

# PISCES HAWAII

## *Message from the Program Manager*



**Rodrigo Romo**  
Program Manager

This February the Hawai'i legislative session was in full swing and we had four bills involving our agency and work going through the house and senate. Two of the bills sought funding support to continue PISCES' basalt materials research in Hawai'i. Indirectly there were two legislative bills relating to PISCES for the creation of a "Lunar Alliance" and the appropriation of funds to provide funding for a feasibility study that would assess the benefits of establishing a small satellite launch facility in the state.

February is also a month in which our young scientists and engineers put their skills to the test. This year, the Hawai'i District Science and Engineering Fair brought many interesting projects in multiple areas of study. PISCES proudly honors one participating student each year with an award in recognition of an outstanding project.

Personally, I'm looking forward to attending the Hawai'i State Science Olympiad coming up in March. This time around, students from Hilo Intermediate School and Kalaniana'ole School received first and second place in the regional competition on Hawai'i Island. These bright students will go on to Honolulu to challenge their skills in the state finals. I wish both schools the best of luck in the finals!

In our outreach efforts, we have been working closely with NASA Ames Outreach Lead Brian Day to organize Hawai'i Island school visits in March to show students how to use programs currently used at NASA to map the Moon and Mars. We have also been assisting the Pacific Aviation Museum in Honolulu by arranging meetings with local teachers so they can bring their "Barnstorming Tour" to classrooms on Hawai'i Island. *Continued on pg. 3*

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## New Worlds Loom on the Horizon



*Image: An artist rendering envisions the surface of a newly discovered exoplanet, TRAPPIST-1f. Courtesy of NASA/JPL-Caltech.*

## Hawai'i Observatory Reveals 100 Exoplanet Candidates



*Photo: W.M. Keck Observatory's twin telescopes atop Maunakea on Hawai'i Island. Credit: WikiMedia Commons.*

In the search for habitable alien worlds, Hawai'i's W.M. Keck Observatory on Maunakea has contributed a revelatory discovery of over 100 potential new exoplanets orbiting distant stars in the heavens.

Officials of the Hawai'i Island telescope announced the findings on Feb. 13, drawn from analysis on data that was gathered over a 20-year period.

Scientists observed over 1,600 stars using a special instrument called HIRES (High Resolution Echelle Spectrometers), which is mounted on one of Keck's twin telescopes. By detecting minute wobbles in the rotation of nearby stars, HIRES is capable of sensing surrounding planets through the gravitational pull they exert. Scientists use complex algorithms to identify the faint signatures given off by potential exoplanets from the data they gather.

NASA's announcement on Feb. 22, 2017, of a landmark discovery identifying seven new exoplanets that could host liquid water have thrilled astronomers and the public alike, bringing the search for alien life to the horizon much sooner than previously thought.

The newfound planets orbit a faint dwarf star called Trappist-1 just 39 light years from our own solar system (a mere 235 trillion miles away – very close, in cosmic distances). Their proximity make them ideal candidates for further studies in the search for alien life, and for understanding atmospheric conditions of other earth-like, habitable planets.

NASA's Spitzer Space Telescope discovered four of the seven planets after Chile's TRAPPIST telescope first identified three of the exoplanets in May 2016. Conditions for all the planets are thought to be suitable to support the presence of liquid water, but only three occupy the "habitable zone" where conditions could be capable of supporting life as we know it.

Scientists have estimated the mass and density of six of the new exoplanets, and observations indicate that each of them have rocky surfaces. NASA is already drawing up plans to have the James Webb Space Telescope, the predecessor of Hubble with a launch date in 2018, focus on studying the atmospheres of these new planets.

The discovery of the Trappist system could be a "significant piece in the puzzle" for finding worlds with habitable environments, according to Thomas Zurbuchen, associate administrator of NASA's Science Mission Directorate in Washington.

"Answering the question 'are we alone' is a top science priority and finding so many planets like these for the first time in the habitable zone is a remarkable step forward toward that goal," he said during the NASA press conference announcing the findings.



## *Prog. Manager's Message Cont.*

Barnstorming is an applied science workshop targeted for sixth grade students that brings the science of aviation to life right in the classroom. We're excited to facilitate this engaging and exciting program for local students.

