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Title: SME@XSEDE: An Embarrassingly Parallel Approach to Stellar Characterization of Planet Hosting Stars
Type: Poster
Session: Characterizing Transiting Planets
Abstract:
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Over the last decade, large scale exoplanet discovery surveys like Kepler have produced vast catalogs of potential planet hosting stellar systems. However, these continue to be hampered by a lack of precision stellar characterization. Accurate analysis of this large collection of exoplanet candidates presents a new computational challenge. Moreover, recent studies have called into question the accuracy of standard techniques used to measure stellar parameters from these spectra, including systematic errors that may be inherent to specific characterization algorithms. Here, we describe SME@XSEDE, a new automated technique we have developed to measure stellar parameters by coupling well tested analysis tools with the advantages of large computational resources. At the core of our methodology, we utilize existing and stable software to perform the detailed synthesis of stellar spectra (SME: Spectroscopy Made Easy). However, we expand on the traditional non-linear least-squares minimization technique by employing an "embarrassingly parallel" Monte Carlo approach requiring large parallel processing resources. This allows us to operate the software in an automated fashion on large number of spectra, and importantly explore the effect of systematics on our derived stellar parameters. We will describe our algorithm and show how the parameters inferred using our technique compare to those from other methodologies (e.g., astroseismology). We will also present an initial set of stellar parameters for a large collection of KOI stars we have analyzed as part of the larger California-Kepler Survey follow-up campaign.