

Siemens Competition

Math : Science : Technology

Regional Finalist

Name: Charles Gulian

High School: Ossining High School

Mentor: Dr. Michal Simon, PhD

Project Title: *A Search for Tidally-Distorted White Dwarf Binaries in the Kepler Survey (Astrophysics)*

White dwarf (WD) binary stars represent the final stage of stellar evolution for the majority of stars in our Galaxy, though they are currently rare in the Universe. Only ~100 WD binaries have hitherto been discovered, severely limiting opportunities for observational studies of WD binaries that may further our understanding of transient astronomical events such as Type Ia supernovae. We therefore conducted an independent search for undiscovered WD binaries using publicly-available photometric data from the *Kepler* survey. A novel computational search method was created to identify potential binaries by detecting unique photometric signals that arise from tidal-interactions in binary systems. A sample of 1,970 stars was selected based on the closeness of the stars' color properties to those of known WDs. We downloaded all available photometric data for the sample from the *Kepler* archive, and analyzed the noise and variability characteristics of the obtained light curves. By visually inspecting all 399 light curves, we identified short-period variability in 156 stars in the sample. The computational search successfully identified a single potential WD binary that had not been previously mentioned in the literature; KIC 112887855. Follow-up observations and studies of these objects are needed to confirm these results.