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Eyes To The Skies

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by KELLY KETTERING

Grad student uses NASA award to study Near Earth Asteroid

Desiree Cotto-Figueroa, a native of Puerto Rico, always has been interested in space. She excelled in math and science classes in high school, where she also became interested in astronomy.

“My friends and I started our astronomy club, and I was the president. That was really the only thing that grabbed my attention in school. I always wanted to know more and more,” she said.

This hunger for scientific knowledge led Cotto-Figueroa to earn her bachelor’s degree in physics at the University of Puerto Rico at Humacao before coming to graduate school at Ohio University. She recently earned her master’s degree in physics, and as part of her work towards her Ph.D., she’s studying an interesting issue: asteroids that come close to the Earth’s orbit.

NASA recently awarded Cotto-Figueroa the Harriet G. Jenkins Pre-Doctoral Fellowship to support her research on this topic. The fellowship provides three years of financial support for educational and travel expenses, opportunities to collaborate with NASA scientists and the chance to participate in an annual symposium.

“I think getting this fellowship was such a boost to Desiree’s enthusiasm,” said her advisor, Professor of Physics and Astronomy Tom Statler. “The way that she took off to read papers and started working on the data shows she clearly wants to do the whole job of being a working scientist.”

Cotto-Figueroa has used the telescopes at Ohio University’s MDM Observatory on Kitt Peak, Arizona to examine the properties of what scientists call Near Earth Asteroids, which may be either solid rocks or “rubble piles” held together by low amounts of gravity. The sizes of the asteroids under study range in diameter from 20 to 800 meters, approximately the size of an office building or a shopping mall.

The researchers study the change in the Near Earth Asteroid’s brightness when it rotates. They determine how fast the object spins, which then sheds light on its composition, Statler explained. “The fastest-spinning objects should be the ones that are just on the brink of falling apart,” he said.

Three things can alter the spin of an asteroid: It can be hit by another object; it can be gravitationally twisted in a close pass by the Earth or another planet; or the effects of solar heating can slowly change the spin over many thousands of years. For these small Near-Earth objects, the latter scenario is most likely, Statler explained.

“It is not only important to find asteroids but to characterize them and get their properties so we know about them for the future,” Cotto-Figueroa said.



[next >](#)

Desiree Cotto-Figueroa, David Riethmiller and Tom Statler observe the cosmos from the MDM Observatory at Kitt Peak, Arizona

photo by: Courtesy of Desiree Cotto-Figueroa

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There are roughly 1,000 objects currently classified as potentially hazardous asteroids, or 1/6 of Near Earth Asteroids. While small objects impact Earth frequently, Statler stressed that the chance of a catastrophic asteroid impact (1 kilometer or larger) during the average person's lifespan is about 1 in 1,000. But scientists continue to study the asteroids to learn more about the evolution of our solar system.

To further her work on the subject, Cotto-Figuera has taken three different trips to the MDM Observatory to gain more experience with using the telescope and, on the last trip, with collecting data without a professor's assistance.

After her education is complete, Cotto-Figueroa hopes to become a professor of astrophysics back in Puerto Rico and increase scientific study there.

"I actually want to establish a department of astronomy or integrate astronomy with an existing department of physics in Puerto Rico," she said. "As of today astronomy is just an area of research in some of the physics' departments, but there are no degrees available in astronomy or astrophysics — not even at the undergraduate level."

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