Detection and Dynamics of Exoplanets (DDE): Interplay between theory and observations



Contribution ID: 126

Type: not specified

Stretching the limits of TTV analysis

Friday 11 July 2025 09:45 (15 minutes)

We used PyDynamicaLC, a photodynamical model tailored for the analysis of the smallest- and lowest-TTVamplitude- planets, to analyze Kepler's multi-planet systems (Ofir+2025), where we were able to determine significant masses to 88 planets. We demonstrate consistency with literature results over 2 orders of magnitude in mass, and for the planets that already had literature mass estimations, we were able to reduce the relative mass error by ~22% (median value). Of the planets with determined masses, 23 are new mass determinations with no previous significant literature values, including a planet smaller and lighter than Earth (KOI-1977.02/Kepler-345 b). I will also put the above discoveries in a wider context of the limits of shallow signal identification and the benefits of photodynamical modeling vs. classical TTV analysis, as they manifest themselves differently in signal detection, in modeling relatively high SNR systems, and in limited (but still possible) analysis of low-SNR systems.

Presenter:OFIR, Aviv (Weizmann Institute of Science)Session Classification:TTVs and transit-detected compact systems