



THE UNIVERSITY OF ARIZONA
COLLEGE OF SCIENCE

LUNAR & PLANETARY LABORATORY

FALL 2023

LPL NEWSLETTER



*Artist's illustration of an asteroid passing close to Earth. LPL's **Catalina Sky Survey** has discovered 10,700 near-Earth asteroids measuring 460 feet or more, almost half of the total population of objects in that size range. Photo: Sebastian Kaulitzki/Science Photo Library/Corbis via Wikimedia Commons*

CITIZEN SCIENCE PROJECT NETS A NEW ASTEROID, AND IT'S A CLOSE ONE

By Penny Duran, NASA Space Grant Science Writing Intern

Discovering asteroids in space used to be a privilege reserved for astronomers – until now, thanks to a project led by LPL's **Catalina Sky Survey** (CSS), which made it possible for several members of the public to spot a previously unknown near-Earth asteroid on its orbit around the Sun. Named **2023 TW**, the newly discovered asteroid is the closest to ever be discovered by a citizen science initiative. Initial calculations indicate it ventures into Earth's vicinity at a "mean orbital intercept distance" of 375,000 miles, about 35,000 miles past the average distance between the Earth and the Moon.

Despite its close proximity to Earth, 2023 TW does not pose a threat. There is no chance of 2023 TW impacting Earth, and even if this asteroid did enter our atmosphere, severe consequences would be unlikely. Spanning 164 feet, 2023 TW's diameter is similar in size to the meteor that created the 0.8-mile-wide Barringer Crater, also known as Meteor Crater. This is well below the threshold of 459 feet for potentially hazardous asteroids.

The public-facing portal, dubbed the **Daily Minor Planet**, began operating in June and allows volunteers to pore over images collected with a telescope on Mount Lemmon (Arizona). Each night, the telescope surveys about 200 patches of the sky. A software algorithm flags anything that appears to be an object that is moving relative to the fixed stars in the background. A typical night of observing yields hundreds of such candidate detections. This is where the volunteer observers come in. Their task: decide which detections are actual asteroids and which ones are artifacts or other phenomena unrelated to asteroids.

Aside from discovering 2023 TW, the project has reached the milestone of reporting 1,200 newly discovered, individual objects to the **Minor Planet Center** of the International Astronomical Union. Most of the objects reported through the project have been asteroids, but it also picked up the occasional comet. Comets are different from asteroids in that they contain water and other ices and typically reside in the outer reaches of the solar system.

Before 2023 TW was found, the project's volunteers detected many other candidates for near-Earth asteroids. Many asteroids, particularly those close to Earth, whip around our planet quickly before heading out into space for another trip around the Sun. To establish and publish an asteroid as a new discovery, asteroid trackers need to understand the object's orbit, which requires repeated observations over several days. The recent asteroid discovery was made only two days after the initial observation. Beyond the time pressure, knowing how to tell real objects and false detections apart is a central component of the data collection process. To achieve its goal of finding and cataloging all near-Earth asteroids, CSS will continue to rely on volunteers.

Read full story with quotes from citizen scientists: bit.ly/CitizenScienceNetsNewAsteroid

Join the hunt for asteroids: zooniverse.org/projects/fulsdavid/the-daily-minor-planet



WELCOME TO THE LPL NEWSLETTER

Mark S. Marley, Ph.D.

Department Head and Laboratory Director

Welcome to the **Fall 2023 LPL Newsletter**! This has been an epic semester with the exciting **OSIRIS-REx** sample return and the arrival of Bennu samples at LPL. All of the excitement resulted in many news stories and events celebrating LPL and our scientists. Look for news about the first wave of science from the sample analysis campaign in the coming months.

In the last newsletter I highlighted a new citizen science opportunity to support the **Catalina Sky Survey** by discovering near-Earth asteroids that the automated detection pipelines might miss. The first such asteroid has now been discovered by volunteers! It is somehow reassuring that the human eye still has a place in astronomical discovery. The volunteer program was developed by **Carson Fuls**, who in October assumed the role of CSS director. You can read a Q&A with Carson on page 12.

Speaking of asteroids, LPL has long played an important role in their science and discovery, as evidenced by the number (currently 244) of asteroids named in honor of our faculty, staff, students, and alums. The list includes many recognizable names (Kuiper, Gehrels, Matthews) that are inextricably linked to LPL and to space science. You can visit the web page tracking LPL-affiliated asteroid names here: <https://www.lpl.arizona.edu/outreach/lpl-asteroid-names>

A number of our faculty, students, staff, and alums have been recognized with awards in the last several months. Be sure to check out their accomplishments on the following pages. Also look for some great photos from this semester's field trips. The **Wilkening-Sill endowment** enables these trips and we appreciate all of the donations that make these opportunities available to our students.

