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



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Dynamic masses of rocky planets in near-by planetary systems

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The nearest rocky exoplanets are non-transiting, making their atmospheric characterization possible only through a combination of high spatial and spectroscopic separation of planetary and stellar light. Nearby rocky planets, particularly those in the habitable zone of their host stars, are prime targets for future missions such as LIFE and HWO to search for biosignatures. Most nearby stars are M dwarfs, meaning that the closest rocky planets are often found orbiting these low-mass stars. To prepare for future atmospheric studies, we have initiated efforts to determine the true masses of these planets by analyzing radial velocity variations caused by planet-planet interactions, using subtle deviations from Keplerian orbits. Long observational base-lines combined with new high-precision, dense RV monitoring now enable the detection of dynamical effects in the sub-m-per-second range. Focusing on multi-planet systems around nearby M dwarfs, we present initial results that refine target selection and prepare for the next generation of exoplanetary exploration.

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