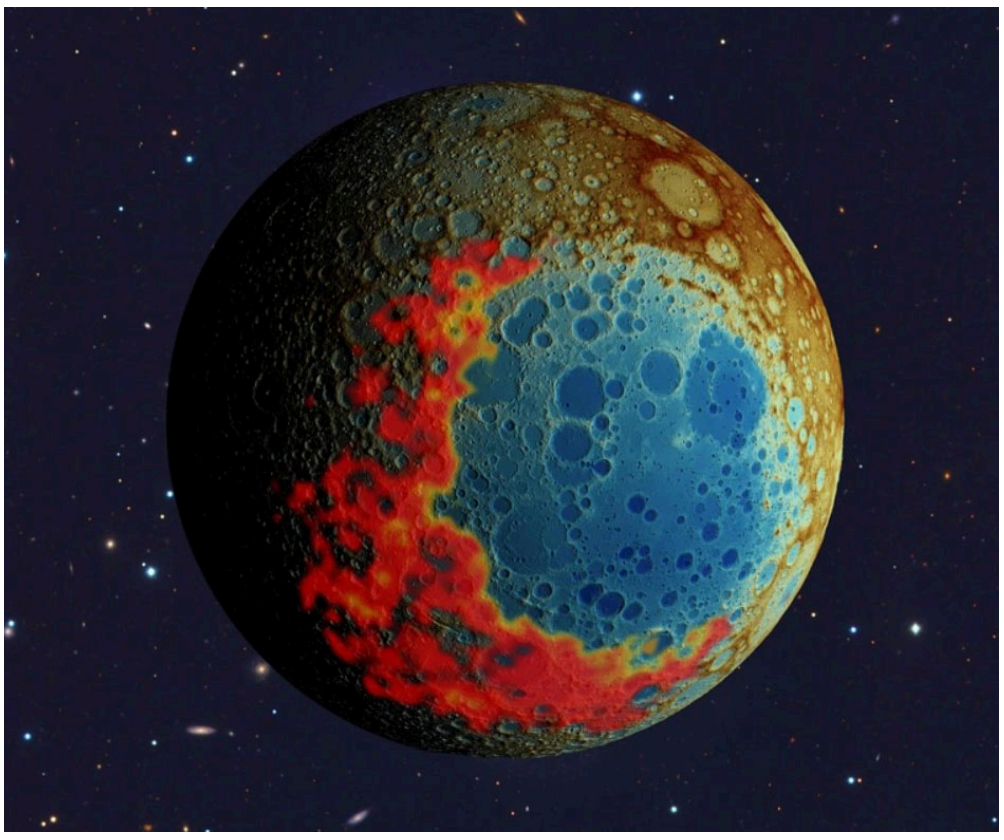
LPL NEWSLETTER

FALL 2025

THE UNIVERSITY OF ARIZONA
COLLEGE OF SCIENCE
LUNAR & PLANETARY LABORATORY

THE MOON'S BIGGEST IMPACT CRATER MADE A RADIOACTIVE SPLASH



By Daniel Stolte, University Communications

When astronauts land near the Moon's south pole as part of NASA's Artemis program in a few years, they likely will find themselves in an unexpected treasure trove of clues that could help scientists better understand how Earth's only natural satellite came to be. That's according to a new study led by LPL **Professor Jeffrey Andrews-Hanna**.

Published in October in the journal ***Nature***, the paper also provides a snapshot of the Moon's tumultuous past that could help explain longstanding puzzles such as why the Moon's crater-riddled far side is so dramatically different from its smooth near side.

Roughly 4.3 billion years ago, when the Solar System was still in its infancy, a giant asteroid slammed into the far side of the Moon, blasting an enormous crater referred to as the South Pole-Aitken basin, or SPA. This impact feature is the largest crater on the Moon, spanning more than 1,200 miles north to south, and 1,000 miles east to west. The oblong shape of the basin is the result of a glancing blow rather than a head-on impact.

By comparing the shape of SPA to other giant impact basins across the Solar System, Andrews-Hanna's team found that these features get narrower in the down-range direction, with a shape resembling a teardrop. Upending conventional wisdom that SPA was formed by an asteroid coming in from a southern direction, the new analysis reveals that SPA's shape narrows toward the south, indicating an impact coming from the north instead. The down-range end of the basin should be covered by a thick layer of material excavated from the lunar interior by the impact, while the up-range end should not, Andrews-Hanna explained.

In the paper, the group presents additional evidence supporting a southward impact from analyses of the topography, the thickness of the crust and the surface composition. In addition, the results offer new clues about on the interior structure of the Moon and its evolution through time, according to the authors.

It has long been thought that the early Moon was melted by the energy released during its formation, creating a magma ocean covering the entire Moon. As that magma ocean crystallized, heavy minerals sunk to make the lunar mantle, while light minerals floated to make the crust. However, some elements were excluded from the solid mantle and crust and instead became concentrated in the final liquids of the magma ocean. Those "leftover" elements included potassium, rare earth elements and phosphorus, collectively referred to as "KREEP." According to Andrews-Hanna these elements were found to be particularly abundant on the Moon's near side.

"If you've ever left a can of soda in the freezer, you may have noticed that as the water becomes solid, the high fructose corn syrup resists freezing until the very end and instead becomes concentrated in the last bits of liquid," he said. "We think something similar happened on the moon with KREEP."

