

Photometric Observations of Known Bright Eclipsing Binaries from STEREO

Kepler 2 Field 0 Proposal

Darin Ragozzine & Shane Marcus

Florida Institute of Technology

The prime Kepler Mission has clearly demonstrated its ability to discover and characterize planets around other stars and stellar binaries and multiples of all kinds. **We propose to observe ~30 known bright eclipsing binaries** to continue observations of eclipses and search for possible circumbinary planets.

This proposal is one of multiple similar proposals aimed at identifying known binary stars in the fields in a variety of ways. These systems were identified using NASA's STEREO satellite as described in Wraight et al. 2011. Although a Sun-observing mission, STEREO has a wide-field imager which can productively observe bright stars at sub-percent photometric precision. This has enabled searches for transiting planets and eclipsing binaries near the ecliptic. For the Kepler 2 search areas, it should be a mostly complete list of EBs in the 6-9 mag range. We identified all known BDB systems within 12 degrees of the proposed Field 0 boresight (RA (J2000) = $06^{\text{h}} 47^{\text{m}} 00^{\text{s}}$, Dec (J2000) = $+21^{\circ} 22' 47''$).

By targeting known eclipsing binary stars, the probability of valuable science is much higher than picking a random field star. Hence, the science yield is likely to be much higher. Recall that the Kepler Eclipsing Binary Working Group (of which Ragozzine is a member) and others have already produced dozens of important papers regarding stellar properties, binary probabilities, circumbinary planets, and a variety of other science. These targets have a high probability of similar scientific returns.

Furthermore, the proposed targets are doubly valuable due to pre-existing data and analysis. Binaries identified from lists of known binaries must already have significant eclipsing binary solutions. This will enhance the understanding and interpretation of any Kepler 2 Field 0 photometric data that is obtained on such targets.

Finally, bright targets are likely to have the highest photometric precision for additional studies, be they the search for eclipse timing variations or asteroseismic variability or precise identification of stellar and orbital properties. STEREO targets focus on stars that are anticipated to have high SNR in Kepler 2 and previous and subsequent students.

We consider these targets to be of medium priority and easy to include in the Kepler 2 mission due to their small numbers (~30). Some of the brighter stars may be problematic and we leave it to the mission to determine the engineering plausibility of observing these targets. We recommend that these stars be included in priority much higher than padding the list with field stars of similar magnitude.

Thanks to the Kepler 2 Mission Team for coordinating these proposals.

Reference

Mon. Not. R. Astron. Soc., 416, 2477-2493 (2011) "STEREO observations of stars and the search for exoplanets." by WRAIGHT K.T.; WHITE G.J.; BEWSHER D.; NORTON A.J.