Long time friends of LPL and alumni of the 1980s might remember the Mars Ball Project, a grad student led effort to develop a novel prototype Mars rover. I recently came across some **Mars Ball** materials that enabled us to add a Mars Ball page to our LPL history page (LPL.Arizona.edu/about/history/mars-ball-project). Perhaps someday we will see such a device exploring Mars.

For more content and **expanded stories with links**, visit LPL.Arizona.edu/news/2023/fall.

Thanks to LPL Donors

We would like to thank all those who have donated to LPL in 2023. Thanks for supporting research, education, and outreach at LPL. To give to LPL programs, visit:

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

Individual Donors: Thomas Arden, Edward C. Beshore and Amy L. Phillips, Catherine Duncan Folkers and Thomas W. Folkers, Laura L. Dugie and Col. Valentine J. Dugie, William B. Hubbard and Jean N. Hubbard, Chrysantha Kapuranis, Alexander Langoussis, Ann M. Lapidus and Martin Lapidus, Colin Leach, Gloria L. McMillan and Robert S. McMillan, Dr. Kelly K. Nolan and Mr. Brian Nolan, Jani Radebaugh, Timothy D. Swindle and Kerry Swindle, Eric W. Tilenius

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2023 SCIALOG FELLOWS

science+dialog

Three members of the LPL faculty were on teams selected for the Scialog Signatures of Life in the Universe Collaborative Innovation Awards. **Christopher Hamilton**, **Sukrit Ranjan**, and **Tyler Robinson** each received \$50,000 in direct costs to support their research.

The Scialog project is sponsored by the Research Corporation for Science Advancement, the Heising-Simons Foundation, the Kavli Foundation, and NASA. Scialog seeks to stimulate interdisciplinary conversation and community building around an important scientific theme such as the search for life beyond Earth.



Dr. Christopher Hamilton
Associate Professor
*Rocky Roads: Flow
Pathways and Chemical
Evolution in Vesicular Lava
and Pumice*



Dr. Sukrit Ranjan
Assistant Professor
*Constraining the Abiotic
Sulfur Cycle on Temperate
Terrestrial Planets*



Dr. Tyler Robinson
Associate Professor
*Irradiated Sea Spray
Aerosol Generation and
Analysis Under Early
Earth Atmospheres*

PTYS Alumni



Dale Cruikshank (1968) was awarded the **2023 Masursky Prize** by the American Astronomical Society Division for Planetary Science (DPS) in recognition of his outstanding service to the planetary science community. Dr. Cruikshank served as the first historian of the DPS until 2020; the position was created after he undertook efforts to document and preserve DPS history. He worked to build international bridges between scientists through outreach to USSR scientists during the Cold War and participation in the IAU, including serving as President for IAU Commission 16. He was Associate Editor of *Icarus* and a member of multiple decadal studies in both Planetary Science and Astronomy.



David Grinspoon (1989) was appointed by NASA to be the **Senior Scientist for Astrobiology Strategy**. He has been a frequent advisor to NASA on space exploration strategy, a long-time investigator for NASA-funded programs and a science team member on several active interplanetary spacecraft missions. Dr. Grinspoon is the former inaugural **Blumberg NASA/Library of Congress Chair in Astrobiology** (2012-2013). In 2022, he was appointed as a member of the NASA independent study team on unidentified aerial phenomena and elected as a lifetime member of the **American Association of the Advancement of Science**.

Michael David Hicks (1964 - 2023). Mike earned his Ph.D. at LPL in 1997 with a dissertation titled, *A Spectrophotometric Survey of Comets and Earth-Approaching Asteroids*. He moved on to work at the NASA Jet Propulsion Laboratory (JPL) as a postdoctoral research associate and then as research scientist from 1998 until 2022. His research specialty was the physical properties of comets and asteroids. He served on the science teams of the DART Project, the Near Earth Asteroid Tracking (NEAT) Project, the Dawn Mission, and the NASA Deep Space 1 Mission. He was the author of over 80 peer-reviewed scientific papers.

(<https://dps.aas.org/news/michael-david-hicks-1964-2023>)



TRAVIS MATLOCK PTYS UNDERGRADUATE MINOR

Travis is an **Astronomy** major with minors in **Planetary Sciences** and **Physics**. Travis chose to minor in PTYS because he has always been fascinated with the objects in our solar system. The PTYS undergraduate courses aligned with his interests and he believes the PTYS minor provides him with a well-rounded, interdisciplinary education.

As a student, Travis really enjoyed the **Asteroids, Comets, and Kuiper Belt Objects (PTYS 416)** course with **Dr. Dani DellaGiustina**. He remembers the assignments imitating real work that a planetary scientist might do. For example, students used a 3D computer model of Eros to count craters and then determine the surface age from the crater size-frequency distribution. The class also spent a night at **Catalina Sky**

Survey and participated in observing activities. In addition to minor coursework, Travis also has an **Arizona NASA Space Grant** internship with LPL Research Professor, **Dr. Lon Hood**, working primarily on modeling the crustal magnetic anomalies on Mars. The models are constructed to reflect data from the magnetometer aboard the Mars **MAVEN** spacecraft. In addition to these projects, Travis also works as a student software developer with the **USA National Phenology Network** in the **School of Natural Resources and the Environment**.

