
at 2005 Kalia Rd.

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

Special Guests in the Exhibit Hall

Among the programs highlighted by the IAU at Booth 329 in the Exhibit Hall are those being carried out under the Cosmic Light theme for IYL 2015. Please come by during the morning and afternoon coffee breaks to meet some of our project leaders:



| | |
|--|---|
| Tuesday, 11 August 10:00 am & 3:30 pm | Cosmic Light Project Coordinator Pedro Russo, Dark Sky Meter App |
| Wednesday, 12 August 10:00 am & 3:30 pm | Cosmic Light Global Coordinator Sze-leung Cheung, IAU Office for Astronomy Outreach |
| Thursday, 13 August 10:00 am & 3:30 pm | Cosmic Light Project Coordinator Rosa Doran, Cosmic Light EDU Kit |

for more outreach in Spanish, but in the future he wants to do the podcasts in English as well.

This week, García is at the SOCHIAS booth to tell everybody

about the astronomical sites in Chile, the telescopes, the Ph.D. programs, and tourism in the area. He has also brought some virtual-reality glasses to the IAU General Assembly, which only need a [Google Cardboard](#) and access to his [website](#) on a smartphone. “I like to see the face of everybody who looks through the glasses and shouts out ‘Wow!’ That is a magic moment.” García is recording new episodes for his podcasts while he is in Hawai‘i. He is also recording videos about things that he likes in the Exhibit Hall for the [Periscope](#) app, a live-broadcast platform connected to Twitter that allows people who follow him to ask questions in real time.

In the future, García wants to be more involved in astronomy outreach. He wants to make a TV series, use augmented reality for kids, and other new innovations. That’s why he wants to get to know everybody involved in the outreach scene. “I meet so many great people and see other outreach projects here,” he says. “I would like to help out, connect to other projects and share ideas!”

If you would like to get to know Ricardo García and try out his virtual-reality glasses, come to Booth 345 in the Exhibit Hall! 🌸

IAU SYMPOSIUM 319

Galaxies at High Redshift and Their Evolution Over Cosmic Time

By SUGATA KAVIRAJ

Over the last two decades, a convergence of powerful observational facilities and high-performance computing has significantly advanced our understanding of galaxy evolution. Detailed empirical studies have quantified the evolution of galaxy properties (particularly over the latter half of cosmic time), and theoretical models, within the framework of the Lambda Cold Dark Matter (Λ CDM) paradigm, have met with significant success in reproducing these properties.

While our knowledge is still dominated by work in the nearby

(redshift $z < 1$) universe, an explosion of multiwavelength data at high redshift is revolutionizing our understanding of emergent galaxies at $z > 1$. Since the bulk of cosmic stellar-mass assembly and black-hole growth takes place at these redshifts (both peaking around $z = 2$), answers to basic questions at these epochs are central to a complete understanding of galaxy evolution. For example, what processes drove the growth of early stellar populations and black holes? How did interactions between galaxies and their constituent black holes shape the universe we see



This Hubble image, from the Cosmic Assembly Near-infrared Deep Extragalactic Legacy Survey (CANDELS), is a playground for astronomers studying galaxy formation and evolution. [NASA, ESA, A. Riess, STScI, JHU, D. Jones, S. Rodney, S. Faber, UCSC, H. Ferguson, CANDELS Team]

today? How did the morphological mix of the visible universe evolve into today's Hubble sequence? How well do our current theoretical models reproduce the properties of galaxies in the early universe?

Recent and ongoing studies are delivering a dramatic improvement in our understanding of these fundamental questions. Hubble Space Telescope (HST) surveys such as [CANDELS](#), combined with other from Spitzer and Herschel, are now constraining galaxy parameters — such as star-formation rates, ages, metallicities, masses, and sizes — to $z = 2$ and beyond. Together with deep Chandra observations, these data are probing the co-evolution of young galaxies and their black holes, as well as the critical role of AGN-driven jets in producing negative feedback, which quenches star formation and influences the morphology of

The First and Last Face You See

When you spend a week or two at a conference, you eventually come to regard some of the people who staff the venue — security guards, concession-stand vendors, and the like — as acquaintances and perhaps even friends. Today I would like to introduce you to **Yugan**, 28 years old, born in Honolulu, and the happiest and most positive security guard I have ever met. He wishes everybody who comes into the Hawai'i Convention Center “a wonderful day.”

