

## **KEPLER OBSERVATIONS OF LONG-TERM ACTIVITY IN ALGOL-TYPE INTERACTING BINARY SYSTEMS**

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We propose a combination of high and low cadence Kepler observations of ten Algol-type binaries in the Kepler fields to study the physics of mass accretion in these interacting systems. Emphasis will be placed on long-term variability, especially the Double Periodic Phenomenon identified by Mennickent et al. (2003). Double Periodic Variables (DPVs) display cyclic photometric variations on the short time scales of their orbital periods and long cycles of hundreds of days. The cause for the long cycle is unknown, but it might be the result of the waxing and waning of an obscuring circumstellar (CS) disk about the mass gainer precipitated by critical rotation of the gainer. Variability in an identified hot accretion spot at the site of the gas stream impact (photosphere or disk) and its size and longitude on the time scale of the long period will be investigated. We will look for changes in possible accretion-induced photospheric pulsations that might help drive mass loss to a CS disk and study its depth dependence. We will also search for variable micro-flaring that might result from shocks due to a clumpy gas stream. Since the radiative energy from hot spots and disk mass loss at L3 can precipitate systemic mass loss, their existence influences the evolution of close binaries. We expect that a hot spot and micro-flaring will be visible only on the trailing hemisphere of the system. Pulsations should be global, but perhaps of an irregular nature on hemisphere experiencing the impact. Although we have a general understanding of how Algol systems are formed and their evolutionary state, little is known about the details of the mass accretion. We will investigate both short and long-term variability over many orbital cycles to identify unique light curve structure that will provide insight into the physics of mass transfer. The Kepler photometry will be analyzed with the latest version of the Wilson-Devinney light curve analysis program. The residual light will be analyzed using standard Fourier techniques. Frequencies found in the residuals will be interpreted with the aid of current asteroseismology software. The project addresses NASA's Strategic Subgoal 3D, Discover the origin, structure, evolution, and destiny of the universe, and search for Earth-like planets, as it will advance our understanding of the evolution of early-type close binary stars