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Title: What Can the Phase Signatures of Kepler Multi-Planet Systems Teach Us?

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Abstract: This work has been performed in collaboration with Stephen R. Kane at San Francisco State University. The Kepler mission has revealed numerous cases of transiting planets in multi-planet systems. Kepler's high photometric precision has allowed access to the technique of analyzing the phase variations of planets as they orbit their stars. In multi-planet systems, the predicted phase variations can be quite complicated and depend upon the period, radius, and albedo distributions for planets in the system. Here we describe the confusion that short-period terrestrial planets and/or non-transiting planets can cause in a system by adding high-frequency correlated noise or low-frequency trends to the data stream. We describe how to decouple these sources of ambiguity through models of the Solar System, and the Kepler-20 and Kepler-33 multi-planet systems. We further present results from a multi-planet phase analysis of the Kepler-11 system which uses precise ephemerides to predict epochs of maximum and minimum flux, thereby constraining the albedos of the planets.