A uniform survey of bright open clusters

This research will be conducted at Austin Peay State University (APSU) with faculty mentor J. A. Smith. APSU is located in Clarksville, Tennessee.

Research Description: Open clusters are an important class of objects to understand stellar evolution [A, B]. Several open clusters have been investigated by many researchers, mostly using different detectors and filter systems thereby injecting uncertainties into the comparative analyses. APSU is performing a survey of open stellar clusters using the APSU 0.5 m and the WIYN 0.9 m telescopes in a uniform filter set (the SDSS-ugriz system). This filter set is quickly becoming the wide-band filter set of choice in astronomy. The survey is designed to observe several dozen clusters, the red giant stars, the red clump stars, and at least the upper portion of the main sequence stars. These observations will allow a rough “standardization” for comparative studies of these clusters in other filter systems.

Other projects are also available including “Characterization of White Dwarfs as large survey calibration standards” which will involve reduction of CCD ugriz imaging data of white dwarf candidates to about rough temperatures, surface gravities, and atmospheric compositions for the stars. The hotter candidates (not the variable instability regions) will be selected for follow-up spectroscopy to refine the parameters.

Student Involvement, Expectations, and Deliverables: With faculty guidance, REU interns at APSU will learn how to operate the campus 0.5 m telescope in Tennessee and the WIYN 0.9 m telescope in Arizona. This includes planning and executing an observational program as well as reducing and analyzing the data that is obtained. In doing so, students will master a variety of instruments and software including CCD cameras, image-processing workstations that includes associated mathematical tools and image analysis software. Each student will be assigned a target object for which they will be responsible for investigating. This will include conducting background literature searches to verifying the data is accurately recorded, logged, and entered into the electronic archive. The student is also responsible for disseminating the research by preparing (and giving) an oral/poster presentation, a written report, and, if sufficient progress is made, writing sections of a manuscript for which they will be designated as co-author.

Peer Collaborators and Summer Activities: The REU student will live on the APSU campus, working and collaborating with 4 to 6 APSU physics and astronomy students and the 12 to 15 APSU students working with Science and Math faculty from across the campus.

References for this project:
