Searching for Planets around Young Stars: Young M Dwarfs

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Planets around young stars are of great astrophysical interest for a number of reasons. Massive short period planets around such stars must have migrated into place and will not have had time to experience significant tidal damping. The eccentricity and obliquity distributions of these planets will thus provide information on the migration mechanism, while the populations of planets around young stars of different ages can constrain when migration takes place. The populations of smaller planets around young stars can also help constrain the formation timescale for these planets and whether and when they migrated. For instance, there is currently a controversy surrounding whether the compact multiplanet systems found by *Kepler* were formed in situ (e.g., Chiang & Laughlin, 2013) or migrated into place during the planet formation process (e.g., Raymond & Cossou, 2014). Searches for planets around young stars can help to answer these questions.

Unfortunately, there are no bright young stellar clusters in the Campaign 3 field of view. Instead, we conducted a literature search for members of young stellar moving groups and other young stars that will be in the Campaign 3 field. We identified only one target: GJ 4282, an M2.5+M2.5 binary system with an age of 20-150 Myr (Shkolnik et al., 2009). With a separation of 1.6", corresponding to $\sim$ 42 AU at the distance of the system (Daemgen et al., 2007), both stars will be blended upon one *Kepler* pixel. *Kepler*, however, has had success finding planets around similar targets during its prime mission, such as Kepler-13 Ab (Barnes et al., 2011) and KOI-284 (Lissauer et al., 2014). There is no reason to expect that this should be different for K2. Additionally, the Shkolnik et al. (2009) catalog is being used as the target catalog for the PALMS survey (Bowler et al., 2012), which is a direct imaging survey for wide planetary companions to young low-mass stars. GJ 4282 thus may be observed by PALMS; in combination with K2 data on this targets, this represents a unique opportunity to constrain the presence of planets at both small and large separations.

Based upon early characterization of the K2 photometric performance (Howell et al., 2014), we expect that K2 should be able to detect (with at least three transits) transiting planets with $R > 1.6R_{\oplus}$ and $P < 24$ days around GJ 4282 A or B, accounting for dilution. While the smallest planets will be out of reach for K2 due to dilution, K2 is nonetheless capable of placing interesting limits upon the presence of transiting planets in these system.

References

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