Small Planets around Small Stars: Proper Motion & Spectroscopic Selection

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M dwarfs continue to be targets of high priority for exoplanet surveys because of the higher probability for detecting Earth-size planets orbiting these smaller, low-mass stars. M dwarfs make the best targets as they offer the largest signals for transit discovery and subsequent atmospheric characterization. Here we propose observations of a high-quality list of M dwarfs with especially low contamination fractions. These are selected using two techniques: **well-characterized M stars with SDSS spectra**, and from high proper motion (which comprise **the majority of M dwarfs within 100pc of the Sun**). Both techniques have essentially zero contamination from background giants (thanks to the proper motion selection and careful spectral classification).

Our proper motion-selected sample uses the same initial selection criteria as we used in K2 GO0120 (PI Lepine), based on the SUPERBLINK proper motion survey (e.g. Lepine & Shara 2005, AJ 129:1483; Lepine & Gaidos 2011, AJ 143:138). **We prioritize our targets based on the expected transit S/N**, determined by comparing the expected photometric precision to the transit depth expected for a nominal, transiting super-Earth. We estimate transit depths by converting optical, NIR, and WISE photometry to spectral type and thence to radius (Pecaut & Mamajek 2013, ApJS 208:9; Boyajian et al. 2012, ApJ 757:112). Our proper motion sample therefore provides the greatest possible sensitivity to small transiting planets, and includes 8000 targets, with a median brightness of Kp$\sim$16.5 mag.

Our SDSS Spectroscopic sample is based on the all-sky identification of $> 70,000$ M dwarfs (West et al. 2011, AJ 141:97). These targets were vetted by eye and so the sample is exceptionally pure. Interpreting any transiting planets or eclipsing binaries found in these systems will be much easier thanks to the precise spectroscopic characterization of the stars. We therefore include all 522 objects lying within 8.5 degrees of the Campaign 1 boresight.

In total our sample includes 8522 targets; `K2fov` indicates $\sim$3808 will lie on silicon.

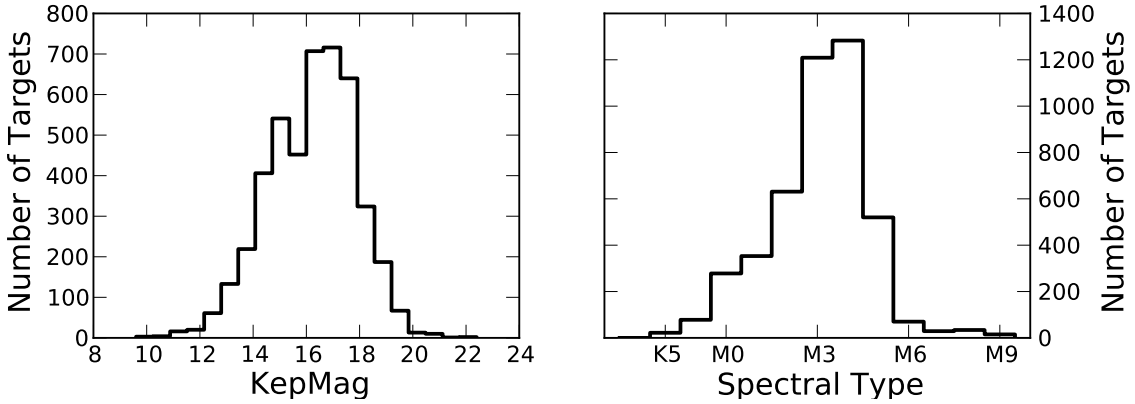

Fig. 1.— Distribution of proposed low-mass targets as a function of Kepler Magnitude (**Left**) and Spectral Type (**Right**). Late-type objects are selected almost exclusively via SDSS spectra.