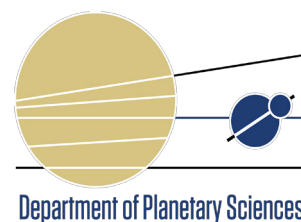




UA SCIENCE

LUNAR & PLANETARY LABORATORY



LUNAR AND PLANETARY LABORATORY NEWSLETTER

SPRING 2015

Malhotra Elected to National Academy of Sciences and American Academy of Arts and Sciences

Professor Renu Malhotra has been elected as a member of both the National Academy of Sciences (NAS) and the American Academy of Arts & Sciences.

The NAS is a private, non-profit society of scholars, established in 1863. It provides objective advising on science and technology issues. Members are elected by their peers in recognition of distinguished and continuing accomplishments in original research. Approximately 500 of its members have won Nobel Prizes. LPL faculty members Randy Jokipii, Jay Melosh (Emeritus), and George Rieke are also elected members of the National Academy of Sciences.

The American Academy of Arts & Sciences is one of the oldest and most prestigious academic societies in the U.S. It was established in 1780 to convene leaders from a variety of disciplines (academic, business, government) for the purpose of addressing critical challenges to society. Notable members from the discipline of science have included Percival Lowell, Albert Einstein, and Mariah Mitchell. Among the Academy Fellows, there are more than 250 Nobel laureates and 60 Pulitzer Prize winners.

Professor Malhotra received her Ph.D. in Physics from Cornell. Her research focus is orbital dynamics and theoretical astrophysics. She was awarded the Harold C. Urey Prize (AAS Division for Planetary Sciences) in 1997. Professor Malhotra joined the LPL faculty in 2000. In 2010, she was named a Galileo Circle Fellow of the University of Arizona.



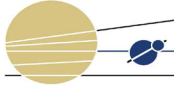
Professor Malhotra is Chair of the Theoretical Astrophysics Program at the University of Arizona.

More information about Professor Malhotra and her election to the American Academy of Arts & Sciences and to the National Academy of Sciences is available from two UA News articles at uanews.org.



Roger Angel and George Rieke congratulate Dr. Malhotra





Welcome from the Director

Welcome to the Spring 2015 LPL Newsletter. As we finish off another academic year, there is, as always, lots to talk about.

The most exciting news is that [Professor Renu Malhotra](#) has been named a member of the National Academy of Sciences, one of the highest honors an American scientist can receive. For good measure, she also was named a member of the American Academy of Arts & Sciences.

The other big piece of faculty news is that two long-time LPL faculty members, [Randy Jokipii](#) and [Rick Greenberg](#), are retiring over the summer. Rick has been at LPL for roughly a quarter of a century, but Randy has been here longer—he was one of the early hires when the Lunar and Planetary Laboratory added an academic component and the Department of Planetary Sciences was born.

In addition, our talented graduate students continue to accrue honors. Most notably, [Jamie Molaro](#) won the UA College of Science award for the most outstanding effort in public outreach, based on the very successful Art of Planetary Science event that she designed and organized. The College gives out one award each for Research, Teaching and Service each year—an LPL grad has won one of those three each of the last four years, and the award-winners have been in all three categories, a testament to our students' performance.

We also have several items of personal interest involving the LPL family, ranging from births and graduations to just introductions to the people you might see in the hallway (if you work at LPL) or hear about from LPL friends (if you're part of LPL's extended family).

But perhaps the most impressive thing about LPL is still the work that is done here. This newsletter includes more than two dozen articles with an LPL twist from various news outlets, covering a broad range of topics. Reading those will give you some sense of the amazing range of interesting things going on at LPL, from flying kites in Hawai'i to study Mars to using "leftover" data from Catalina Sky Survey to study black holes. And because not every excellent paper generates a press release, you'll have to use either your imagination or a database of the scientific literature to understand the full scope of the science that goes on at LPL.



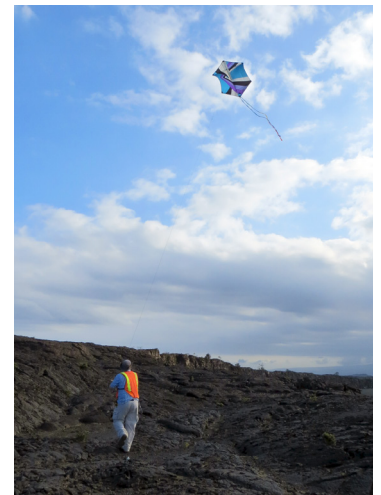
Enjoy the newsletter, and as always, if you have news about you, your career, or your family, please let us know, so that we can pass it along to all the people who would be interested.