Travis is currently applying for doctoral graduate programs in planetary science (or similar programs). His research interests include planetary surfaces and atmospheric processes and hopes to gain more expertise with geological data.

In his spare time, Travis likes spending time outdoors and exploring the areas around Tucson. He describes himself as “bit of a coffee hobbyist” and also enjoys small craft projects.

SHAE HENLEY ASTROBIOLOGY UNDERGRADUATE MINOR

Shae is majoring in **Aerospace Engineering** with a minor in **Astrobiology** and expects to graduate in 2024. She is interested in the study of the origin of life and research into potential life beyond Earth. Shae knew the astrobiology minor courses would allow her to gain a strong background in astrobiology and has enjoyed being able to supplement her engineering classes with courses focusing more on the biological sciences, chemistry, and geosciences, among other areas of study.

Her favorite astrobiology class has been the **Coevolution of Earth and the Biosphere (GEOS 484)**. Shae began the course with very little knowledge about Earth's history and the field of geosciences, but through lectures, papers, and class trips, she feels that she has received a comprehensive review of the subject matter. Course outings to local mountains and plains to see fossils and historical sites were incredibly valuable and helped spark her interest in geology and the history of the Earth.

Shae plans to attend graduate school, either at UArizona to earn an M.S. in aerospace engineering or another program to conduct graduate research in bioastronautics (the support of life in space). She wants to research human-system interactions and the intersection of aerospace engineering and human health. She sees herself designing spacecraft technologies that enhance human life in space, or working on deep space missions that further our knowledge of our planet and surrounding universe.

As part of her research with **Dr. Christopher Walker** (Department of Astronomy/Steward Observatory), Shae serves as the Project Manager/Flight Director for the **CatSat CSLI (CubeSat Launch Initiative) Mission** and oversees the astrodynamics, communications, commanding, and payload teams. The team is currently preparing for the spacecraft's upcoming launch. Shae helped to design the **Artemis Infrared Explorer for Space Studies (ARIES)**, a proposed lunar surface instrument designed to conduct infrared astronomy from the lunar south pole, and **LunaCat**, a proposed lunar orbiter that aims to study and map the distribution of molecular water in the lunar regolith. In recognition of her accomplishments, the Universities Space Research Association honored her with the **2023 Thomas R. McGetchin Memorial Scholarship Award**.

Here on Earth, Shae enjoys hiking and running and has started rock climbing (bouldering).



CONGRATULATIONS LPL FACULTY

JESSICA BARNES

2024 Galileo Circle Curie Award



Awarded by the UArizona College of Science, the Curie Award recognizes early-career scientists who are advancing science with innovative work and also adding to the diversity within the scientific community.

Dr. Barnes was the recipient of the inaugural **NASA Planetary Science Early Career Award**.

JOE GIACALONE

Elected Fellow, American Geophysical Union



For seminal contributions to our understanding of charged particle acceleration and transport throughout the interplanetary medium.

Professor Giacalone is a member of the Integrated Science Investigation of the Sun team on the **Parker Solar Probe**.

DANTE LAURETTA

2023 Eugene Shoemaker Lecture



Presented by the American Geophysical Union to recognize excellence in planetary exploration.

Regents Professor Lauretta is Principal Investigator for **OSIRIS-REx**, which returned to Earth its sample of the asteroid Bennu on Sept. 24.

ILARIA PASCUCCI

2024 Leon and Pauline Blitzer Award



The Blitzer Award for Excellence in Teaching of Physics and Related Sciences recognizes outstanding teaching at the undergraduate and graduate levels.

Professor Pascucci was elected a **Fellow of the American Astronomical Society** in 2022.

FALL 2023

PTYS 554: EVOLUTION OF PLANETARY SURFACES

PROFESSOR SHANE BYRNE, INSTRUCTOR
NORTHERN ARIZONA, METEOR CRATER



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

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

FALL 2023

PTYS 590: PLANETARY GEOLOGY FIELD STUDIES

ASSOCIATE PROFESSOR CHRISTOPHER HAMILTON, INSTRUCTOR
PETRIFIED FOREST, NAVAJO NATIONAL MONUMENT, HORSESHOE BEND, GLEN CANYON



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

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

GRADUATE STUDENT AWARDS



VISITING GRADUATE FELLOWSHIP GALEN BERGSTEN

Fourth-year Ph.D. student **Galen Bergsten** was selected for a six-month Visiting Graduate Fellowship at the **Infrared Processing and Analysis Center (IPAC)** on the campus of the California Institute of Technology in Pasadena. He will be working with **Dr. David Ciardi** on a project using high-resolution imaging data to understand the effects of stellar binarity on the frequency of small planets orbiting low mass stars.