As it cooled over many millions of years, the magma ocean gradually solidified into crust and mantle. "And eventually you get to this point where you just have that tiny bit of liquid left sandwiched between the mantle and the crust, and that's this KREEP-rich material," he said.

"All of the KREEP-rich material and heat-producing elements somehow became concentrated on the Moon's near side, causing it to heat up and leading to intense volcanism that formed the dark volcanic plains that make for the familiar sight of the "face" of the Moon from Earth, according to Andrews-Hanna. However, the reason why the KREEP-rich material ended up on the nearside, and how that material evolved over time, has been a mystery.

The Moon's crust is much thicker on its far side than on its near side facing the Earth, an asymmetry that has scientists puzzled to this day. This asymmetry has affected all aspects of the moon's evolution, including the latest stages of the magma ocean, Andrews-Hanna said.

"Our theory is that as the crust thickened on the far side, the magma ocean below was squeezed out to the sides, like toothpaste being squeezed out of a tube, until most of it ended up on the near side," he said.

The new study of the SPA impact crater revealed a striking and unexpected asymmetry around the basin that supports exactly that scenario: The ejecta blanket on its western side is rich in radioactive thorium, but not on its eastern flank. This suggests that the gash left by the impact created a window through the Moon's skin right at the boundary separating the crust underlain by the last remnants of the KREEP-enriched magma ocean from the "regular" crust.

"Our study shows that the distribution and composition of these materials match the predictions that we get by modeling the latest stages of the evolution of the magma ocean," Andrews-Hanna said. "The last dregs of the lunar magma ocean ended up on the near side, where we see the highest concentrations of radioactive elements. But at some earlier time, a thin and patchy layer of magma ocean would have existed below parts of the far side, explaining the radioactive ejecta on one side of the SPA impact basin."

Visit www.lpl.arizona.edu/news to read the complete article.

WELCOME TO THE LPL NEWSLETTER

Mark S. Marley, Ph.D.
Department Head and Laboratory Director

Welcome to the **Fall 2025 LPL Newsletter**!

This year saw two highly impactful retirements from LPL. Academic Manager **Mary Guerrieri** and Business Manager **Lynn Lane** both retired, after a combined total of about 75 years of service to the University. Together they served as our library of institutional knowledge and were instrumental in explaining to me how and why things worked as they did at LPL when I arrived back as Director. Everyone who has studied or worked at LPL over the past decades was touched, in one way or another, by their steady guidance, leadership, sense of humor, and support of our program. See page 5 for more about their impact and importance to LPL.

With the departure of Lynn and Mary we were fortunate to find excellent individuals to step into their roles. **Erma Santander**, who managed the **Hydrology and Atmospheric Sciences** academic enterprise, now serves in that role for us. Meanwhile **Amy Brenton**, who advises our graduate and undergraduate students and oversees graduate student recruitment, has taken on additional roles previously handled by Mary, including producing our newsletters. Finally, **Adriana Kelly** is our new Business Manager, overseeing our business operations and keeping watch over our budget. Our new team is already working together and serving our community to the high standards set by their predecessors.

Enjoy the photos of this fall's graduate student field trip to the **Owens Valley**, on the eastern slopes of California's Sierra Nevada. In the field our students explored a variety of geologic features and some used radar to look for subsurface ice in a suspected rock glacier. My very first geologic field trip as an undergraduate was also to Owens Valley, so I was particularly excited to see our students in this setting.

Be sure to meet our incoming 2025 class of graduate students on page 5. In addition to being exceptionally well prepared and accomplished, this is the first all-woman class in the history of our graduate program.

The newsletter also features highlights of the accomplishments of our students and alumni over the past few months. We are particularly proud that LPL alums **Faith Vilas** and **James Keane** were recognized by the **Division for Planetary Sciences of the American Astronomical Society** with their **Kuiper** and **Urey** awards, recognizing, respectively, achievement by senior and junior planetary scientists.

Another distinguished LPL alum, **Gordon Bjoraker**, has established a new award to support LPL graduate students who receive external prizes and recognition (see box below). We thank Gordy for his support of our students and appreciate all the achievements and contributions of all of our alumni and generous donors.

DR. GORDON BJORAKER GRADUATE STUDENT AWARD

We are thrilled to announce the establishment of the **Dr. Gordon Bjoraker Graduate Student Award**. Dr. Bjoraker (or "Gordy" to his many friends and colleagues) is an LPL alumnus (1985) who specialized in the study of the atmospheres of giant planets and brown dwarfs and made many scientific contributions through **James Webb Space Telescope** (JWST) and ground-based observations during his 39-year career at **NASA's Goddard Space Flight Center**. The Bjoraker Award is aimed at helping LPL graduate students who are recognized with external fellowships, grants, or awards that may not fully cover their graduate expenses. Award funds will be dispersed to help make sure that such excellent students are not placed at a disadvantage by winning an external recognition. We thank Gordy for his exceptional generosity and support of LPL students in the establishment of this new award.