Timothy D. Swindle, Ph.D.
Department Head and Laboratory Director

LPL Scientists Fly Kites in Hawaii to Study Mars

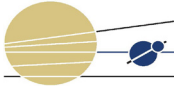
LPL Assistant Professor [Christopher Hamilton](#) and Postdoctoral Research Associate [Stephen Scheidt](#) fly kites over Hawaii to unravel the past mysteries that shaped Mars. The kites are equipped with off-the-shelf instruments such as a camera, a GPS, and orientation sensors. The resulting images are assembled into tens of thousands of extremely detailed and accurate 3D digital terrain models (DTMs) through use of parallel computing and powerful software algorithms. The DTMs are used to interpret images of Mars taken with the LPL HiRISE camera aboard NASA's Mars Reconnaissance Orbiter.

Hamilton's team chose Hawaii's Kilauea volcano as a study area because it is a "chemical desert" with several geologically very young lava flows, including a flow from December 1974. Comparing images of the Martian surface taken by HiRISE with images of the December 1974 Kilauea flow reveals similarities. For example, many martian features that have been interpreted as channels carved by running water are more likely to be the result of a volcanic process that Hamilton describes as a "fill-and-spill" lava emplacement, which developed when lava accumulated in enormous "perched ponds" that breached like an overtopped dam, giving way to catastrophic floods of lava. "Hamilton explained that liquid lava first filled the area between the cliffs from older lava flows like a big bathtub. When the perched lava pond breached, the lava surged forward, causing plates of cooled lava on the surface to break apart and fresh lava to well up from underneath. As the plates were floating toward the drain, they became crumpled. The DTMs even revealed a "bathtub ring" formed when lava filled the pool. "The question that drives us is: How can we assemble this kind of data for Mars landscapes and decide whether a feature is volcanic or fluvial—shaped by water—and allow us to develop a story?" Hamilton said.



The technique used to acquire the data, Multi-View Stereo-Photogrammetry, produces images that appear to be aerial photographs but are actually image mosaics projected onto DTMs. "The kite takes an image every two seconds, producing up to tens of thousands of photos of a site," Scheidt said. "The software then removes any distortion and stitches those images together to create a virtual representation of the terrain that you would never have otherwise." This orthorectification process uses massive computing power and takes weeks to render a terrain model, but results in resolution high enough to clearly show footprints in the sand blanketing the lava flow.

Read the full story online at lpl.arizona.edu/news/2015/spring.



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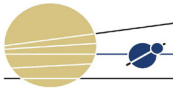
Professors Greenberg and Jokipii to Retire in 2015

Rick Greenberg began his career at LPL in 1986 as a Senior Research Scientist before becoming a Professor in 1990. His research has centered on investigations of the dynamical evolution of the solar system, including studies of asteroids, meteorites, planetary rings, and the formation of the planets. Rick has had a long-term research program in tidal processes and orbital resonances among natural satellites, and their implications for the history and physical character of the satellites. Recent work has included studies of the tidal evolution of extra-solar planets and the implications for planetary-system formation and planetary properties. Greenberg was a member of the Imaging Team for NASA's Galileo spacecraft mission from 1977 until 2003, where his research became focused on characterizing and interpreting Jupiter's satellite Europa. This work led to the publication of *Unmasking Europa* in 2008. From 1989 until 2000, Professor Greenberg served as director of the Science and Mathematics Education Center (SAMEC). He also founded and directed the Image Processing for Teaching (IPT) project and the Center for Image Processing in Education, which gave students in classrooms across the nation the power to engage in substantive scientific exploration and discovery using state-of-the-art digital image processing. Professor Greenberg has mentored many PTYS students over the years, including William Bottke (PTYS), Melissa Dykhuis (PTYS), Sarah E. Frey (Applied Math), Greg Hoppa (PTYS), Terry Hurford (PTYS), Brian Jackson (PTYS), Michael Nolan (PTYS), David O'Brien (PTYS), James Richardson (PTYS), Chris Schaller (PTYS), Joseph Spitale (PTYS), Randy Tufts (Geosciences), and Christa L. Van Laerhoven (PTYS).