The fellowship program was established to provide doctoral students with applied research experience with leaders in research areas such as exoplanets and stellar formation. The program hosts between two and four students per year. Galen begins his fellowship in February 2024.

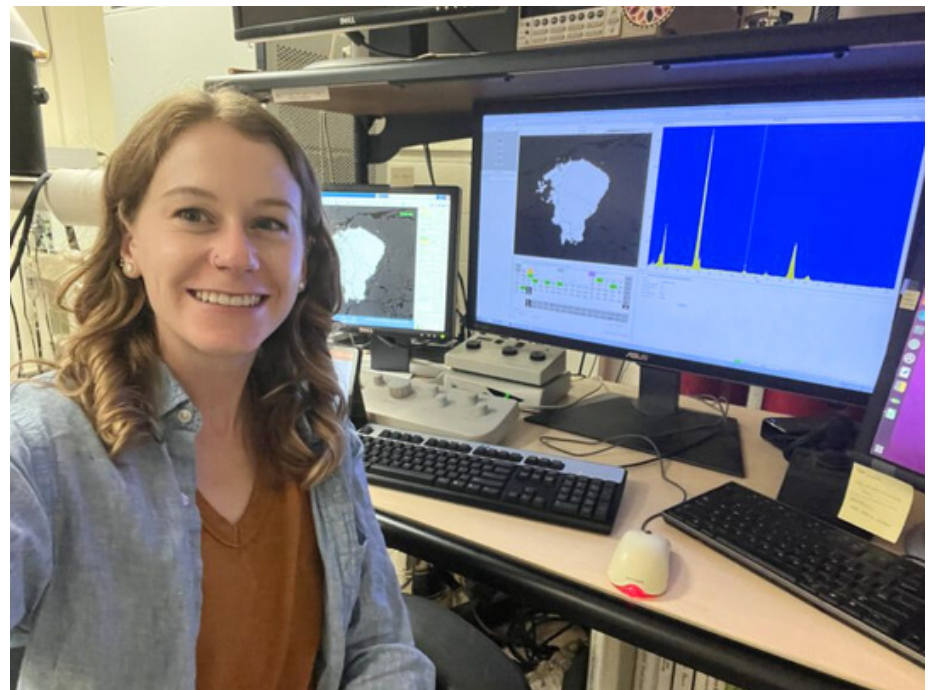
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PROFESSIONAL SOCIETY HONORS ZOË WILBUR

Fifth-year graduate student **Zoë Wilbur** was recognized with two awards for her research on meteorites.

Zoë won the **2023 Ninger Meteorite Award**, presented by the Buseck Center for Meteorite Studies at Arizona State University, for outstanding original student research paper in meteoritical science. Zoë's paper was titled, *The Effects of Highly Reduced Magmatism Revealed through Aubrites*.

Zoë was also honored with the **2023 McKay Award**, presented by the **Meteoritical Society**. The award recognizes the best student oral presentation. The title of Zoë's winning presentation was, *Unraveling the Volatile Story of Reduced Meteorites through Djerfisherite*.



AMELIA EARHART FELLOWSHIP

Ph.D. candidates **Maizey Benner** and **Zoë Wilbur** each received a **2023 Amelia Earhart Fellowship** from Zonta International; they are two of only thirty scholars selected for the honor, which recognizes outstanding academic record and demonstrated initiative, ambition, and commitment to pursuing a career in space sciences.



Maizey Benner studies the origin and evolution of phosphorus-bearing materials in ordinary and carbonaceous chondrites. These chondrite groups represent two reservoirs of material from the beginning of solar system history that are mostly unaltered since their formation. Probing these pristine materials allows her to evaluate the most primitive phosphorus-bearing materials and evaluate their thermodynamic conditions of formation for refinement of the solar condensation sequence.

Maizey's research couples experimental cosmochemistry and computational thermodynamics to better understand the origins and evolution of moderately volatile elements in the early solar system. She uses electron microscopy techniques such as electron microprobe, focused ion beam scanning-electron microscopy, and transmission electron microscopy to probe the chemistry and structure of materials from the micro- to nanoscale. Maizey also uses density functional theory to calculate the thermodynamic properties of materials for use in models of solar condensation. These two are linked by comparing experimental results to computational models of materials and iterating until they replicate the natural system.

.....

Zoë Wilbur seeks to understand the history of degassing (volatile loss) among the sample suites, how eruption dynamics are preserved in lunar basalts, and to what extent volatile behavior is dependent upon a basalt's chemical composition.

