

Proposal for Observations of Eclipsing Binaries in Kepler K2 Field 1

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We propose *Kepler* LC observations of eclipsing binary systems in K2 Field 1. All observations are in the long cadence mode. As part of a wider study of the detailed physics of mass transfer in Algols, we are modeling the *Kepler* light curves of short-period systems observed during Cycles 1-4. The observations have revealed that several systems display unequal brightness at their quadrature phases and that the quadrature brightness ratio varies from > 1 to < 1 on a time scale of about 100-400 days (<http://nexsci.caltech.edu/conferences/KeplerII/posters/peters.pdf>). To the best of our knowledge such behavior (called L/T - leading/trailing hemisphere - variability) has never been reported from ground-based photometry. The *Kepler* light curves are being modeled with the Wilson-Devinney program (Wilson 2012 and references therein) and we are exploring whether a migrating hot accretion spot on the primary and/or cool spots on the secondary can explain the quadrature light variability. Observations of additional Algols and related Ebs in *Kepler* K2 Field 1 will allow us to investigate the prevalence of the L/T phenomenon in short-period systems, look for the behavior in longer-period Algols in which the gas stream misses the primary star, and study variability in the secondary as some systems show total eclipses.

Following the guidelines on the K2 webpage (keplerscience.arc.nasa.gov/K2/ProposeTargets.shtml) we searched the region centered on α (2000) = 11^h 35^m 45.5^s, δ (2000) = +01°25' 02" for eclipsing binaries with EA (eclipsing Algols), EB (eclipsing binaries of the beta Lyr type), and EW (eclipsing binaries of the W Uma type) using a 8.5° search radius. Several catalogs of variable stars were consulted including Avvakumova et al. (2013), Malkov et al. (2006), Budding et al. (2004), the General Catalog of Variable Stars (Samus et al. 2013), and Simbad. Only three objects were found: FM Leo (EA, P = 6.73 d, Ratajczak et al. 2010), HI Leo (EB, P = 0.3 d, also an X-ray source, Szczygiel et al. 2008), and PS Vir (EW, P = 0.3 d, Hoffman et al. 2009).

References:

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| Object | J2000 | J2000 | Kp (mag) | Cadence (min) | Comments |
|-----------|-----------------|--------------|----------|---------------|--|
| | Right Ascension | Declination | | | |
| | (deg) | (deg) | | | |
| 201488365 | 11 12 45.095 | 11 12 45.095 | 8.814 | 30 | FM Leo, EB of the Algol Type, P=6.73 d |
| 201552030 | 11 12 16.829 | +01 19 05.60 | 10.87 | 30 | HI Leo, EB of the beta Lyr Type, P=0.3 d, X-ray source |
| 201857250 | 11 57 51.278 | +06 27 04.70 | 11.541 | 30 | PS Vir, Eclipsing Binary of the W UMa Type, P=0.29 d |

| Object | J2000 | J2000 | Kp (mag) | Cadence (min) | Comments |
|-----------|-----------------|--------------|----------|---------------|--|
| | Right Ascension | Declination | | | |
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