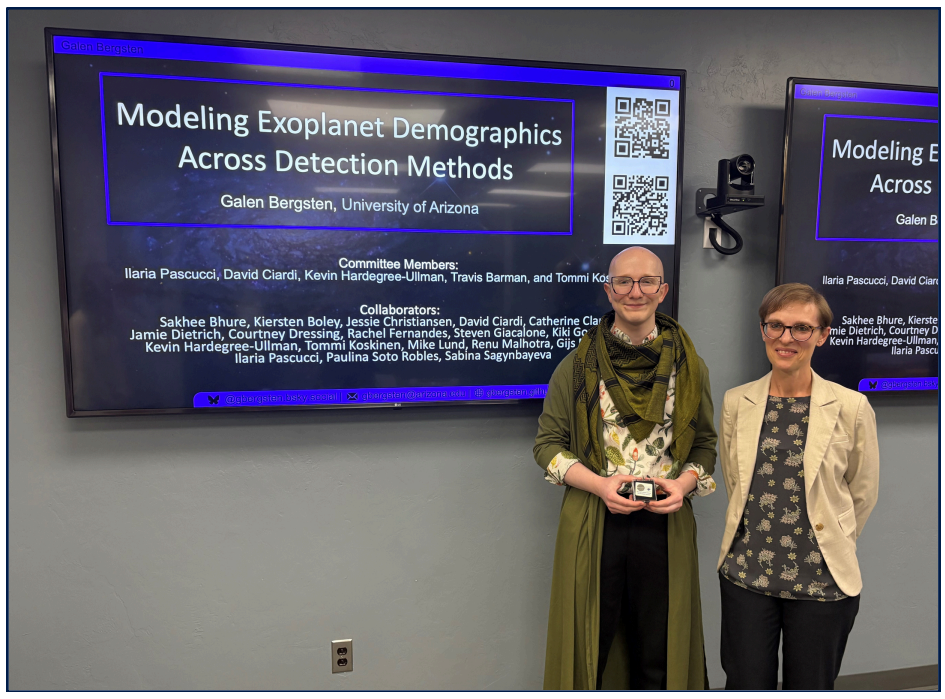
THANKS TO LPL DONORS

Luis Arnal, Gordon Bjoraker, Shirley Campbell, Christian Carey Lear, David Choi, Laura Dugie, Katherine Gall, Chrysantha Kapuranis, Jeanne Koss, Colin Leach, Renu Malhotra, Kelly Nolan, Michelle Rouch, Timothy Swindle

Brinson Foundation, Hitachi High Technologies, Northrop Grumman Foundation, The Eric W. Tilenius Giving Fund, DAF

Thanks for supporting research, education, and outreach at LPL. To give to LPL programs, visit: ***https://give.uafoundation.org/science-lpl****.*

CONGRATULATIONS **PTYS GRADUATES**



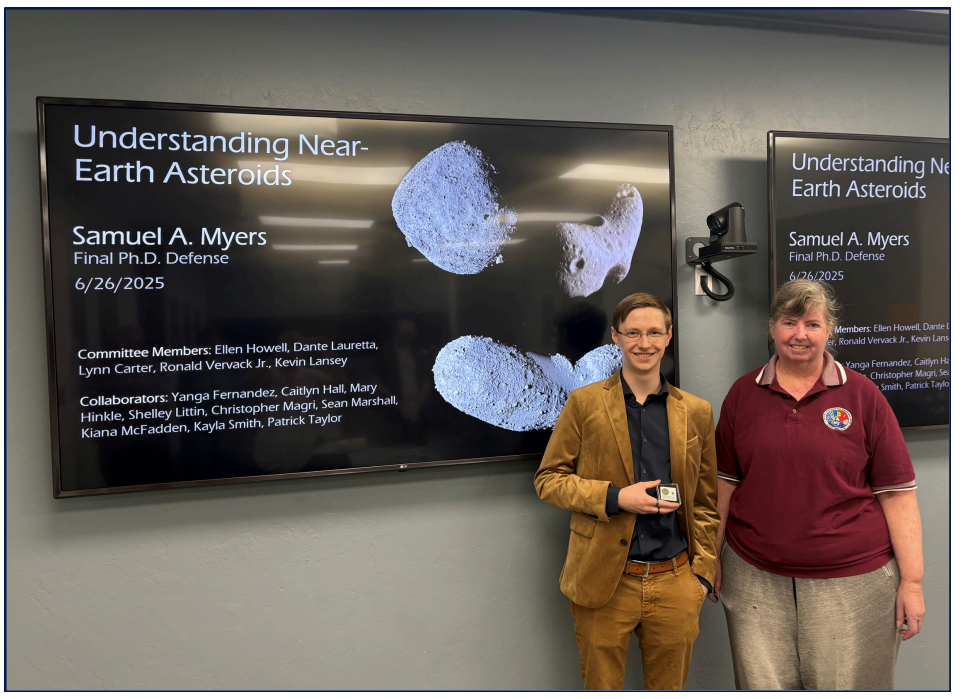
GALEN BERGSTEN

June 2, 2025

Modeling Exoplanet Demographics Across Detection Methods

Advisor: **Ilaria Pascucci**

New position:
Exoplanet Science Fellow,
Space Telescope Science Institute



SAMUEL MYERS

June 26, 2025

Understanding the Limits of Simple Thermal Models for Characterizing Near-Earth Asteroids

Advisor: **Ellen Howell**

New position:
Science and Technology Policy Fellow,
California Council on Science and Technology