Zoë investigates the volcanic histories of Apollo 15 and Apollo 17 basalts and, in particular, an Apollo 17 basalt that was stored frozen and has been released for study for the first time after 50 years. This frozen sample is part of the *Apollo Next Generation Sample Analysis Program*. Zoë and her advisor (**Dr. Jessica Barnes**) are the first researchers to study this sample since its return from the Moon. This frozen sample offers a direct comparison to other basalts curated using traditional methods at room temperature and gives the opportunity to search for volatiles (like water) using improved, 21st century techniques. To analyze this specially curated sample, Zoë is utilizing a novel combination of 2D and 3D methods, including the measurements of water, chlorine, and fluorine in lunar minerals and 3D gas bubble structures.

CONGRATULATIONS PTYS GRADUATES



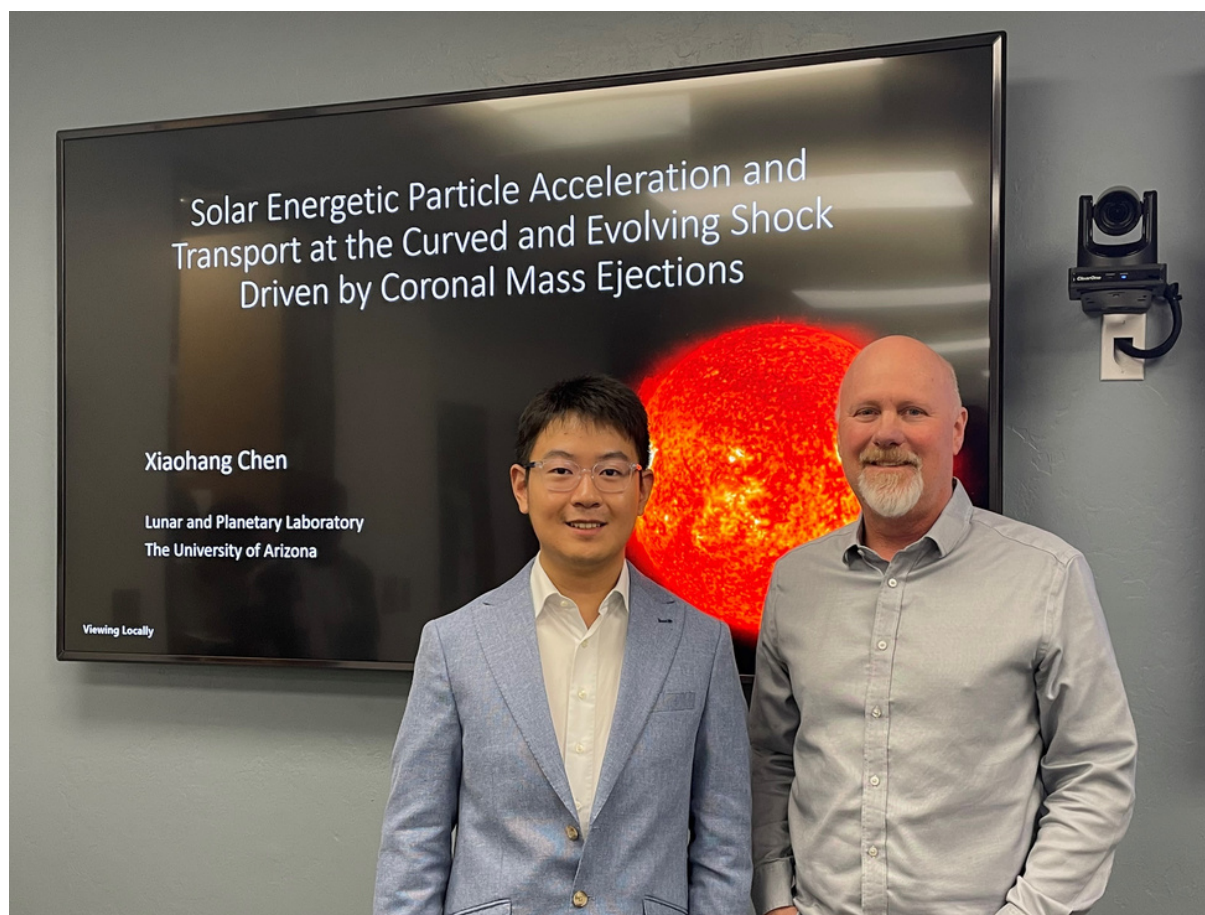
ZARAH BROWN

November 3, 2023

Saturn's Upper Atmosphere in the Ultraviolet: Temperature and Compositional Trends from Cassini UVIS with Implications for Energy Balance and Dynamics

Advisor: **Associate Professor Tommi Koskinen**

New position: Postdoctoral Research Associate, LPL



XIAOHANG CHEN

November 9, 2023

Solar Energetic Particle Acceleration and Transport at the Curved and Evolving Shock Driven by Coronal Mass Ejections

Advisor: **Professor Joe Giacalone**

New position: Postdoctoral Research Associate, University of Michigan

GRADUATE STUDENT AWARDS

HARVILL GRADUATE FELLOWSHIP MELISSA KONTOGIANNIS



AWARDED TO INCOMING GRADUATE STUDENTS WHO EARNED A BACHELOR'S DEGREE AT THE UNIVERSITY OF ARIZONA

Melissa graduated from UArizona in May 2023 with a major in chemistry and minors in planetary sciences and environmental studies.

