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 from high proper motion, which captures **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) and GO0314 (PI Crossfield), 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 (DSS + Pan-Starrs 1), NIR, and WISE photometry to spectral type and thence to radius and temperature (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**. Our sample has a median brightness of Kp∼15.7 mag, and in total our sample includes 4545 targets, all of which lie on silicon (as verified by `K2fov`).

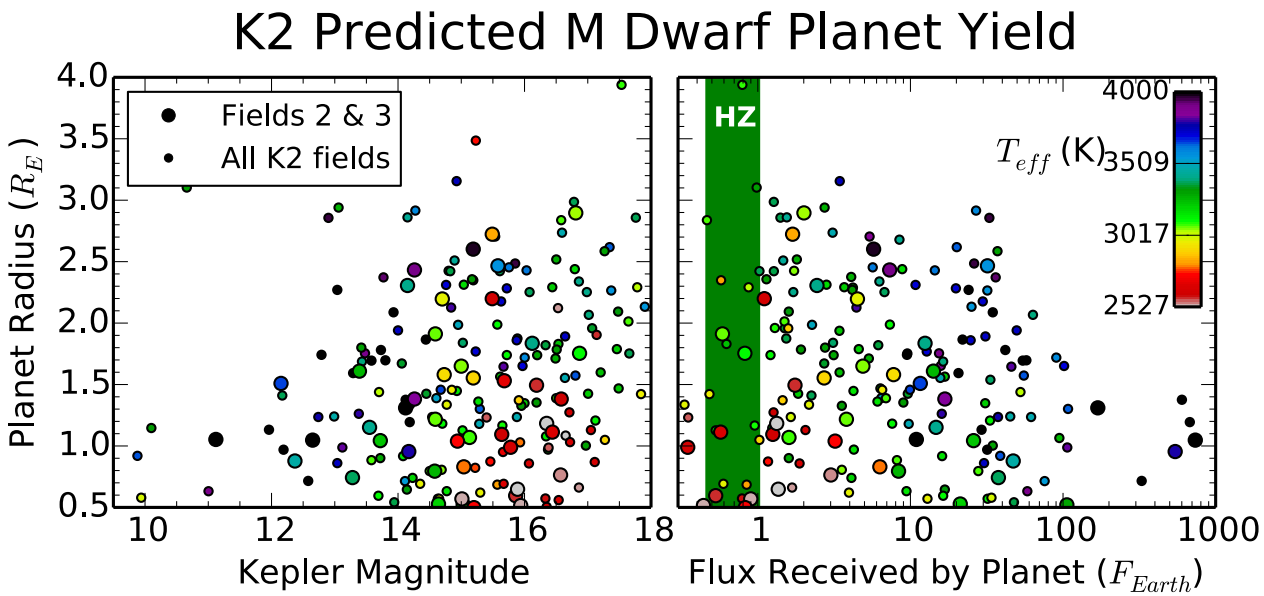

Fig. 1.— Transiting planets expected from our proposal for fields 2 and 3 (large circles) and the entire K2 mission (small circles). The panels show planet radius versus Kepler magnitude (left) and versus planet irradiation (right) and are based on K2's photometric performance and the intrinsic occurrence rate of M dwarfs (Berta et al. 2013). **Our program will produce >200 small planets (30 in Fields 2+3), some suitable for followup with RVs and JWST.**