SAMANTHA MORUZZI

August 5, 2025

Geophysical Evolution of Sputnik Basin on Pluto

Advisor: **Jeff Andrews-Hanna**

New Position:
Postdoctoral Research Associate,
University of Arizona, LPL

NATHAN HADLAND

December 8, 2025

Evaluating the Habitability of Basaltic Volcanic Environments in Iceland as an Analog for Potential Life on Mars

Advisors: **Christopher Hamilton and Solange Duhamel**

New Position:
Research Program Coordinator,
Arizona Astrobiology Center

LPL ALUMNI

FAITH VILAS

LPL alumna **Dr. Faith Vilas** (1984) was awarded **The 2025 Gerard P. Kuiper Prize** by the **Division for Planetary Sciences of the American Astronomical Society**. This prize recognizes and honors outstanding contributors to planetary science.

Past recipients include geologist **Eugene Shoemaker**, who co-discovered comet Shoemaker-Levy 9, and astronomer and science communicator **Carl Sagan**. University of Arizona **Professor Emeritus William Hubbard** and **Regents Professor Emeritus Donald Hunten** have also received this prestigious award.

The DPS commends Vilas' distinguished career of groundbreaking research and wide-ranging innovations. She has made outstanding contributions to planetary science across a range of diverse topics. She has pioneered remote sensing of the Solar System, pushing capabilities through instrument design and expert observations of a variety of targets. Vilas designed the coronagraph used to acquire the first image of a circumstellar disk around another star and made the first asteroid survey using a CCD spectrograph, an instrument for measuring the intensity of light at different wavelengths. She made pioneering observations of aqueous alteration on primitive asteroids, the mineralogy of Mercury and hydration on the Moon.

The DPS presented Vilas with her award at the **2025 EPSC-DPS meeting**, held in **Helsinki, Finland** on Sept. 11, where she gave the keynote speech.

"I've been in planetary sciences for 50 years. When I began, humankind's first space probes were passing planets in our Solar System for the first time," she said. "Now we study samples of material returned from the surfaces of asteroids to the Earth and determine the compositions of atmospheres of planets around other stars. Our scientific growth has been extraordinary."

Her service to and leadership of the community have been extraordinary, according to the DPS commendation, including her roles as Program Director for Planetary Astronomy at the National Science Foundation; Chief Scientist of the NASA Planetary Data System; inaugural NASA Small Bodies Assessment Group Chair; Chair of the American Astronomical Society Division for Planetary Sciences; NASA Discovery Program Scientist; and Vice-Chair and Chair of the Detection and Characterization Sub-Committee on National Academies' 2010 study on near-Earth object detection, characterization, mitigation. She was the Director of the Multiple Mirror Telescope, or MMT, observatory from 2005-2010 and has been involved in missions such as MESSENGER – short for MErcury Surface, Space ENvironment, GEochemistry, and Ranging – at Mercury and Hayabusa at the asteroid Itokawa. Furthermore, she currently serves as the inaugural Editor of the ***AAS Planetary Science Journal***. The impact of exceptional planetary science contributions enabled by Vilas' work in these areas cannot be overstated.

JAMES KEANE

Dr. James Keane (2017) was awarded the **The Harold C. Urey Prize**, which recognizes and encourages outstanding achievements in planetary science by an early-career scientist. He distinguished himself with his broad and impactful research portfolio studying the geophysics of worlds across the Solar System, including the Moon, Io, Arrokoth, Pluto, and Enceladus.

Dr. Keane is also an accomplished science illustrator and communicator who has improved the accessibility of planetary science to not only the scientific community, but the general public. He has a record of community service and outreach serving as a member of **DPS, AAS Committee on the Status of Women,** and multiple other scientific organizations and groups. James is a mentor to graduate students at **Caltech**, **Purdue**, and the **University of Arizona**.

James is a planetary scientist at the **NASA Jet Propulsion Laboratory**. He studies the interactions between orbital dynamics, rotational dynamics, and geologic processes on rocky and icy worlds using theoretical models and the analysis of spacecraft-derived datasets. These techniques facilitate his investigation of the dynamics, structure, origin, and evolution of solar system bodies. James has experience with NASA missions including **GRAIL**, **Juno**, and **New Horizons**.

DEPARTMENT NEWS

DANI MENDOZA DELLAGIUSTINA

Assistant Professor Dani Mendoza DellaGiustina is the invited **Fred Kavli Plenary Lecturer** at the **American Astronomical Society's** 247th meeting in Phoenix, Arizona in January 2026. Each year the AAS Vice Presidents name a special invited lecturer to kick off each AAS meeting with a presentation on recent research of great importance.

Dr. DellaGiustina was invited to deliver the lecture in her role as Deputy Principal Investigator of the **OSIRIS-REx** sample-return mission. The mission team is commended "for providing groundbreaking insights into the origins of the Earth and other solar system bodies via the significant achievement of successful sample return from the near-Earth asteroid 101955 Bennu."