Randy Jokipii has been with LPL for over 40 years. Prior to joining LPL as a full professor in 1973, he was on the faculty at both the University of Chicago and Caltech. He is one of the world's leading theoreticians on the study of cosmic rays in the Galaxy and solar system. He is responsible for many of the field's current paradigms including the origin of the 22-year cycle in the intensity of galactic cosmic rays seen at Earth. Professor Jokipii has had very broad research interests at LPL including cosmic-ray astrophysics, solar, heliospheric and astrophysical plasma physics, plasma and magnetic field turbulence in astrophysical fluids, and the acceleration of charged nuclei to high energies by astrophysical shock waves. He has had formal involvement in a number of spacecraft missions, including Ulysses as an Interdisciplinary Scientist, and as a Guest Investigator for both the Advanced Composition Explorer mission and Voyager Interstellar Mission, the latter of which he remains actively involved. In 1985, Professor Jokipii led a proposal for a legislative decision package to establish a theoretical astrophysics program (TAP) at the University of Arizona. He was named the founding director of TAP, and served for more than a decade in that capacity. His vision was that "a strong, coordinated theoretical astrophysics program—coupled with the existing observational program—can provide an increased intellectual basis for research in astronomy, planetary sciences, physics and indeed many other areas on campus." TAP quickly hired several new faculty (Adam Burrows, David Arnett, Ramesh Narayan, Jonathan Lunine) whose strong record of research and scholarship brought them wide recognition and honors and soon catapulted the University of Arizona into national stature in theoretical astrophysics. Professor Jokipii is a Fellow of both the American Physical Society and the American Geophysical Union. He was named a University Regents' Professor in 1996 and was elected to the National Academy of Sciences in 2001. His former Ph.D. students include Guy Consolmagno (PTYS), Vladimir Florinski (PTYS), Chung-Ming Ko (Physics), David Kopriva (Applied Math), Vladimir Pariev (Astronomy), Chunsheng Pei (AME), Lance Williams (PTYS), and Aramais Zakharian (PTYS).





Department

2015 AP and Classified Staff Excellence Awards

Congratulations to [Sarah Sutton](#), recipient of this year's LPL Appointed Personnel Staff Excellence Award, and to [Eneida Guerra de Lima](#), recipient of the 2015 Classified Staff Excellence Award!

Sarah Sutton is a Photogrammetry and Image Processing Scientist with the HiRISE. She began working for Alfred McEwen as a student in 2006 and moved into a staff position in 2008. The group she leads, which includes 4 undergraduate students, produces digital terrain models (DTMs) from HiRISE, LROC, and CTX images. The nomination letters for Sarah cite many notable contributions, including: development of methods to correct geomet-

ric distortions of images (produced by spacecraft pointing jitter), which not only improve DTMs and orthoimages, but are also valuable and applicable to other scientific studies and to certifying landing sites; volunteering to support special studies, proposal preparation, and educational and outreach activities; implementing innovations and automations that increase DTM production; and exceeding job expectations by providing service such as training LPL graduate students in production and analysis of DTMs.

Eneida Guerra de Lima joined LPL in October 2013 as an Information Technology Support Analyst, Principal, and immediately began making positive changes to LPL, improving the quality and effectiveness of IT services, identifying weaknesses and making recommendations and improvements. Eneida

brought to LPL her expertise and previous experience with UA computing resources such as UAConnect and Outlook, and desktop support. Some specific examples of Eneida's superior performance include: identifying weakness in data security for business operations and making suggestions for updating and consolidated LPL services; multitasking and solving routine problems while carrying on other, more technical responsibilities; providing excellent customer support; taking on projects like setup and networking of new copiers and advising and support of academic AV requirements. Sarah and Eneida received their kudos at the LPL Spring Awards reception, held on April 22. As the classified staff recipient, Eneida's contributions were also acknowledged by Dean Joaquin Ruiz at the annual College of Science Staff Excellence Awards Luncheon.

WISE Honors Susan Brew, Kristin Block

Two LPL staff members were honored at the awards banquet for the Women in Science and Engineering (WISE) program this spring.

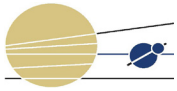
[Susan Brew](#), Program Manager for Arizona Space Grant Consortium, received the award for Excellence in Campus Outreach for STEM Diversity. The award celebrates Susan's accomplishments during her 25 years with Space Grant, a program that recruits a diverse group of undergraduates into research internships projects, and, for the last 10 years, at least, can boast a 98% graduation rate with 90% of the graduates moving into either the STEM workforce or into graduate school.

[Kristin Block](#), a Science Operations Engineer for HiRISE, was a nominee for the award for Excellence in STEM Diversity, based on her work as a founding board member and vice president of Tucson Women in STEM, service on the STEM-ED Advisory Panel for Children and Family Resources for reducing teen pregnancy through after-school STEM activity involvement, and other activities including the LPL Women organization and serving as vice president of the UA LGBTQ Advisory Board. In a similar vein, Kristin was also nominated for the on-campus Peter W. Likins Inclusive Excellence Award.

