

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



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ExoNAMD: a community tool to gauge multi-planetary systems

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Multi-planetary systems reveal diverse dynamical histories. Stellar obliquity is a key diagnostic of these histories, linking past dynamical interactions to migration pathways (e.g., quiescent disc vs. violent high-eccentricity). To measure the remaining dynamical violence of planetary systems, we introduce an obliquity-based NAMD (Normalized Angular Momentum Deficit), improving on the previous relative inclination-based NAMD in capturing the systems' architectures. Our open-source ExoNAMD Python tool calculates these metrics, enabling cross-system dynamical state comparisons. The dynamical context provided by the NAMD can be used for (1) interpreting planetary atmospheres, as migration history shapes composition and thermal structure; (2) unbiased target selection for future observations and to guide model testing; (3) enabling comprehensive dynamical descriptions alongside stability indicators (AMD, MEGNO, SPOCK) in the forthcoming era of PLATO and Ariel.

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