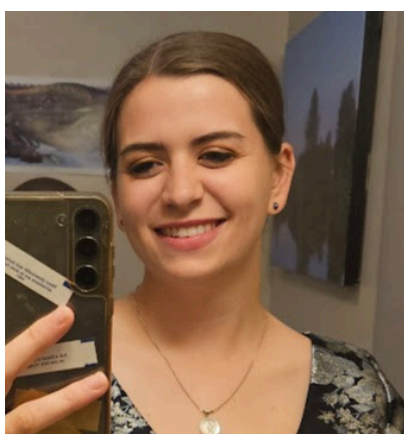
LYNN LANE AND MARY GUERRIERI RETIRE

Lynn Lane first came to work at the University of Arizona in 1973 and joined LPL in 1978, supporting **Laurel Wilkening** and **Mike Drake**. She became the Director's Assistant when Laurel became LPL Director in 1981. Over the years Lynn served in a variety of roles supporting our operations before she was promoted by Mike to the role of Business Manager, a position in which she excelled for over 20 years. As Business Manager Lynn oversaw all the financial and administrative activities of our program, expertly supporting everything from the smallest personnel decisions to the largest space mission financial complexities. She is particularly proud that there was never an audit finding against LPL during her tenure. Everyone who has worked, held a grant, or studied at LPL for the past fifty years was in some way supported by Lynn. In retirement she plans to travel, enjoy her family, and spend more time in her beloved Greer, Arizona.

Mary Guerrieri first arrived at the University of Arizona as an undergraduate in 1984. She joined LPL as a student assistant in the LPL library (working with **Jen Chapman**) in 1988 and was then hired in 1989 by **Tom Gehrels** and **Mildred Matthews** to work as an editor with the **University of Arizona Press Space Science Series** where she managed the transition to using TeX to prepare camera-ready manuscripts. After completing an M.S. in Library Science, she was hired in 1993 as the Data Manager for the **Space Imagery Center** (**Bob Strom**, Director). Her first task was to re-locate and organize the archive from storage into the new SIC space. She also supported the Space Science Series as an editorial consultant and was given cover recognition as an Editor of the volume *Resources of Near-Earth Space*. Mary later worked with **Journalism** and the **College of Agriculture and Life Sciences** where she focused on faculty and student affairs, including special projects, curricular affairs, and student financials. Mary returned to LPL in 2007 as Manager of Academic Affairs for the **Department of Planetary Sciences**. In this role Mary supported faculty meetings, tenure and promotion packages, classroom scheduling, colloquia, public lectures, special events, and a myriad of other aspects of behind-the-scenes tasks that enabled every aspect of our academic enterprise. In retirement Mary is helping organize the LPL historical archives, organizing everything from important internal reports from the 1970s to stray negatives from the **Rectified Lunar Atlas**. Mary also plans to travel and continue her volunteer passion of supporting and fostering dogs from Tucson animal shelters.

2025 INCOMING GRADUATE STUDENTS

Elana Alevy
Colby College
Cosmochemistry
Advisor: **Samuel Crossley**



Maddy Christensen
California Institute of Technology
Astrobiology
Advisor:
Christopher Hamilton

Sophie Clark
University of Florida
Planetary Formation
Advisor: **Ilaria Pascucci**

Kylie Hall
Wellesley College
Exoplanets
Advisor: **Daniel Apai**

Carter Mucha
University of Edinburgh
Planetary Surfaces
Advisor:
Christopher Hamilton

FALL 2025

PTYS 590: PLANETARY GEOLOGY FIELD STUDIES

Owens Valley, California
October 2-6, 2025

by Joe Schools and Jack Holt

Twenty-one LPL graduate students enjoyed three days in beautiful Owens Valley, California. This trip was a ten-and-a-half-hour drive both to and from the site. It was one of the longest drives that LPL students have taken to get to a field trip location. Faculty and staff on the trip included **Jack Holt**, **Lynn Carter**, **Stefano Nerozzi**, and **Joe Schools** as part of the **PTYS 590 Planetary Geology Field Studies** course.

Activities included exploring the relatively young volcanic terrains associated with the Long Valley Caldera. We stood in the main caldera which formed in a supereruption event ~760,000 years ago. We also explored a lava tube in a ~50,000 year old volcanic field, and hiked around Panum Crater, a rhyolite dome which erupted only 600-700 years ago. Magma likely still exists at depth beneath where we were standing, as evidenced by the active hot springs which were shut down for being too hot.

The students also learned about the glacial processes which carved out the mountains of the area, discovered the history of the California Water Wars, and hunted for trilobites in the ancient White-Inyo mountains.

Everything went absolutely smoothly, and there were no vehicle-rock incidents. For anyone who did not get to experience the field trip, we brought a bit of Owens Valley home with us in the form of the mantle xenolith sample currently outside the Kuiper building. If you get a chance to stop by and see it, note the clusters of green olivine, that's the mantle!

Photos courtesy of Joe Schools

Support the LPL Graduate Field Trip by donating to the Wilkening-Sill endowment

https://give.uafoundation.org/science-lpl

Some of the PTYS 590 field trip students were also enrolled in **PTYS 549, Radar Remote Sensing**. Radar activities for that class were conducted in collaboration with a **University of California Los Angeles** group led by **Professors Dave Paige and Mackenzie Day**, who met us in the field along with some of their colleagues and graduate students. This joint effort focused on planetary analog features at three localities that overlapped with the PTYS 590 itinerary, including aeolian bedforms in volcanic cinder deposits at Fossil Falls, a rock glacier at a 9,000 foot elevation in the Eastern Sierras near Bishop, California, and ash fall deposits adjacent to Mono Lake. Students ran ground-penetrating radar on the surface to compare with drone-based radar sounding, complemented by drone-based LiDAR mapping and photogrammetry of the surface.