As an undergraduate, Melissa was an **Arizona NASA Space Grant** undergraduate research intern; she analyzed thin sections of a CM chondritic meteorite first to assist in the development of a database for cataloging and co-registering data collected from samples returned by OSIRIS-REx and additionally to understand hydrothermal processes and sequences that result in the alteration of primitive solar system bodies, including Bennu.

Melissa had the opportunity to use 3D imaging processing software as well as cutting-edge technology such as a digital microscope and SEM and an electron microprobe, FIB, and TEM. During her graduate career at LPL, Melissa will use the techniques and insight gained as an undergraduate as she pursues new research with Regents Professor **Dante Lauretta** on OSIRIS-REx sample science research.

UNIVERSITY FELLOWS AWARD NATHALIA VEGA SANTIAGO



PROVIDES PROFESSIONAL DEVELOPMENT AND NETWORKING OPPORTUNITIES

Nathalia completed a bachelor's degree in natural sciences with a minor in mathematics from the University of Puerto Rico (Cayey) in June 2023.

As an undergraduate, Nathalia was selected as a **Diversity Scholar** to attend the 2019 American Institute of Aeronautics and Astronautics SciTech event. She was the co-founder and vice president of the first astronomy association at her university. And Nathalia was nominated by her peers to serve as lead scientist for the development of a preliminary design review for a lunar orbiter as part of the **NASA L'Space Mission Concept Academy**. Nathalia's undergraduate research included work at the **Arecibo Observatory**, where she used remote sensing data to characterize near-Earth asteroids.

As a graduate student at LPL, Nathalia is pursuing research interests in astrobiology and cosmochemistry with advisor **Dante Lauretta**.



Q&A WITH CARSON FULS

Director of Catalina Sky Survey

Fuls was named Director of CSS in October 2023. He holds a B.S. in Physics and an M.S. in Natural Applied Sciences (Physics) from Stephen F. Austin State University and is currently completing his first semester as a doctoral student in Planetary Sciences at LPL.

HOW DID YOU GET YOUR START AS AN ASTRONOMER?

I knew for as long as I can remember that I wanted to be a scientist, but I didn't settle on astronomy for many years. When I was 17, I was at Stephen F. Austin State University and I got a job in the physics department to help set up telescopes for the freshman level astronomy classes night labs at the university's fantastic observatory. In fact, access to the observatory's 41" telescope was one of the main reasons I chose to attend SFA. I spent many nights out there working on the telescopes and trying to gather data in new ways. I've worked in other areas of science and engineering, but I've always come back to astronomy. To me, it is a more universally appreciated and accessible science than many others. The ability to share what I'm doing with others and have them instantly grasp what I'm working on has always appealed to me.

HOW DID YOU GET YOUR START WITH CSS?

I started at LPL and CSS in 2015 as a full-time observer. I was actually the second choice in the applicant pool, but fortunately, the team was able to add two positions. And the top choice applicant and I are now married, so everything worked out great in the end!

WHAT DO YOU LOVE ABOUT BEING AN ASTRONOMER?

As I've said, I love sharing with others what I do, but I also love being an observational astronomer. I love heading up to the top of a remote mountain for days at a time. Winter nights are cold and long, but peaceful, and you have the most time to make discoveries. Summer nights are short, but you have time during the day to appreciate the mountain. I've spent many afternoons before work hiking and rock climbing in the Catalinas. It's hard to imagine another profession where that is your daily routine.



Catalina Sky Survey

catalina.arizona.edu

The **Catalina Sky Survey** is a NASA funded project supported by the Near Earth Object Observation Program (NEOO) under the Planetary Defense Coordination Office (PDCO). The CSS mission is to discover and track near-Earth objects (NEOs) in an effort to meet the congressional mandate to catalogue at least 90% of the estimated population of NEOs larger than 140 meters, some of which classify as potentially hazardous asteroids (PHAs) which pose an impact threat to Earth. Longstanding success of the project is attributable to comprehensive sky coverage, continued development and application of innovative software and our NEO detection pipeline, and the inclusion of near real-time human attention to the NEO discovery and follow-up process.



The **Catalina Sky Survey** has discovered most of the near-Earth asteroids found since 2005

WHY DID YOU CHOOSE TO START GRADUATE SCHOOL AND HOW WILL THE GRADUATE ACADEMIC PROGRAM CONTRIBUTE TO YOUR WORK?