Our own exciting program, the summer STARS (STem Aerospace Research Scholars) workshop for Hawai'i high school women, is now moving into its fourth year and we are teaming up with several partners to provide a unique and memorable experience to aspiring female STEM students. Some of our partners thus far include the Canada-France-Hawai'i Telescope, Hawai'i Technology Development Corporation (HTDC), Subaru Telescope and the Pacific Aviation Museum.

We're also preparing some thrilling opportunities for our next round of interns this summer in the fields of robotics, materials science and unmanned aerial vehicles. We are working with the AKAMAI Internship Program to provide potential internship sites for university students who are interested in these fields.

In other exciting news, our Basalt Kiln is just about to be ready in its new home at the Institute for Astronomy (IFA) workshop. It will be shared-use equipment between the University of Hawai'i, IFA, NASA's Infrared Telescope Facility and PISCES. We will soon resume our trials with sintered basalt materials with the intent of developing an effective ISRU process that we can use both for space exploration, and to benefit the State of Hawai'i.

*Cont. reading on next page...*

## PISCES Celebrates `Imiloa Astronomy Center's 11<sup>th</sup> Birthday



`Imiloa Astronomy Center celebrated its birthday on Feb. 20, marking the 11<sup>th</sup> anniversary since it opened its doors to the Hawai'i community in 2006. This year's theme centered around "Earth, Sea and Sky."

PISCES' Program Manager Rodrigo Romo and Public Information Associate Chris Yoakum manned a "Mars exploration" booth in the exhibit hall complete with navigable interactive maps of the Moon, Mars and other places in the solar system. `Imiloa's Education Coordinator, Punawai Rice accompanied the PISCES booth, engaging visitors with a space trivia game for kids, samples of sintered basalt, Mars dust simulant and mock lunar rocks.

Over 500 adults and children attended the free event to enjoy games, crafts, food and presentations in the planetarium. Other local organizations celebrated with exhibits and activities themed around Hawai'i's cultural cosmos as well as the cosmic universe.

`Imiloa, a part of the University of Hawai'i at Hilo, showcases the connection between Hawai'i's rich cultural heritage and the groundbreaking science being conducted atop Maunakea volcano through educational and interactive exhibits, as well as monthly presentations. The Center was first conceived in the mid-90s, and sits on nine acres of UH's Science and Technology Park in Hilo. For more information visit [www.imiloahawaii.org](http://www.imiloahawaii.org).



*PISCES' Rodrigo Romo (left) and `Imiloa's Punawai Price (seated in middle) share Moon rocks and Martian dust with visitors during the Center's anniversary event.*

## *Prog. Manager Message Cont...*

Finally, I have to touch on the exciting news happening in the commercial space industry. SpaceX achieved a perfect landing of their Falcon 9 booster rocket at Kennedy Space Center in Florida, raising confidence in the future of reusable rockets. That launch sent a Dragon capsule to the International Space Station with supplies, and although there was a delay in the docking, the delivery was a success. SpaceX has also announced a manned mission to orbit the Moon with two private citizens in their Dragon2 capsule. This is a leap ahead toward SpaceX's efforts to conduct a manned mission to Mars. We live in truly exciting times!

*-Rodrigo Romo*

*PISCES Program Manager*

## *Hawai'i Observatory Cont...*

Scientists from around the world contributed to the painstaking analysis including astronomers and representatives from University of California at Santa Cruz, Yale University, Carnegie Institution for Science, University of Hertfordshire, and Universidad de Chile.

"The work of this team and their willingness to share data and techniques unveils a world of new possibilities, vastly increasing the ability of astronomers everywhere to perform in-depth studies of these exoplanet systems," said Hilton Lewis, Keck Observatory director.