Support the LPL Graduate Field Trip by donating to the Wilkening-Sill endowment

https://give.uafoundation.org/science-lpl

UNDERGRADUATE PROGRAMS

BENJAMIN BUCEY
PTYS UNDERGRADUATE MINOR

Benjamin is a **Geosciences** major with an **Earth, Oceans, and Climate** emphasis. He has minors in **Planetary Sciences** and **French**. Benjamin found he was really interested in the large-scale processes that led to the formation of planets so he began looking at minors that would allow him to study those processes. The planetary sciences minor looked like it might be a good fit, but did not add the minor until he saw that Dynamic Meteorology, which sounded especially interesting, was part of the program. His passion for planetary science led him to switch his major to Geosciences, which has allowed him to study planetary processes on Earth and the planetary sciences minor has given him the opportunity to study processes on other planets and the processes that lead to the formation of planetary systems.

Benjamin's favorite planetary science class has been **PTYS 450, Origin of the Solar System and Other Planetary Systems**, taught by LPL **Professor Ilaria Pascucci**. It was the first class in which Benjamin studied the complex processes behind the formation of galaxies, clouds of gas and dust, planetary nebulae, planetary disks, solar systems and their components. It was all new material, so he really got a lot out of the class. This course changed the way he looks at the world and the universe.

Benjamin is currently working with **Professor Jianjun Yin** from **Geosciences** to study how sea level rise rates have changed and how they may be related to increased coastal flooding rates on the East Coast of the United States. He is using Python to conduct spectral analysis on East Coast sea level data to understand the periodicity of sea level rise rates and comparing results to spectral analysis data of AMO and Niño3.4 sea level anomaly data to determine how these processes impact the current East Coast sea level.

Benjamin is applying to graduate schools to study environmental policy and management. He has spent his undergraduate career learning about the formation of planets and their processes. He has realized how complex but fragile these processes are and how important they are to us if we want to continue living comfortably on Earth. This inspired him to pursue a career in environmental policy where he can work to protect these systems.

When Benjamin is not in class or working on research, he enjoys playing the piano, drawing, and hiking.

CHASE COOPER
ASTROBIOLOGY UNDERGRADUATE MINOR

Chase is majoring in **Astronomy** with minors in **Astrobiology and Mathematics.** Chase is fascinated by the concept of alien life and is excited that he can be a part of the search. He really likes that astrobiology brings together relevant knowledge from diverse fields.

Chase is currently enrolled in his favorite astrobiology course, **MCB 437**, **Life in Extreme Environments** with **Associate Professor Solange Duhamel**. This class focuses on how current life on Earth has adapted to conditions that are considered extreme, such as high heat or extreme pressures on the sea floor. Chase has enjoyed learning how it is not only important to consider what kinds of life we could find beyond Earth, but it is also an opportunity to appreciate how diverse, adaptable, and weird our own planet is.

Chase has goals to become a researcher and teacher. He would like to be a professor so that he can continue conducting groundbreaking research and sharing those findings with others.

For the last 18 months, Chase has been working with LPL **Associate Professor Tyler Robinson**. He has been studying the phase curves of Titan and Earth, particularly how their atmospheres and oceans impact their brightness. This is impactful in designing and building future telescopes that can look for signs of habitability. Chase has also been working on another research project with LPL **Assistant Professor Sukrit Ranjan** to model biosignature gasses in Earth-like exoplanets.

When Chase is not working on school or research, he enjoys cooking, coding, and video games.

LPL GRADUATE STUDENTS

MAIZEY BENNER

2023-2024 Nininger Meteorite Award

Outstanding student achievement in meteoritical sciences as embodied by an original research paper.

Maizey's paper entitled *Microstructural analysis of phosphorus (P)-bearing assemblages in type 3 chondrites: Implications for P condensation and processing in the early solar nebula* is one of the two papers selected for this award.

Advisor: **Tom Zega**

ANNA TAYLOR

2025 Sharon Langenbeck Amelia Earhart Fellow

The fellowship is awarded annually to up to 30 women in doctoral programs in aerospace engineering and space sciences.

Anna's research examines how hydrogen and helium escape from hot Jupiter-sized exoplanets under intense stellar radiation, using hydrodynamic simulations, stellar flux models, and spectroscopic observations to explore planetary evolution and star–planet interaction.

