

Workforce Development



2018 Women's S.T.A.R.S. Program
STem Aerospace Research Scholars

Applications Open for Summer STARS Program

PISCES is now accepting applications for its fifth annual Women's STARS Program! This week-long summer intensive for Hawaii high school girls immerses participants in the career world of STEM fields, introducing them to accomplished female scientists, engineers and educators who can serve as mentors and role models for their own academic and career paths in the future.

This summer's program will feature a variety of guest speakers spanning the fields of Polynesian navigation, astronomy, geology, engineering, marine science and planetary science. Students will be engaged with hands-on workshops in robotics and conduct a mock-Mars mission with the PISCES planetary rover, "Helelani." Participants will also

be led on a series of behind-the-scenes tours exploring some of Hawaii Island's world-class scientific research facilities, including the USGS Hawaiian Volcanoes Observatory, PISCES planetary analog sites, and several Maunakea observatories.

Twelve students will be selected to participate in the program, which will be held from July 9 to 13, 2018. There is no fee to attend STARS and all meals, transportation and overnight accommodations will be provided. Students must meet the following requirements to apply:

- Female, 16 years or older;
- Attend a Hawaii high school or be homeschooled in the state;
- Maintain a minimum GPA of 3.0;
- Be in good physical health.

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Message From the Program Director



Rodrigo Romo

Aloha Kakou,

Spring is here and our former interns are shining with PISCES. Kyla Defore, our resident geology technician, has made invaluable contributions to our basalt sintering project which have improved the quality of our sintering process. Kyla has been working closely with Jeff Taylor, a planetary scientist at the University of Hawaii at Mānoa, to characterize a variety of Hawaiian basalts and understand the intricacies of producing high-fidelity lunar and Mars regolith simulants. Kyla will present the results of her current work at the upcoming ASCE Earth & Space Conference in Cleveland this month.

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Outreach & Education



Journey Through The Universe Week Brings Wonders of Astronomy to Hawaii Isle Students

A classroom of fifth-grade students at Keaukaha Elementary School in Hilo "throw shakas" following a presentation on light and sound waves by PISCES Director Rodrigo Romo during Journey Through The Universe week in March.

PISCES staff were busy with classroom visits in East Hawaii during the 2018 Journey Through the Universe program organized by Gemini Observatory. Held from March 5 to 9 this year, the annual science outreach event engaged students from grades K-12 with more than 75 local scientists, outreach specialists and educators, as well as scientists from NASA to learn more about the world of space science and related STEM fields.

PISCES Geology Technician Kyla Defore piques student interest during a 3rd grade class presentation at Ha'aheo Elementary School in Hilo about space exploration and establishing human colonies on Mars.



According to estimates, this year's program included some 230 classroom visits in East Hawaii and impacted some 7,500 students. In North Hawaii, the program reached roughly 1,800 students throughout the week.

Astronomers from Hawaii Island observatories visited classrooms island-wide, in addition to activities that included the StarLab portable planetarium, certification workshops and career awareness presentations.

Program Director's Message cont...

Jack Andersen, another former PISCES intern and current Hawaii Community College student, has been working on PISCES' planetary rover Helelani during his Spring break. Jack is developing the telemetry and controls that will facilitate an upcoming test to determine the analog space rover's wheel traction and efficiency. Jack will graduate from HCC this summer and plans to attend the University of Hawaii at Hilo next year to pursue a degree in Computer Science.

In other news, I'm pleased to say the Keaukaha robotics program organized by PISCES in conjunction with PUEO, KOYD (Keaukaha One Youth Development) and the University of Hawaii at Hilo, is off to a great start. The weekly program for elementary grade students is based on the VexIQ model. Two UHH students, Joel Paye and Teyah Modjeska (both former Hilo High students), have been mentoring youth enrolled in KOYD's RISE program to build and program VexIQ robots. The students will be participating in an upcoming robotics invitational competition at HCC organized by St. Joseph's School. Later, they plan to compete in the local VexIQ league with other local schools.

During the last month, the PISCES staff spent endless hours working on three different research grant proposals that were submitted to NASA. Two of these proposals were part of the SBIR (Small Business Innovation Research) program and involve planetary rover projects: one will look at an innovative rover wheel design and the second looks at an alternative power source for the rover.

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Economic Development



PISCES Secures Contract with SMA for Basalt Fiber Market Feasibility Study

PISCES successfully secured a contract in March with SMA, a defense and aerospace consulting firm based in Irvine, California to conduct a market study on the feasibility of a Continuous Basalt Fiber (CBF) manufacturing operation in Hawaii County.

The study, which began on March 20, will research the financial viability of building a basalt fiber manufacturing facility in Hawaii County and prepare a comprehensive report discussing the current market demand for CBF, manufacturing capabilities world-wide and the going market price for CBF products. The study will also determine the cost to build and operate a CBF plant on Hawaii Island, and provide a business model for such a facility to determine whether it would benefit the local economy. The study will also determine the estimated cost of basalt fiber manufactured in Hawaii County compared with fiber manufactured elsewhere, as well as the potential number of jobs and wages such a facility would provide. PISCES hopes a

CBF plant will benefit the local economy by providing more jobs and a sustainable new product in Hawaii.

