

UNDERSTANDING M-TYPE STARS AS EXOPLANET HOSTS: CHARACTERIZING VARIABILITY AT SHORT TIMESCALES

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Exoplanet research has experienced an exponential growth over the past few years. This is both because of the impressive discoveries made recently and also because of the inherent appeal of the topic. One of the future challenges is the discovery and subsequent characterization of habitable exoplanets. Intensive efforts are being put into advancing towards this goal. A possible shortcut to find a potentially habitable planet is to carry out the searches around low-mass stars (M dwarfs). M-type exoplanet hosts have two major advantages: (1) Because of the lower stellar mass and luminosity, habitable planets are closer in, have shorter orbital periods and hence induce higher amplitude reflex motions on the star; and (2) because of the smaller radius, a transit of a terrestrial planet has a depth of a few per cent and therefore it is suitable for discovery and follow up even from the ground. The search for exoplanets around M-type stars is blooming with new experiments (like the MEarth transit search) and projects for the near future. A critical element to the advancement of this field is to attain a detailed characterization of the targets. This is chiefly because of the inherent stellar activity that affects M-type stars causing both photometric and radial velocity jitter. Such jitter is related to the overall light modulation induced by starspots and to the time variability of their position and properties. Surprisingly, the activity patterns of M-type stars are largely unknown at the required level for exoplanet investigations. We will utilize the Kepler data, with its exquisite precision and time coverage, to obtain the power spectrum of the variability of some 10 bright M-type stars in the Kepler field over timescales from minutes to months. We will investigate the photometric variations to understand the variability patterns (including starspots and other activity-related phenomena) and define the best strategy to mitigate their effect in photometric or spectroscopic transit searches from the ground. In addition, we will collect data that will be central to the missing overall characterization of M-type stars as potential exoplanet hosts.