What do you like about Hawai'i?

I feel at home. If you are born here, you understand this special place — the culture and the people. There are only about 150,000 native Hawaiians left. That's why I understand the people who protest against the Thirty Meter Telescope. Somebody has to stand up and do something for our people, because we have nobody but ourselves.

What do you like about this job?

I like the interaction with people, and I want to be hospitable. You all come to visit this place, and you don't know anything about it, so I'm here to help! I like to welcome you all with the spirit of aloha.

What does the spirit of aloha mean to you?

It's all about love. To open yourself — your heart, mind, and spirit. Hawaiians will do everything they can to help you. They treat each other with aloha, and they have hope in their hearts.

Why are you always happy?

I am the first and last face you see when you come to the Convention Center, so if I don't smile, you don't have a good day. I need to smile! Also, God blesses me every day to show people in the right direction and to help them.

Do you have a tip for visitors to Hawai'i?

My favorite restaurant is [Ono Hawaiian Foods](#). When you have time, learn about our culture at the [Bishop Museum](#); it is a great place. Or go surfing on the South Shore.

— Iris Nijman, Kai'aleleiaaka



[Iris Nijman, Kai'aleleiaaka]

galaxies at early epochs.

High-resolution near-infrared imaging from HST is quantifying the origin and evolution of the Hubble sequence in the early universe, allowing us to probe the evolving morphological mix of the visible universe over cosmic time. In parallel, near-infrared integral-field spectrographs on 10-meter-class optical telescopes, such as [SINFONI](#) and [OSIRIS](#), together with facilities like the 30-meter telescope operated by the Institute for Radio Astronomy in the Millimeter Range (IRAM), are enabling detailed spatially resolved studies of the kinematics, star formation, and molecular gas in significant samples of early galaxies, yielding crucial insights into what drives the assembly of the stellar populations that dominate our universe today. This growing empirical literature is motivating an array of theoretical work, in particular high-resolution hydro-simulations, which are elucidating the cosmic drivers of stellar-mass buildup, black-hole growth, and

morphological transformations with unprecedented accuracy.

Our current understanding of galaxy evolution will shortly be bolstered by new instruments with multiplexing capabilities — such as the [K-Band Multi-Object Spectrograph \(KMOS\)](#), the [Multi Unit Spectroscopic Explorer \(MUSE\)](#), and the [Multi-Object Spectrograph For Infra-Red Exploration \(MOSFIRE\)](#) — and by others that offer high-resolution imaging in the long-wavelength regime, such as [ALMA](#) and the [SKA precursors](#). These will enable

| IAU Symposium 319: Galaxies at High Redshift and Their Evolution Over Cosmic Time | |
|---|---|
| Start date | Tuesday, 11 August |
| End date | Friday, 14 August |
| Oral sessions | Room 311, Hawai'i Convention Center |
| Posters | Exhibit Hall 1, Hawai'i Convention Center |
| Related event | S319 Plenary: Reinhard Genzel (Max Planck Institute for Extraterrestrial Physics), "The Formation and Evolution of Massive Star Forming Disk Galaxies," Wednesday, 12 August, 8:30 to 10:00 am, Ballroom B, Hawai'i Convention Center |
| Coordinating Division | Division J: Galaxies and Cosmology |
| For details on presenters, topics, and times see the online program or mobile app . | |

unprecedented studies of stellar and gas kinematics at high redshift and allow us to investigate the poorly understood interplay between gas and star formation in the early universe.

In addition, the depth and resolution of the [eROSITA](#) X-ray mission will offer transformational insights into large-scale structure and active galactic nuclei (AGN) across cosmic time. Looking further ahead to the turn of the decade, the field is poised for yet another revolution, both in terms of the ground-breaking depth and area offered by future imaging and spectroscopic surveys (e.g., [LSST](#), [Euclid](#), [4MOST](#)), and in our ability to comprehensively probe galaxy evolution all the way up to the epoch of reionization, using instruments like the [James Webb Space Telescope \(JWST\)](#) and the [European Extremely Large Telescopes \(E-ELT\)](#).