Advisor: **Tommi Koskinen**

LILY ROBINTHAL

2025 National Science Foundation Graduate Research Fellowship

Earth as an Exoplanet for the Era of Exo-Earths

Advisor: **Tyler Robinson**

2025 NASA FINESST RECIPIENTS

NAMAN BAJAJ

Decoding the Evolution of Protostellar Outflows with JWST MIRI

Advisor: **Ilaria Pascucci**

DEVIN HOOVER

Cassini/UVIS observations of Titan's variable atmosphere

Advisor: **Tommi Koskinen**

CURSON TRAVEL AWARD

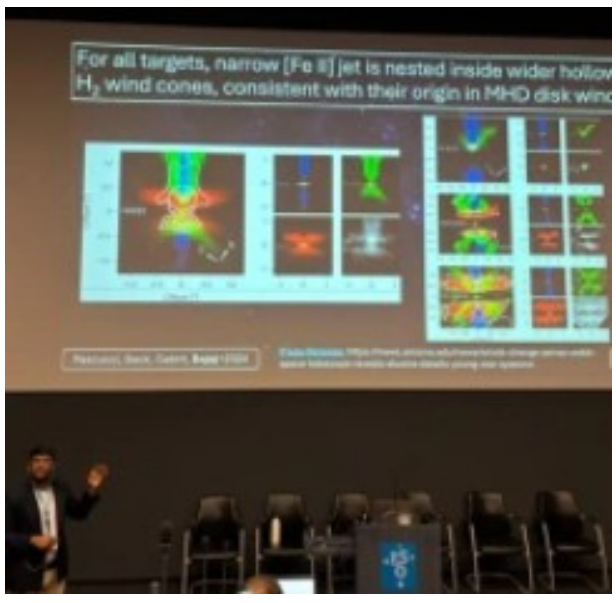
The **Shirley D. Curson Education Plus Fund in Planetary Sciences and LPL** (formerly the Shandel Education Plus Fund) was established by **Shirley Curson**, a generous donor and friend of LPL, for the purpose of supporting travel expenses outside the state of Arizona during summer break. The award is open to LPL students who propose to fund study, museum visits, special exhibits, seminars, instruction, competitions, research and other endeavors that are beyond those provided by the normal campus environment and are not part of the student's regular curriculum during the recipient's school year.

THE **CURSON TRAVEL AWARD** SUPPORTED TRIPS FOR THREE LPL GRADUATE STUDENTS FOR SUMMER 2025.

NAMAN BAJAJ

Thanks to the **Curson Travel Award**, I had the opportunity to attend the **RAVEYSO** (The role of accretion and ejection variability in the evolution of young stars and their disks) workshop at the **European Southern Observatory** (ESO) in **Garching, Germany**. The conference was directly aligned with my research interest in understanding the various processes involved in planet formation. This was my first time visiting ESO, and being in that environment, surrounded by people who think deeply about young stellar accretion, jets, and winds, was both energizing and grounding. The meeting struck a great balance between formal talks and informal conversations, which made it easy to connect with others whose work intersects with mine.

I presented a talk titled "*The Wind-Jet-Accretion Connection: Insights from Spatially Resolved Jets and Winds with JWST,"* and shared recent results from our collaboration that I'm excited about. The feedback was thoughtful, and several conversations sparked ideas that will directly inform the next stage of my research, especially as I begin work on my **NASA FINESST** project. One particularly fruitful exchange has already led to a new observational proposal, using the Very Large Telescope (VLT) in Chile, that I'm now leading, something that wouldn't have happened without this trip. It was also really rewarding to see my earlier work resonate with others in the field.



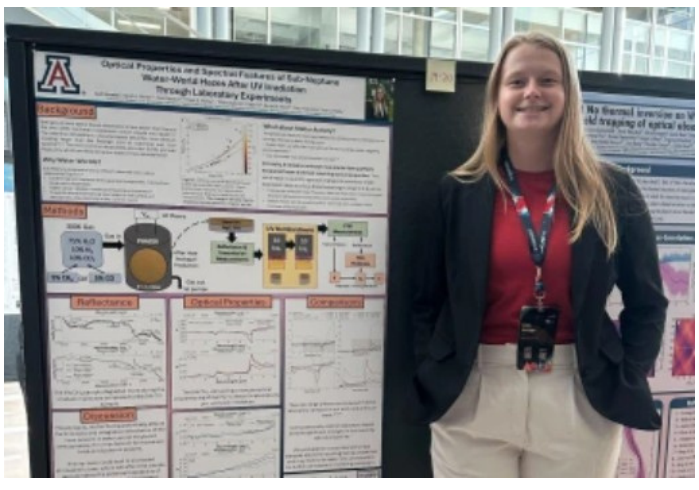
Beyond the science, this conference gave me a deeper sense of connection to the community and where my research fits in. I left with new collaborators, fresh momentum, and a clearer sense of direction for upcoming projects. I'm very grateful to the **Curson Travel Award** for making this possible. It was a meaningful experience, both professionally and personally.

MAIZEY BENNER

The **Curson Travel Award** supported my participation in the **Canadian Center for Electron Microscopy** (CCEM) **Summer School** at **McMaster University** in **Hamilton, Ontario**. This workshop was extremely impactful in expanding my knowledge and skills in electron microscopy.

I participated in theoretical lectures and hands-on demonstrations that allowed me to understand the cutting-edge of electron microscopy research. The lectures were useful in both refreshing and expanding my knowledge in different spectroscopic techniques and allowed me to learn from the field's foremost experts. One highlight was seeing both a lecture and demonstration on 4-dimensional scanning transmission electron microscopy (4DSTEM) by **Dr. Colin Ophus**, a leading developer of open-source software tools and nanoscale 4DSTEM research. I learned the details of performing tomographic experiments on the ThermoFisher Talos, and milli-electron volt resolution electron energy loss spectroscopy experiments on the Nion ULTRASTEM, some of the most powerful transmission electron microscopes available.

