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Gahanna science students share research with top astronomers



The Gahanna Lincoln High School Science Academy team that participated in the NITARP astronomy research this past year included (from left) Kirstie Yanai, Emily Merickel, Laura Stegner, instructor Fred Donelson and Aaron Grgurich.

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By **MARLA K. KUHLMAN** *ThisWeek Community News*

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Gahanna Lincoln High School Science Academy instructor Fred Donelson and students Aaron Grgurich, Emily Merickel, Laura Stegner and Kirstie Yanai presented research alongside professional astronomers during an international conference Jan. 5-9 near Washington, D.C.

The presentation at the American Astronomical Society was the culmination of their yearlong participation in the NASA/IPAC Teacher Archive Research Program.

They've been analyzing data from the Kepler Space telescope, searching for more information about red giant stars and their evolutionary life cycle.

Using Kepler mission data from the NASA Exoplanet Archive, the team performed a blind study of 200 red giant stars previously identified as hydrogen-shell burning or helium-core burning. By analyzing the amplitude of the strongest period of each star, they developed a diagnostic that predicts the red giant evolutionary state with 82 percent accuracy.

"It was so great," Stegner told *ThisWeek*. "I learned a lot. We analyzed different red giant stars, looking at different patterns. We did a bunch of research at home, collecting data. That took a long time. We looked at 200 stars, taking 20 minutes each to analyze. There were four of us students, so we each looked at 50 stars."

The team worked with Dr. David Ciardi (NASA Exoplanet Science Institute/IPAC) and Dr. Steve Howell (NASA/Ames Research Center), as well as high school instructors Holly Bensel (St. Mary's School, Medford, Ore.), Danielle Miller (University High School, Orlando) and Sally Seebode (San Mateo High School, San Mateo, Calif.) and students from their schools.

Each student spent about 50 hours last spring and early summer, doing the initial data collection and analysis. Then they met for several days in California at the Jet Propulsion Laboratory with the astronomers and other teacher/student teams to sift through the data to find patterns, looking for some type of diagnostic tool that could help predict evolutionary stages in red giants.

After looking at hundreds of periodograms, phase-binned curves and histograms, they finally found a promising relationship between amplitudes and the strongest periods of the stars. Using another blind study of about 40 stars, the group was able to predict hydrogen-shell and helium-core burners with about 82 percent accuracy, which is very good in the field of astronomy, Donelson said.

An abstract then was written and submitted to the American Astronomical Society, along with a poster, and students and teachers were selected to present their research at the AAS annual meeting near Washington.

The meeting brings together hundreds of astronomers from around the world to present recent research.

"Although I didn't understand technical components, it was great to be there among the star people," Stegner said. "We had a research poster we presented. There were industry booths, and that's where I spent most my time, looking at different vendors."

The Gahanna students also participated in a telescope viewing session.

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"It was called a star party, with telescopes set up," Stegner said. "People were on a book. It was cool. I think astronomy is so cool. There's a lot to learn."

Donelson said it was an honor to be there and exciting to meet and discuss new astronomy findings with astronomers who are on the cutting edge of research.

"Aaron, Kirstie, Laura and Emily did an excellent job all year, and their presentations to other astronomers and the general public were extremely well-done," he said. "This wasn't just a simple high school project. They did original astronomical research and developed a new diagnostic tool that hopefully will lead scientists to a better understanding of stellar evolution."

"I received several compliments from other teachers and astronomers on how well-versed they were in the science behind the evolution of red giants and how they were able to take a complex subject and make it understandable," Donelson said. "We work on that all the time in the Science Academy here at Gahanna, and it was nice to see that work pay off on the big stage like the AAS."

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