UH Hilo astronomy student Kyle Steckler discovers new object in solar system

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The minor planet discovered by Kyle Steckler is technically classified as a centaur, a subclass of trans-Neptunian objects or minor planets that orbit the sun beyond Neptune.

By **Leah Sherwood**.

Kyle Steckler

This story is part of a series on projects done by UH Hilo physics and astronomy students awarded research positions.

A student studying astronomy at the University of Hawai'i at Hilo discovered a new object in the solar system while completing an internship this past summer at the University of Michigan, Ann Arbor.

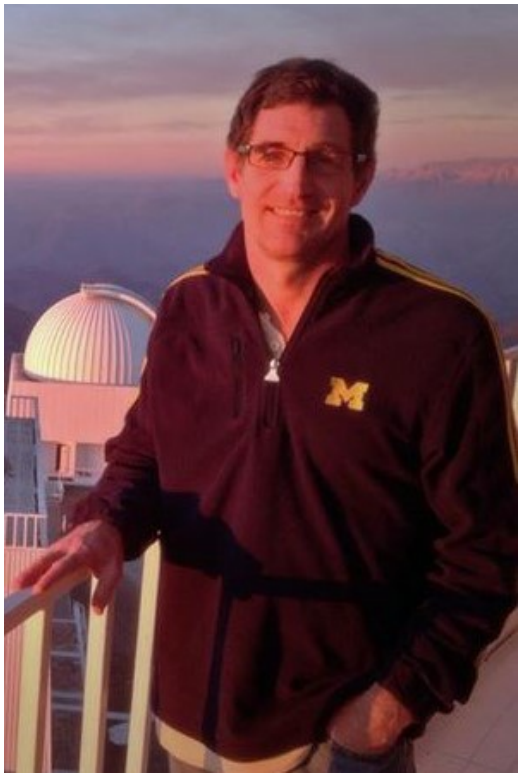
The minor planet discovered by **Kyle Steckler** is technically classified as a centaur, a subclass of trans-Neptunian objects (TNO), or minor planets that orbit the sun beyond Neptune.

"Centaurs are interesting in that they spend part of their orbit outside of Neptune, but then actually cross the orbit of Neptune and spend some time inside its orbit," explains Steckler. "This object is likely 35 to 60 kilometers in diameter and about 20 times more distant than Earth from the sun."

Pluto, the first and most famous TNO to be discovered, became infamous when it was demoted from planet to TNO in 2006. Luckily, Steckler's TNO is not so controversial because its size and orbit fit the category neatly.

Research Experiences for Undergraduates

Steckler's internship when he made the discovery was through the Research Experiences for Undergraduates program, a U.S. National Science Foundation program that allows undergraduates to take part in active research over the summer. Steckler spent this past summer at the University of Michigan, working under the tutelage of Professor of Physics **David Gerdes**.



David Gerdes

"I spent pretty much the entire summer developing an algorithm to discover TNOs or minor planets using data from the Dark Energy Survey" says Steckler. The Dark Energy Survey (DES) uses the 4-meter Blanco telescope at Cerro Tololo in Chile to survey visible and near-infrared light with the goal of probing the dynamics of the expansion of the universe.

"It's kind of weird because the Dark Energy Survey was designed to look at the deepest parts of our universe, but a few years ago Professor Gerdes wondered if forefront TNOs could be seen in the data inside our own solar system," explains Steckler. "And sure enough, they can be. Hundreds of new TNOs have since been discovered with this data."

Steckler discovered his TNO by developing algorithms that utilized machine learning to detect distant objects in the DES data.

"It was an application of machine learning in a domain perfectly suited for it," says Steckler. "I had done some machine learning and artificial intelligence type stuff in my previous research and I saw an opportunity to apply it here too."

Steckler's TNO was literally a last-minute discovery.

"The algorithm didn't fully work all summer and I wasn't discovering anything new," he says. "I discovered a bunch of TNOs but they were ones that had been discovered with previous methods. About three hours before I gave my final presentation at the symposium in Ann Arbor, I was running my software and it popped up and said, `Hey, I found something new!' So I had to modify my presentation at the last minute."

Hawai'i Space Grant Consortium trainee

Previously, in the fall of 2017, Steckler was selected to be a Hawai'i Space Grant Consortium trainee. The consortium trains the space scientists, space settlers, and aerospace engineers of the future and is part of NASA's National Space Grant College and Fellowship Program.

Marianne Takamiya, chair of the UH Hilo physics and astronomy department, encouraged Steckler to apply to the program and served as his mentor.

Marianne Takamiya

"We were allowed to use the Keck telescopes, which is an amazing opportunity for undergraduates," says Steckler. "We were looking at star forming regions, measuring star formation rates, and analyzing a lot of the physical properties of the interstellar medium. This is useful because it tells us a lot about how galaxies evolve. If we paint a better picture of how galaxies evolve then we can in turn paint a better picture of how the universe evolved."

A native of Seattle, Wash., Steckler came to UH Hilo almost by accident.

"My girlfriend came here to study marine biology," he explains. "She said, 'Hey, you're into astronomy, right? We have these world-class telescopes here on Maunakea.' I had no idea."

About the author of this story: Leah Sherwood is a graduate student in the tropical conservation biology and environmental science program at UH Hilo. She currently serves as an intern in the Office of the Chancellor. She received her bachelor of science in biology and bachelor of arts in English from Boise State University.

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