Dan Moynihan, 1971-2015



Paul (Dan) Moynihan passed away on February 18, 2015. Dan had been a Staff Engineer with Professor Robert Brown's Cassini VIMS group since 2000. Dan will be missed by his LPL colleagues.



Department

LPL Fieldtrip Fall 2014: Southern New Mexico



*Catherine Elder at White Sands National Monument
(courtesy Margaret Landis)*

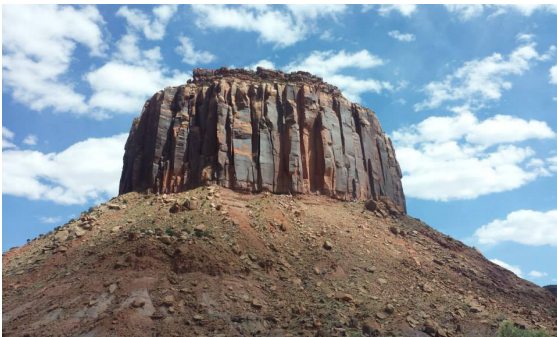


*Up the rim of Kilbourne Hole
(courtesy Melissa Dykhuis)*



*White Sands
(courtesy Catherine Elder and Melissa Dykhuis)*

LPL Fieldtrip Spring 2015: Canyonlands, Utah



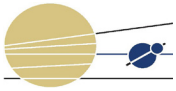
*Top Left: Erosional "monuments" within Canyonlands
Top Right: Ali Bramson with an incised meander at Goosenecks State Park, Utah*



*Bottom Left: The class walking within the joints in the rocks in The Needles, Canyonlands
Bottom Right: Agathla Peak, a diatreme in northern Arizona*

Photos courtesy of Ali Bramson.

More details about the LPL Fall and Spring Fieldtrips can be found online at www.lpl.arizona.edu/news/2015/spring.



Department



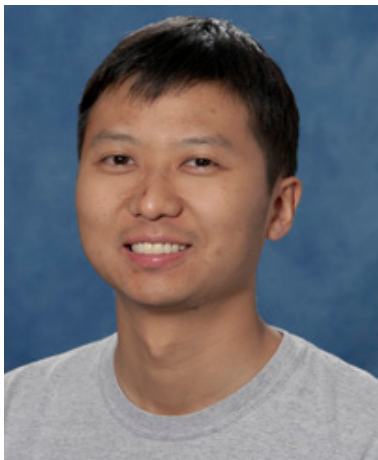
Get to Know a Staff Scientist: Federico Frascchetti

Federico Frascchetti is an Associate Staff Scientist at LPL and Guest Lecturer/Faculty Affiliate Member of the Theoretical Astrophysics Program at the University of Arizona. He joined the department in 2009. His research interests are in the origin of cosmic-rays, the particle acceleration/transport and the turbulence generation at shocks emitted in multi-scale explosive phenomena, as well as coronal mass ejections from the Sun, supernovae and Gamma-Ray Bursts (GRBs).

He earned his B.S. and M.S. (2001) in Italy at the University of Rome La Sapienza and his Ph.D. (2004) at the University of Rome La Sapienza/University of Trento. His doctoral research was on the modeling of ultra-relativistic shocks of GRBs. For this work, he was awarded the Tacchini prize by SAI (Italian Society for Astronomy).

Prior to joining LPL, Federico held a postdoctoral appointment at Brera Astronomical Observatory (Italy) with the Swift mission for GRBs, before moving on to work as a Post-doctoral Fellow at CEA/Saclay (France), where his research was on numerical simulations of cosmic-rays and convective instabilities at supernova remnant shocks.

In his free time, Federico enjoys swimming and tennis, playing the violin, and cooking. He also enjoys time with his wife, renaissance art historian Evgenia Diakonenko, and his two children.



Get to Know a Post-doc: Xi Zhang

Xi Zhang joined LPL in January 2013, working as a Bisgrove post-doctoral scholar on planetary atmospheres with Dr. Adam Showman. His research focuses on developing a fundamental understanding of the planetary climate system from observational, theoretical and modeling work. He has been involved in several projects on Venus, Jupiter, Saturn, Titan, Neptune, extra-solar planets, brown dwarfs, as well as Earth. Xi's work covers topics on atmospheric science, including fluid dynamics, spectroscopy, chemistry, cloud microphysics, and radiative transfer.

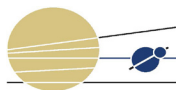
Xi is from Sichuan, China. He studied at Peking University, where he earned a B.S. in Space Physics (2007). Xi earned his Ph.D. in 2012 from California Institute of Technology with a thesis on aerosol and chemistry on planetary atmospheres in the solar system. Xi enjoys reading, swimming, and outdoor activities.

