ACCURATE FUNDAMENTAL PROPERTIES OF KEPLER TARGET STARS

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We propose to perform a homogeneous and accurate re-determination of fundamental properties of the full Kepler target sample, with an emphasis on precise measurements for planet-candidate host stars. The primary goals of the extended Kepler mission - the determination of the frequency of habitable planets and the discovery of Earth-sized planets orbiting in the habitable zone of Sun-like stars - are fundamentally connected to the properties of the observed stars. Systematic errors in the stellar properties of the parent sample can significantly bias planet occurrence studies, while uncertainties in the properties of planet-candidate host stars can prevent firm conclusions about the characteristics of small planets found in the habitable zone. Nearly all studies on planet occurrence have so far relied on stellar properties listed in the Kepler Input Catalog, which was designed for target selection and is known to suffer from significant biases. Since the creation of the Kepler Input Catalog, a large amount of new data has become available, ranging from new photometric surveys to spectroscopic follow-up observations, and the Kepler light curves themselves which can be used to infer stellar properties using asteroseismology. The aim of this proposal is to combine these new datasets to determine accurate fundamental properties for all Kepler target stars, and to optimize precise asteroseismic studies of Kepler planet-candidate hosts. The results are expected to 1) enable an accurate determination of the frequency of habitable planets around sun-like stars, 2) establish robust correlations between host-star and planet properties and 3) identify and characterize new planets detected in or close to the habitable zone.