PISCES has been working with Hawaiian basalt as a feedstock for ISRU (in-situ resource utilization) technology to research and create usable materials with locally sourced raw materials for both space exploration efforts and sustainable products in Hawaii.

After researching and working with Hawaii basalt, PISCES found it meets the specific chemical profile needed to manufacture Continuous Basalt Fiber (CBF), a lesser-known product with myriad uses that mimic fiberglass and carbon-fiber. CBF products possess favorable characteristics including resistance to corrosion, heat and high tensile strength. Globally, CBF manufacturing is valued at around \$100 million and expected to double in the coming decade according to estimates.

The study is being funded by the state and will be completed by July 10, 2018.

Applications Open for Women's STARS Program *cont...*

Now moving into its fifth year, the STARS Program was launched by PISCES in 2014 to encourage and inspire more young women in Hawaii to pursue STEM careers by engaging them in the working world of STEM with female role models and mentors.

According to a U.S. Department of Commerce report, "women are underrepresented both in STEM jobs and STEM undergraduate degrees and have been consistently over the last decade." The report finds that although women fill close to half of all jobs in the U.S. economy, they hold less than 25 percent of STEM jobs. STARS is also a part of PISCES' Workforce Development initiative to develop and cultivate more youth interest in high-technology education and career tracks that support Hawaii's growing technology sector.

We wish to thank our continuing sponsor for the STARS Program, the Hawaii Technology Development Corporation (HTDC). This year, HTDC awarded a \$4,000 grant to support meal, transportation and accommodation costs. STARS will also be supported through numerous partnerships with local science, education and nonprofit institutions and organizations this year.

If you know an eligible student who might benefit from this unique program, please share the following link for more info and the application instructions: <http://www.pacificspacecenter.com/2018-stars-program>.

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Guest Spotlight

From Intern to Technician: The Value of Experience

Kyla Defore

Geology Technician, PISCES Hawaii

I was once told by a professor that a degree is just the first step to obtaining a career in the sciences, and that experience goes a long way when applying for jobs and graduate schools. Heeding his advice, I began looking into programs that would give me real-world experience while going to school at the University of Hawaii at Hilo. His advice would prove to be true.

As a Native Hawaiian originally from Waimea, Kauai, I returned to Hawaii in January 2014 to pursue a degree in geology after nearly a decade of living on the mainland. Hawaii offered me everything I needed: an education, a wonderful location to study geology and astronomy, and being closer to family. It turns out that Hawaii would also offer me the opportunity I needed to land a job in the sciences.

In the summer of 2014, I was accepted to the Pacific Internship Programs for Exploring Sciences (PIPES) program and placed under the mentorship of PISCES staff to conduct planetary geology work. I continued to intern with PISCES for a total of three summers as an undergraduate student, taking a break in the summer of 2015 to attend field camp and propose research for the Hawaii Space Grant Consortium where I investigated the formative processes of Martian gullies found in craters. My PISCES internships challenged me to characterize the geological makeup of Hawaii landscapes to identify analogs for the Moon and Mars. I also had the

pleasure of directing a mock lunar rover mission and helped manufacture tiles sintered from Hawaiian basalt aggregate. As a bonus, I supported PISCES outreach and education events, especially the annual Women's STARS (STEM Aerospace Research Scholars) Program for Hawaii high school girls.

After I graduated from UH Hilo in 2017, PISCES offered me a job to continue working on basalt sintering and manufacturing research through a NASA STTR grant. Since joining the team on this project, I have successfully identified the thermal profiles needed to form cohesive and durable basalt bricks. These bricks will eventually be used to construct a mock lunar landing pad and require a high tolerance for heat and harsh conditions.

I owe everything to PISCES for the opportunities they have provided me. Planetary science is not an easy profession to get into, and my position at PISCES allows me to work in a field I am passionate about. For me, hard work, perseverance and volunteering my time paid off in a big way.

The advice I received long ago proved to be true: internships are extremely important for anyone serious about obtaining a career after graduation. I hope to continue working with PISCES for many years and make real contributions to my field of study. I am eternally grateful for the opportunities and successes I have achieved since returning to my beloved Hawaii nei.



Kyla Defore

Program Director's Message cont...

PISCES will serve as the designated research partner in these proposals. The third proposal was a momentous effort led by PISCES' Operations Manager Christian Andersen. It was submitted in response to NASA's Broad Agency Announcement released in December on the topic of water extraction from Lunar/Mars regolith. If awarded, this proposal will bring just over \$250,000 per year for two years. Funds will be used to pay for research conducted by PISCES staff, the Hawaii Institute of Geophysics and Planetology (HIGP) and the Planetary Science Institute (PSI).

Finally, the contract for the Continuous Basalt Fiber (CBF) market feasibility study was signed, and the work is currently underway. The results of this study will determine whether a CBF plant on Hawaii Island could benefit the state. I look forward to sharing the results of this analysis, which could launch a new industry in Hawaii with rapid growth potential for the local economy.

A hui hou,

Rodrigo Romo
PISCES Program Director