LPL Asteroid and Meteorite Research Highlighted in Display at Rep. McSally's Office

A display highlighting LPL's work on asteroids and meteorites has been constructed by Dolores Hill and installed in U.S. Representative Martha McSally's office in Washington, D.C. University of Arizona President Ann Weaver Hart officially presented the display to Representative McSally on April 22.

The display includes models of the OSIRIS-REx spacecraft and its target, the asteroid Bennu, as well information about LPL's asteroid surveys, Catalina Sky Survey (CSS) and Spacewatch, and a sample of the Almahata Sitta meteorite, which was discovered as an asteroid by CSS before impacting Earth the next day. There is also information about the planetary defense aspect of asteroid studies, with photos of the Chelyabinsk fireball and Meteor Crater, and samples of the resulting meteorites from each, and information about some other meteorites of local interest.





Outreach

LPL Outreach: Spring 2015

by Sarah Morrison

Spring is a busy time for outreach! LPL students, faculty, staff, and volunteers have reached well over 5,000 people this spring semester alone—ranging from introducing preschoolers to “space rocks” to giving popular monthly lectures at Borderlands Brewery as part of our Space Drafts Public Talk Series, a collaboration with Steward Observatory and the National Optical Astronomy Observatory (NOAO).

Other highlights for the semester included LPL participation in two events held in Phoenix: Saturday, January 31, at the Connect2STEM event on UA’s Biomedical Campus, and February 1 at the pre-Super Bowl XLIX festivities. LPL students and staff were there to showcase the department’s broad research strengths and 500 football and science fans alike enjoyed learning about the OSIRIS-REx mission as well as how we discover and characterize exoplanets.

LPL activity tables at the Tucson Festival of Books (TFoB) were huge hits this year. The department had a strong presence at TFoB’s Science City, with participation from OSIRIS-REx (led by Dolores Hill), Teaching Teams (led by Dr. Steve Kortenkamp), and LPL graduate students (led by Sarah Morrison), along with LPL’s Maria Schuchardt as Science City’s Science of Tomorrow tent manager. The graduate students themselves talked directly with over 530 people about our Solar System and beyond!

The LPL Speaker Request form has increased our visibility to the community and allowed us to reach a more diverse audience ranging from preschool children to retirees. Keep those requests coming!

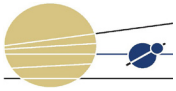
We have many more events on the way, so stay tuned!



Top left: LPL graduate students Ali Bramson and Donna Viola (shown) talk about “Crazy Craters!!! Windows into Martian Ice” as part of our Space Drafts Public Talk Series at Borderlands Brewery on February 11, 2015.

Top right: LPL graduate student Donna Viola wows a family at the Tucson Festival of Books with a comparison of our terrestrial planets on March 14, 2015.

Bottom: LPL graduate student Sarah Morrison and OSIRIS-REx Ambassador/LPL staff Jonna Zucarelli show off the OSIRIS-REx mission and how we use spectroscopy to figure out the composition of objects in our Solar System and beyond at Connect2STEM on January 31, 2015.



Graduate

Keane Receives 2015 Kuiper Award



Congratulations to **James Tuttle Keane**, recipient of the 2015 Gerard P. Kuiper Memorial Award.

James Keane is a fourth-year graduate student advised by Assistant Professor Isamu Matsuyama. He graduated from the University of Maryland (College Park) in 2011 with B.Sc.

degrees in Astronomy (with High Honors) and Geology (with Honors). Keane's research interests include the formation and evolution of solar system planets, planetary satellites, and small bodies, with an emphasis on the interactions between rotational/orbital dynamics and geologic processes of terrestrial and icy bodies.

Keane was awarded a NASA Earth and Space Science Fellowship (NESSF) for 2013-2016, for research on "Stability of Asteroid Regolith during Planetary Close Approaches." He is the recipient of several other awards, including a 2014 Outstanding Student Paper Award from the American Geophysical Union (fall meeting). Keane was also awarded a 2014 Galileo Circle Scholarship from the University of Arizona's College of Science.

In addition to his studies and research, Keane has been actively involved with planetary science outreach in Tucson and at LPL, including serving as a volunteer for OSIRIS-REx, Tucson Festival of Books, and LPL special events. He volunteers, too, at the Pima Air and Space Museum; works as a counselor for UA Astronomy Camp; and serves as a writer and artist for 321 Science! Keane is also one of two co-organizers responsible for developing and organizing The Art of Planetary Science at LPL.