The aim of [IAU Symposium 319](#) is to bring together the wealth of empirical and theoretical studies that are leveraging today's instruments and to set the stage for the exploitation of new and forthcoming facilities. 🌸



SUGATA KAVIRAJ is Associate Professor at the University of Hertfordshire, U.K., Senior Research Fellow at Worcester College Oxford, and Co-Chair (with Henry Ferguson of the Space Telescope Science Institute) of IAU Symposium 319.

How to Say It in Hawaiian



- Ahi: fire
- Hana: work
- Haumana: student
- Kala: money
- Mauna: mountain
- Ua: rain

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](#).

Saving Our Window on the Universe

By RICHARD GREEN & CONSTANCE WALKER

As an international professional community we have the opportunity to put our good ideas into practice. Please come to the Business Meeting of the new Commission B7, Protection of Existing and Potential Observatory Sites.

We will address several aspects of protection of our ground-based astronomical sites against interference of glare from artificial outdoor lighting and radio-spectrum interference. Sites around the world increasingly depend on outreach and educa-



As dawn broke on Sunday, 9 August, the twin 10-meter telescopes of the W. M. Keck Observatory were wrapping up the night's observations, employing their laser-guide-star adaptive-optics systems.
[Babak Tafreshi/NAOJ]

Splinter Meeting — From C50 to C.B7 (Protection of Existing and Potential Observatory Sites): Business Meeting to Shape Future Plans

| | |
|-----------|---------------------------------------|
| Organizer | Richard Green (University of Arizona) |
| Date | Thursday, 13 August |
| Time | 12:30 to 2:00 pm |
| Location | Room 328, Hawai'i Convention Center |

tion of the public and policy makers; that activity must come from our community as a whole, not just from a handful of us.

We have a more comprehensive charge from the IAU, which is to protect humankind's right to a dark night sky. We will discuss cultivation of sustainable projects that are under development

Honolulu Weather Forecast ☁️ 11-12 August 2015

TUESDAY, 11 AUGUST *High: 87°F / 31°C Low: 76°F / 24°C*

| Morning | Afternoon | Evening |
|--------------------|--------------------|--------------------|
| Partly cloudy | Partly cloudy | Partly cloudy |
| 10% chance of rain | 25% chance of rain | 25% chance of rain |

WEDNESDAY, 12 AUGUST *High: 88°F / 31°C Low: 77°F / 25°C*

| Morning | Afternoon | Evening |
|-------------------|-------------------|--------------------|
| Partly cloudy | Partly cloudy | Partly cloudy |
| 5% chance of rain | 5% chance of rain | 15% chance of rain |

Extended forecast: Showers will remain focused over windward slopes. For the next few days the forecast continues to depend on the evolution of hurricane Hilda; however, regardless of Hilda's intensity, heavy rainfall will be possible later this week. Hilda, or its remnants, will most likely be clearing the state sometime during the weekend. Source: [Weather Underground](#), [National Weather Service](#).



A fish-eye view westward from the Gemini South Telescope at Cerro Pachón. [Credit: Pedro Sanhueza]

for the [International Year of Light 2015](#). Our goal is an informed public, using programs that are unique to each region, for a sustained, long-term effort on the themes of conserving energy and reducing light pollution.

Please come to our 90-minute session and lend your voice to the development of realistic plans for our community to protect its interests in line with preservation of the natural environment. 🌸



RICHARD GREEN is Assistant Director of Steward Observatory at the University of Arizona, incoming President of Commission B7, and Chair of the [IAU Cosmic Light Working Group](#). **CONNIE WALKER** is the incoming Vice-President of C.B7. She works in the Science Education Department at the National Optical Astronomy Observatory in Tucson, Arizona, and serves on the Board of Directors of both the [International Dark Sky Association](#) and the [Astronomical Society of the Pacific](#).