

## **DETAILED MODELLING OF EXTRASOLAR PLANET TRANSIT OBSERVATIONS AS A KEPLER PARTICIPATING SCIENTIST**

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The Kepler Mission will provide ultra high quality photometric observations that will allow a rich and detailed investigation of extrasolar planets and their host stars. The primary goal of the Mission is reconnaissance: to gather statistics and characteristics such as frequencies, sizes, and orbital distributions of Earth-size extrasolar planets and determine correlations with the properties of their host stars. The PI proposes to analyze a subset of the Kepler observations -- the short-period systems -- at a level that is impossible to do for a large set of systems. These short-period systems will be scrutinized with painstaking attention to detail. This narrow focus adds a strong complement to the broader Kepler Mission objectives. In particular, the set of products that will be generated include: (1) precise transit timings (to be used by the Kepler Science Team to detect other bodies for example); (2) accurate system parameters for the planet and host star (e.g. relative radii); and (3) characterization of photospheric "texture" and its effect on the transit light curves (i.e. mapping photospheric features). The PI of this proposal is well-versed in skills relevant to this research, including periodic and aperiodic time series analysis, binary star research, high-speed photometry, and in particular, extrasolar planet transit modelling. Along with Fourier, auto-regressive, correlation, and other similar general tools, the eclipse modelling software "ELC" will be the primary tool employed by the PI. ELC will be improved to take full advantage of the unprecedented level of precision of the Kepler light curves. Thus a fourth product will be generated: (4) the enhanced ELC code will be made available to all Kepler Science Team members. Through the Kepler Participating Scientist Program the PI will become a member of the Kepler Science Team, enabling him to add his expertise and directly contribute to the Kepler Mission.