Keane plans to defend his dissertation in 2016.

College of Science Outstanding Service Award to Jamie Molaro

LPL's **Jamie Molaro** won the award for Outstanding Service and Outreach at the 8th Annual College of Science Graduate Student Awards. The award, sponsored by the UA College of Science and the Associate Graduate Council, recognizes attention to broader impacts and involvement in activities outside of

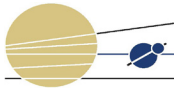


academic responsibilities that benefit the department, university and the larger community. Jamie more than met these criteria through her efforts in developing and organizing The Art of Planetary Science (TAPS) in 2013 and for leading the exhibit in its second, even more successful incarnation in 2014.

TAPS has become a community event, thanks to Jamie's efforts at networking and building partnerships with local artists, museums, and with local business.

TAPS 2014 was a resounding success, with more than 200 pieces of artwork from 90 artists and scientists. The show spanned three floors of the Kuiper Space Sciences building, which was transformed into an art gallery. Over the three nights of the art show (plus the special Galileo Circle event), TAPS drew a crowd of over 800 people. The artists sold several dozen pieces of artwork, making over \$2,000 for the local Tucson art community, along with several hundred dollars in donation to the College of Science and to LPL.

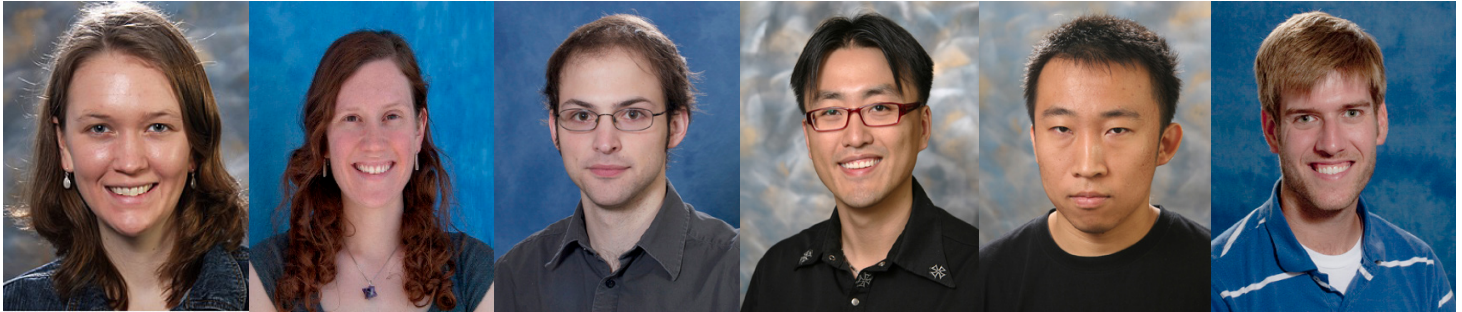
Jamie's award was announced at a College of Science reception on April 7. This is the fourth consecutive year that an LPL graduate student has won one of the three college-wide awards.



Graduate

Recent PTYS/LPL Graduates

Congratulations to Melissa Dykhuis, Catherine Elder, Patrick Harner, Youngmin JeongAhn, Huan Meng, and Rob Zellem, LPL's most recent graduates!



Melissa Dykhuis

Catherine Elder

Patrick Harner

Youngmin JeongAhn

Huan Meng

Rob Zellem

Melissa Dykhuis defended her Ph.D. dissertation on March 13, 2015. Her advisor was Professor Richard Greenberg and her dissertation was titled, "Asteroid Family Dynamics in the Inner Main Belt."

Catherine Elder defended on April 7, 2015. The Ph.D. dissertation is titled, "The Effects of Melt on Impact Craters on Icy Satellites and on the Dynamics of Io's Interior." Catherine was advised by Professor Adam Showman.

Patrick Harner's defense of his M.S. thesis took place on May 5, 2015. The thesis is titled, "Carbonates and Other Salts in the Atacama Desert and on Mars, and the Implications for the Role of Life in Carbonate Formation." Partick's advisor was Regents' Professor Victor Baker.

Youngmin JeohngAhn defended on May 1, 2015. He was advised by Professor Renu Malhotra. His dissertation is titled, "Orbital Distribution of Minor Planets in the Inner Solar System and Their Impact Flux on the Moon, Earth and Mars."

On November 21, 2014, Huan Meng defended his Ph.D. dissertation titled, "Planet Formation in the Terrestrial Zone." Huan's advisor was Regents' Professor George Rieke.

