Student and professor solve astronomical mystery

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(Phys.org) —To ordinary folks, stars in the galaxy may seem like tiny specks of light. But to Penn State Brandywine Professor Timothy Lawlor and undergraduate researcher Nick Rufo, one of those bright balls of gas is actually more massive than scientists originally reported and holds implications for understanding the evolution of the universe.

Research conducted by Rufo and Lawlor about the irregular characteristics of what is known as "Caffau's Star" suggests that it could actually be considered part of the subgiant category rather than a main sequence star. Translation: Caffau's Star could actually be much more immense than initially described. This finding plays an important role in strengthening the understanding of star formation and helps researchers comprehend the evolution of the 13.8 billion-year-old universe.

"The puzzle of stellar evolution is really about the origin of every one of us," explained Lawlor, who is associate professor of physics. "One of the most fascinating things about stellar evolution and the evolution of the universe is how it becomes clear that a huge majority of all atoms that make up you, me and the entire planet can be traced back to the center of a very massive star that blew up long ago."

Rufo, who spent his first two years at the Brandywine campus and is now a meteorology major in the College of Earth and Mineral Sciences at University Park, worked closely with Lawlor to analyze data about Caffau's Star. He was able to complete calculations using a computer code and produced all of the models that were compared to Caffau's Star

in the research process.

"Nicholas was a dedicated researcher," Lawlor said. "He helped uncover that the mass did not fit that of a main sequence star, and that for the observed composition of lithium to match, the star would have to be significantly less massive, which was not likely based on the temperature. Working with Nicholas was one of the most productive collaborations I have had with an undergraduate researcher."

While at the campus, Rufo participated in Penn State Brandywine's spring undergraduate research exhibition called EURECA, where he presented the beginning discoveries of the studies he conducted alongside Lawlor.

"I feel honored to have worked with a great professor like Dr. Lawlor," Rufo said. "I never imagined I would have an opportunity working with Dr. Lawlor on a paper and doing research on a fascinating subject like astronomy when I was a student at Brandywine. I really enjoyed the experience and feel it gave me confidence and motivation."

Provided by Pennsylvania State University