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TESS warm-Jovian exoplanets with strong TTVs

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Recent TESS discoveries have revealed increasing number of exoplanetary systems exhibiting strong transit timing variations (TTVs), many of which consist of warm, Jovian-mass planet pairs near a 2:1 mean-motion resonance (MMR). I will present several peculiar TTV systems identified within the Warm gIaNts with tEss (WINE) collaboration, which systematically characterizes TESS transiting warm giant planets. These systems are particularly valuable for exoplanet studies, as their longer orbital periods amplify TTV signals, allowing for the detection of non-transiting companions and precise constraints on their orbital architecture and physical properties. However, strong TTV signals also introduce degeneracies in planetary mass, eccentricity, and even orbital period, complicating system characterization. To resolve these ambiguities, TTV modeling, photodynamical analysis, and ground-based RV follow-up are essential. By combining these techniques, we can reverse-engineer the formation and dynamical evolution of compact, massive planetary systems, shedding light on their migration history and resonant interactions. I will discuss the challenges in modeling such multi-planet systems, the impact of dynamical interactions on their architectures, and how the synergy between TTVs and RVs provides a powerful tool for uncovering the formation pathways of warm Jupiters and their companions.

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