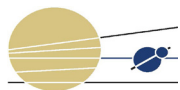
Rob Zellem's defense of his dissertation titled, "Observing Transiting Exoplanets: Removing Systematic Errors to Constrain Atmospheric Chemistry and Dynamics" was on April 29, 2015. His advisor was Professor Caitlin Griffith.

2014 AGU Outstanding Student Paper Awards

Catherine Elder (advisor: Adam Showman) and *James Keane* (advisor: Isamu Matsuyama) each received a 2014 AGU Outstanding Student Paper Award. Catherine won for her paper titled, "Convection and Melt Migration in Io's Mantle." James received the award for a poster titled, "The Contribution of Impact Basins and Mascons to the Lunar Figure: Evidence for Lunar True Polar Wander, and a Past Low-Eccentricity, Synchronous Lunar Orbit." Typically the top 3-5% of presenters in each section/focus group are awarded an Outstanding Student Paper Award.

Fall 2014 GTA Award to Sarah Peacock

Sarah Peacock is the recipient of the Outstanding Graduate Teaching Assistant Award for Fall 2014. Sarah earned the award for her work as a GTA with Dr. Steven Kortenkamp in the PTYS/ASTR 206 course. She is a second-year graduate student working with Associate Professor Travis Barman. Recipients of the Outstanding GTA Award receive funds of up to \$1,000 to support travel to a professional meeting of their choice.



Invest in LPL

Donation Enables Expanded Fireball Network

LPL has a long history and much experience with tracking space rocks. From astronomical surveys such as Spacewatch and the Catalina Sky Survey to the Meteorite Lab to the OSIRIS-REx sample return mission, LPL knows asteroids and meteorites. Now, thanks to a generous gift from an anonymous donor, even more expert eyes will be trained on the sky over southern Arizona. A new collaboration between LPL, the Curtin University of Perth, Australia, and the Vatican Observatory will deploy a network of all-sky cameras throughout southern Arizona. Operating every night, the cameras will monitor the sky for incoming fireballs and help recover any meteorite dropping events in the area.

Phil Bland of the Curtin University operates the Desert Fireball Network which has been successful in the

recovery of two observed meteorite falls, the Bunburra Rockhole eucrite in 2007, and an unpublished 2010 event in the Nullarbor Plains of Australia. The network consists of a number of semi-autonomous systems utilizing commercial DSLR cameras. Bland has agreed to provide 4 to 5 cameras for the Tucson area. The anonymous donation to LPL will allow the lab to match Bland's contribution and build an additional 4 to 5 cameras. The first system will be shipped to Tucson next month for testing, with the remainder delivered throughout the year. Carl Hergenrother of LPL and Jean-Baptiste Kikwaya of the Vatican Observatory will operate the network with Bland.

With its clear skies and desert terrain, southern Arizona is a productive region for meteorite fall detection and recovery. The placement of the network

across the region allows fireballs to be observed from multiple locations. By "triangulating" the path of a fireball from different locales, its atmospheric trajectory can be determined resulting in a better prediction of any fall sites and the object's pre-atmospheric orbit around the Sun.

The new network will complement a group of three existing southern Arizona all-sky fireball cameras set up last fall on Mount Lemmon, Mount Hopkins, and Kitt Peak as a collaboration between NASA Marshall Space Flight Center, LPL, Vatican Observatory, Steward Observatory, MMT Observatory and the National Optical Astronomy Observatory.

New Members for LPL External Advisory Board

We are pleased to welcome two more community leaders as new members of LPL's External Advisory Board: [Dr. Norman Komar](#) and [Dr. Xenia King](#).

Dr. Komar is a retired neuroradiologist who spent the bulk of his career practicing medicine in Tucson. He received his B.S. in Chemistry from the University of Michigan, and his M.D. from Wayne State University. He has been a member of the UA College of Science's Galileo Circle for several years.

Dr. King has a B.A. in Economics and a Ph.D. in Psychology from Catholic University of America in Washington, D.C. She is currently a Research Assistant Professor in the Department of Family and Community Medicine at the University of Arizona, but her career has included everything from being a biostatistician for NASA to being the Head of New Business Development for the New York office of the RAND Corporation.

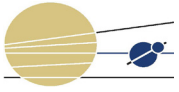
The External Advisory Board is designed to give advice on LPL's interactions with the broader community on all sorts of issues, ranging from branding to development, and has been particularly active in assisting with outreach and with industry relations.