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## Sixth-grader Wins PISCES Award at Hawai'i Science Fair

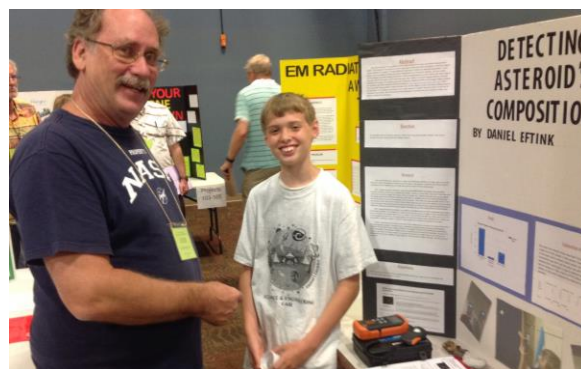
Young minds are truly capable of great things. Many of them turned out at the last Hawai'i District Science and Engineering Fair held at the 'Imiloa Astronomy Center on Feb. 18.

The 29<sup>th</sup> annual event hosted Hawai'i student science exhibits, grades six through 12 with inspired experiments and displays by Hawai'i's next generation of innovators in technology and science.

Over 100 projects were entered this year with 20 designated as "Senior Research" and 80 defined as "Junior Research."

PISCES' EPO/Test Logistics Manager John Hamilton volunteered as a judge at the event, interviewing students and reviewing their projects for creativity, methodology and presentation to help select the best among them to advance to state finals in Honolulu.

Hamilton presented the annual PISCES Science Award to an outstanding sixth-grader, Daniel Eftink of St. Joseph School, for his project called "Detecting Asteroid Composition." Daniel ingeniously devised a method of identifying the composition of asteroids using a geometric albedo of rock compared against a NASA database. His references correlated with the reflectivity of varying types of asteroids. Daniel made all his own calculations to correct the albedo measured for the geometric albedo. Congratulations Daniel! Well done!



*PISCES' John Hamilton (left) pauses for a picture with PISCES Science Award winner Daniel Eftink.*

## Students Leave Career Fair Starry Eyed



PISCES teamed up with 50 other Hawai'i businesses and organizations for the first annual Hilo High School career fair on Feb. 10, giving over 1,000 students a taste of the exciting career possibilities Hawai'i has to offer.

PISCES Program Manager Rodrigo Romo spoke with dozens of curious students about his role as a leader and engineer at the Hilo-based space center, where projects range from student education programs and internships to applied research in ISRU, robotics and other space exploration applications and technologies.

"Inspiring the Islands' upcoming generation of scientists, engineers and programmers is one of my favorite parts about our work here at PISCES," said Romo. "I get to share the work we're tackling to benefit the future of our State and space exploration, and a lot of these kids get really excited."



# PISCES GUEST SPOTLIGHT

## Aerospace in Hawai'i: Charting a Way Forward Hawai'i Sen. Kaiali'i Kahele



*Sen. Kaiali'i Kahele is a Native Hawaiian from Hilo, Hawai'i representing the 1st Senatorial District of Hilo. He is the son of the honorable late Sen. Gil Kahele. Before entering politics, Sen. Kahele pursued a career in aviation after a couple of inspiring chance encounters with Hawai'i Astronaut Ellison S. Onizuka and Hokule'a navigator Mau Piailug. Sen. Kahele is a decorated military pilot and previously flew an Airbus 330 as First Officer for Hawaiian Airlines.*

Hawai'i and its people have always been intrinsically linked to the stars. Using ancestral wisdom and techniques, Polynesians explored the South Pacific with only the stars, skies and currents to guide them. Just like my ancestors before me, I look to the stars and sky to chart a way forward and find new economic opportunities for our people.

Strategically located in the center of the Pacific Ocean, Hawai'i is the premiere location for all things aerospace. Knowing this I've focused on supporting and pursuing efforts to maximize potential opportunities, including:

- Seeking University of Hawai'i Board of Regent approval for the proposed Bachelor of Science Degree in Aeronautical Science at the University of Hawai'i at Hilo.
- Continuing to pursue the establishment of an Aero Technology Park in Hilo.
- Voting in support of SB1247, which makes an appropriation, subject to the availability of matching funds, to the University of Hawai'i to conduct any studies necessary to ascertain the feasibility and benefits of establishing a small satellite launch and processing facility in the State, as well as to conduct any related public outreach programs.

I believe aerospace is the answer to many of the economic and fiscal issues our State faces. With the right support, efforts like the above can play a critical role in bringing much needed jobs in aviation, air control or unmanned aircraft systems to Hawai'i. That's my vision for aerospace and the legacy of our kūpuna (ancestors).