I started graduate school because I was ready and up for the challenge. I also thought that it would help push my career forward. I wanted to jump into the academic side of planetary science by being involved in pushing the science forward, in contrast to what I have done with CSS, which has been focused on operations and engineering.

CSS has always been guided by the latest science. We base much of our observational strategy on the latest asteroid population models and are always considering the latest work on image processing and linking observations of asteroids. I see my role as taking in a larger swath of the current research and making connections with others in the field who may be working in similar areas and bringing that back to the survey.

DO YOU HAVE ANY TIME FOR HOBBIES?

In my ample free time, I volunteer for the **Southern Arizona Rescue Association** (SARA). We are responsible for search and rescue activities in Pima county and have helped those in need all over the state. Much like CSS, SARA is an incredibly dedicated and professional group that I am proud to be a part of.

HOW DO YOU FIND A WORK-LIFE BALANCE?

It is all-asteroids-all-the-time at my house as my wife, **Rose Garcia**, also works at LPL on the **OSIRIS-APEX** mission heading to the asteroid Apophis. I do have to plan my work out to make time for everything. But I try to spend as much time as possible with my daughter, River. She is 5 years old, and we have the best time playing Legos, dolls, or just sitting and watching cartoons together. If I can read to her a bedtime story, then I count that as a productive day.

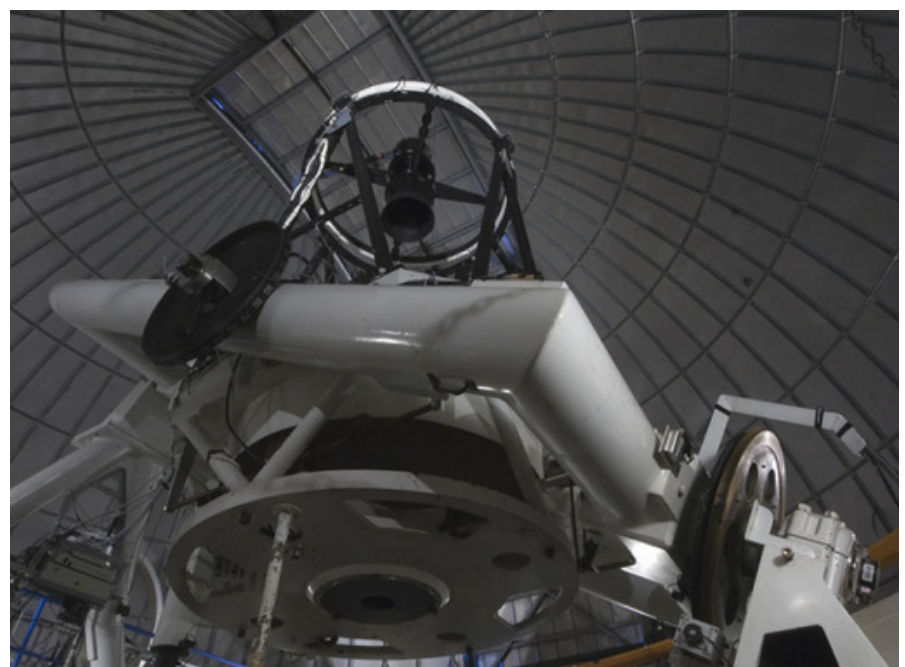
HOW CAN AMATEUR ASTRONOMERS SUPPORT CSS?

For those with their own telescopes and proficient with observing asteroids, I would recommend checking out our **NEOfixer** site (neofixer.arizona.edu) to see which near-Earth asteroids are the most in need of observation.

For those without a telescope who would still like to explore our solar system, check out our citizen science project, the **Daily Minor Planet** (<https://www.zooniverse.org/projects/fuls david/the-daily-minor-planet>) where we upload our nightly image for volunteers around the world to discover their own asteroids. The project has already discovered two new NEOs!

Read more about **Carson Fuls** and the **Daily Minor Planet**:

- <https://bit.ly/CSSCitizenScienceProject>
- <https://bit.ly/CSSHelpHunt4Asteroids>