OSIRIS-REx Mural

The Michael J. Drake Building, home to the OSIRIS-REx mission, is the canvas for a colorful new mural celebrating that mission. The beautiful work of art is located on the building's west wall, just around the corner from the mural that commemorates the PHOENIX Mars Lander mission. The OSIRIS-REx mural was created by University of Arizona art students as part of a mural painting class taught by Professor Alfred Quiroz of the School of Art. The project was funded by the LPL External Advisory Board.

Learn more about the mural and watch a time lapse video of the painting process, see the online article, [To an Asteroid and Back](#), All from the Parking Lot at uanews.org.





Invest in LPL

2015 Galileo Circle Scholarships

Congratulations to LPL's 2015 Galileo Circle Scholarship recipients: Melissa Dykhuis, Youngmin JeongAhn, Tad Komacek, Margaret Landis, Xianyu Tan, Michelle Thompson, and Rob Zelle. Galileo Circle Scholarships are awarded to the University of Arizona's finest science students and represent the tremendous breadth of research interests in the College of Science. Galileo Circle Scholars receive \$1,000 each; these awards are supported through the generous donations of Galileo Circle members. The Galileo Scholars were honored at an early evening reception held on April 9, 2015.



*Top Row: Margaret Landis, Youngmin JeongAhn, Melissa Dykhuis
Bottom Row: Rob Zelle, Xianyu Tan, Michelle Thompson, Tad Komacek*

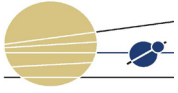
2015 Curson Travel Award



Ali Bramson and Kelly Miller have been announced as recipients of funds from the 2015 Curson Travel Scholarship.

Ali is a fourth-year graduate student working with Associate Professor Shane Byrne. She plans to use the funds to support participation in a two-week summer field campaign in Iceland, followed by the fall 2015 HiRISE camera team meeting to be held in Lake Myvatn, Iceland. The field work is part of a Terrestrial Analogs for Planetary Surfaces campaign intended to fulfill science objectives of Assistant Professor Christopher Hamilton's NASA Planetary Geology and Geophysics grant.

Kelly Miller is a fifth-year graduate student advised by Professor Dante Lauretta. Her Curson award will help to fund travel to the Solar System Origins Gordon Research Conference (GRC), to be held June 28 to July 3, at Mount Holyoke College. The topic of the GRC, which is intended as a scientific conference with limited participation, is "The Physics and Chemistry of Building Planets: Recent Advances and Future Prospects." Kelly will present a poster and work with colleagues in the planetary formation community.



LPL in the News

Links to the news stories below and others are available at: <http://www.lpl.arizona.edu/news/2015/spring>

UA to Join 'A-Team' in Search for Earthlike Planets - A new NASA initiative is embracing a team approach to the quest for life on planets around other stars.

Years Later, HiRISE Camera Confirms the Beagle Has Landed - On Christmas Day 2003, a kitchen table-size lander descended onto the surface of the red planet on a mission to study the Martian surface and potential clues for life. The probe never called home, and no one knew what happened to it. Until now.

LPL Astronomer's Team Discovers Possibly Habitable Planet - A team led by LPL astronomer Ian Crossfield has discovered three planets not much larger than Earth orbiting a relatively nearby star.

Bonus Fuel Could Change OSIRIS-REx Flight Plan - OSIRIS-REx could benefit from an extra load of fuel, allowing an extended stay at the asteroid or a return to Earth a year early.

HiRISE Scientists Capture Image of Sci-Fi Landing Site - Images taken by the LPL-led HiRISE mission reveal that the setting of the best-selling novel "The Martian" is far from being the featureless plain described in the book.

Extrasolar Storms: How's the Weather Way Out There? - Like galactic storm chasers, UA astronomers are leading an effort to discover how clouds and weather systems change over time on other worlds.

To an Asteroid and Back, All From the Parking Lot - Thousands of stars, a looming asteroid, a depiction of the ancient Egyptian deity of Osiris and a man-made space robot whizzing in between — all that and more now graces the western façade of LPL's Michael J. Drake Building, courtesy of students of the UA School of Art.

Plunging Into Saturn's Moon - LPL's Erich Karkoschka produced an animation detailing the landing of the European probe Huygens landing on Titan.

UA's Moon Tree Struggles in Dry Climate - The tree that grew from seeds that have been to the moon may only have a few years left if proper care is not given.

Space Imagery Center Contributes to Astronomy Exhibit at Center for Creative Photography - The new astronomy exhibit at the Center for Creative Photography showcases the celestial bodies and stars of the galaxy.

New Clues from the Dawn of the Solar System - Sulfide chondrules, a new type of building blocks discovered in meteorites left over from the solar system's infancy, provide evidence for a previously unknown region in the protoplanetary disk that gave rise to the planets including Earth.