This experience expanded my knowledge, awareness, and passion in transmission electron microscopy. It was an incredible privilege to learn from the top researchers in the field and gain experience using different types of transmission electron microscopes. Most importantly, I was able to take away new knowledge and skills to use in my own research. My graduate research at LPL focuses on the origins and evolution of moderately volatile elements in primitive meteorites and returned samples. Currently, I am conducting a coordinated analytical study on sulfide minerals in Bennu and Ryugu, with a focus on transmission electron microscopy techniques. This workshop gave me new techniques to expand my research and gain further insights into the origins of sulfide minerals on Bennu.



LORI HUSEBY

The **Curson Travel Award** allowed me to travel to **Montréal, Quebec, Canada** to attend the **ExoSLAM Summer School** and the subsequent **Exoclimes VII Conference** which took place at the **Université de Montréal** from July 3 - 11, 2025. This conference and summer school was centered on a small community of early career specialists in the field who come together to talk about exoplanet climates, which included atmospheric dynamics, chemistry, clouds and aerosols, surface-atmosphere interactions, and atmospheric escape. My work involves both laboratory and modeling work, so this conference was perfect to showcase my experiments and the importance of laboratory work in future modeling efforts of exoplanet atmospheres.

The ExoSLAM Summer School was a 2.5 day workshop including ~50 early career researchers in the field of exoplanet climates, which provided an exceptional networking opportunity and I was able to gain the skills necessary to continue to progress in the field. The lectures included introductions to spectroscopic methods, atmospheric retrievals of data from the **James Webb Space Telescope** (JWST), and high-resolution atmospheric interpretations using the next generation of large ground-based telescopes. We then had hands-on sessions on JWST instrument selection for future proposals, machine learning and how it can be applied to our work, and how to use pipelines to interpret our observations. We finished with a panel on early career questions and how best we can progress through our work and next steps after graduate school.

After a brief break to explore the city, the Exoclimes VII Conference began involving ~200 specialists in the field. This made it much easier to network and have conversations with experts in the field and for them to see your work in a less stimulating environment. I had the opportunity to present a poster titled *“Optical Properties and Spectral Features of Sub-Neptune Water-World Hazes After UV-Irradiation Through Laboratory Experiments.”* This poster allowed me to speak to many modelers and observers alike to describe and demonstrate the need for more optical properties of exoplanet hazes in the field and advocate for exoplanet lab work in general. I also saw many interesting talks on new observational research and it helped me shape what I want to pursue for the rest of my graduate career. In addition, there were panels on science communication, which included breakout sessions conversing with others of different backgrounds, and going beyond academia into other future opportunities in the conference. There was a field trip aspect as well where we were able to visit a cider house for a tasting and more informal science conversations with other participants. I am very grateful to the **Curson Travel Award** for allowing me to present my work and forge potential future collaborations in the field of exoplanet climates.

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LPL IN THE NEWS

Complete list of LPL headlines and linked stories available at: **LPL.Arizona.edu/news**

OSIRIS-APEX Spacecraft Takes Selfie with Earth During Flyby. The OSIRIS-APEX (Origins, Spectral Interpretation, Resource Identification, and Security – Apophis Explorer) spacecraft swung by Earth within 2,136 miles before heading into deep space for another trip around the sun. (DellaGiustina)

LPL's Mars Camera Gets Close Look at Comet from Interstellar Space. 3I/ATLAS was in prime position to be observed and photographed by HiRISE (High Resolution Imaging Science Experiment) mission. (Byrne)

Moon's Biggest Impact Crater Made a Radioactive Splash. When astronauts land near the moon's south pole as part of NASA's Artemis program in a few years, they likely will find themselves in an unexpected treasure trove of clues that could help scientists better understand how Earth's only natural satellite came to be. (Andrews-Hanna)

Asteroid Bennu is a Time Capsule of Materials Bearing Witness to Its Origin and Transformation Over Billions of Years. Asteroid Bennu – the target of NASA's OSIRIS-REx mission, led by LPL – is a mixture of materials from throughout, and beyond, our solar system. Over billions of years, its uniquely varied contents have been transformed by water and the space environment. (Zega, Barnes)

An Emissary from Interstellar Space. A recently discovered extraterrestrial "visitor" is hurtling toward the inner solar system at 130,000 miles per hour and has quickly captured the attention of astronomers and space enthusiasts around the world, including here at LPL. (Fuls)

Revealing the Lives of Planet-Forming Disks. An international team of astronomers including researchers from LPL has unveiled groundbreaking findings about the disks of gas and dust surrounding nearby young stars, using the powerful Atacama Large Millimeter/submillimeter Array, or ALMA. (Pascucci, Deng)

Percolating Clues: A New Way to Build Planetary Cores. A new study led by Research Scientist Sam Crossley at the reveals a surprising new way planetary cores formed.

New Model Helps to Figure Out Which Distant Planets May Host Life. The U.S. is building multiple major telescopes and planetary probes to advance this search. However, the signs of life – called biosignatures – that scientists may find will likely be difficult to interpret. Figuring out where exactly to look also remains challenging. (Apai)

A New Look at TRAPPIST-1e, an Earth-Sized, Habitable-Zone Exoplanet. Of the seven Earth-sized worlds orbiting the red dwarf star TRAPPIST-1, one planet in particular has attracted the attention of scientists, including LPL Assistant Professor Sukrit Ranjan.