DOLORES HILL IS A STAR

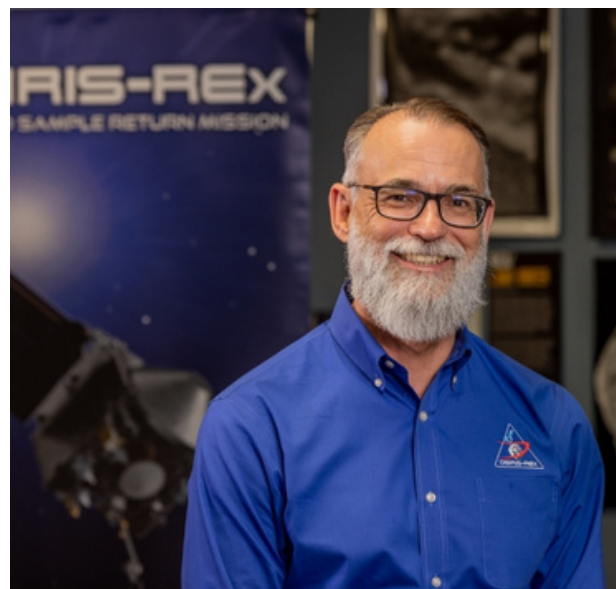
On December 4, Senior Research Specialist **Dolores Hill** was surprised with a **Star Award** from CoSSAC, the College of Science Staff Advisory Committee. Star Awards recognize staff members for outstanding achievement and contributions to teamwork on the job.

Dolores is a star at LPL, where she serves as laboratory safety manager and expert sample analysis technician, but she really shines in her role as outreach coordinator for LPL and OSIRIS-REx. Dolores is well known and always in-demand for her hands-on lessons about meteorites (and meteor-wrongs) and she is a respected colleague and liaison to amateur and professional meteoriticists alike.



ARIZONA ASTROBIOLOGY CENTER

The **Arizona Astrobiology Center (AABC)** was launched in October with LPL Regents **Professor Dante Lauretta** as Director. AABC brings together more than 40 faculty members from 4 colleges and 13 disciplines to conduct cutting-edge research, train diverse future leaders and encourage collaborative dialogue with communities about the existence, origin and evolution of life in the universe. Part of what the center will explore – in addition to life's origins and existence on other worlds – is what such discoveries might mean to different cultures and traditions around the world. The center also seeks to share these grand ideas through public engagement efforts.



KUDOS, OSIRIS-REx

The OSIRIS-REx team was honored with the 2024 **Goddard Memorial Trophy** from the National Space Club and Foundation. The Goddard Trophy is presented annually for significant contributions to U.S. leadership in rocketry and aeronautics. OSIRIS-REx also won the 2023 **SpaceNews Icon Award for Civil Space Achievement of the Year**.

OSIRIS-REx successfully returned its asteroid sample payload on September 24.

LPL IN THE NEWS

Complete list of LPL headlines and linked stories available at: [LPL.Arizona.edu/news](https://lpl.arizona.edu/news)

UArizona Again Ranks No. 1 in Space Science Expenditures, Top 20 Among Public Research Universities. UArizona, led by LPL and Steward Observatory, has held this ranking since 1987.

Pass the Salt: This Space Rock Holds Clues as to How Earth Got Its Water. The discovery of tiny salt grains in an asteroid sample brought to Earth by the Japanese Hayabusa spacecraft provides strong evidence that liquid water may be more common in the solar system's largest asteroid population than previously thought. (Zega, Che)

Tracking an errant space rocket to a mysterious crater on the Moon. Study by UArizona team provides definitive proof that the object that slammed into the Moon in March 2022 was a booster from a Chinese space rocket. The object was discovered in 2015 by LPL's **Catalina Sky Survey**. (Reddy, Battle)

Citizen Science Project Nets a New Asteroid, and It's a Close One. Members of the public helped **Catalina Sky Survey** spot a previously unknown near-Earth asteroid on its orbit around the Sun. The asteroid, TW 2023, has no chance of colliding with Earth. (Fuls)

Asteroid Sample Delivery to Launch Decades of Science. OSIRIS-REx was nearly 20 years in the making and has reached its end, but the scientific investigation is only beginning. (Lauretta, DellaGiustina)

Take a Stroll Through the Solar System – on the UArizona Campus. Designed to illustrate objects true to scale, 11 plaques have been installed across campus as part of an outreach project to make space science accessible to people of all ages. (Brown)

First Look at Bennu Sample Reveals Carbon, Water. NASA's LPL-led OSIRIS-REx mission has returned a sample that scientists will study for decades to learn more about the formation of the solar system. (Lauretta)

Researchers Probe How a Piece of the Moon Became a Near-Earth Asteroid. A LPL team has found that an interesting pathway could have led the Moon fragment to reach Earth's orbital space. (Malhotra)

Digital Terrain Models Zero in on Martian Surface. Realistic, to-scale renditions of otherworldly landscapes, created by a team at the university's Lunar and Planetary Laboratory, help lay the groundwork for ongoing and future Mars exploration campaigns. (Espinoza, Sutton, Gosse, McEwen)

OSIRIS-REx Flies on as OSIRIS-APEX to Explore a Second Asteroid. NASA's OSIRIS-REx mission learned much about the potentially hazardous asteroid Bennu and its risk to Earth. Now, the mission will change hands and target a different kind of potentially hazardous asteroid, Apophis. (DellaGiustina)



**LUNAR &
PLANETARY LAB**