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# A Long-Term Variability Study of Dying Low and Intermediate Mass Stars

Allyse Appel  
*Valparaiso University*

Justin Reed  
*Valparaiso University*

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**Authors: Allyse Appel, Justin Reed**

Department: Physics and Astronomy

Faculty Sponsor: Dr. Bruce Hrivnak

Title: *A Long-Term Variability Study of Dying Low and Intermediate Mass Stars*

Abstract:

We are studying the long-term light variation of dying stars (similar to the sun). These stars pulsate, causing them to vary in light. Our purpose is to better understand the internal structure of these objects through light curve and period analysis. These dying stars are in the proto-planetary nebula (PPN) phase, which lasts only a few thousand years between the red giant phase and the planetary nebula phase. First discovered with the Infrared Astronomical Satellite Survey in 1983, PPN emit strongly in the region, but the central stars of PPN can be studied in visible light. This summer we have observed 20 nights from the Valparaiso University Observatory gathering data for 26 stars. We also have data from collaborators using the SARA-North and SARA-South telescopes located at Kitt Peak, Arizona and Cerro Tololo, Chile, respectively. Our project has two main parts: (1) to continue the long-term observations of PPNs, which started in 1994, and (2) to combine the data from several CCD cameras to enlarge the sample and to better determine the light curves of PPN. We are analyzing a subset of 12 PPN to determine their pulsation periods and amplitudes in order to understand their long-term variability.

About the authors:

Allyse (Allie) Appel is currently a standing junior as a physics major. Her long-term goal is to go to graduate school, possibly receiving a PhD in Particle Physics or Astrophysics as well as to participate in research for the United States. Justin Reed is currently a sophomore physics major, unsure of future career plans. Both students are first year astronomy research students working with Dr. Bruce Hrivnak.

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