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Moon Hunting with TESS: Revealing Exomoons via Transit Timing Variations and Transit Duration Variations

One of the most fascinating and difficult tasks in contemporary astronomy is the finding of exomoons, the moons orbiting exoplanets. In order to find possible exomoons, this study investigates the use of transit timing variations (TTV) and transit duration variations (TDV) as indirect methods. Our goal is to find the dynamical signatures that indicate to the gravitational impact of an orbiting moon by examining the periodic shifts in transit mid-times and changes in transit durations from light curves of known transiting exoplanets. We use this methodology on publicly accessible Transiting Exoplanet Survey Satellite (TESS) datasets, emphasizing systems with stable orbital parameters, clean transit signals, and efficient data. Corresponding TTV and TDV signals could give persuasive evidence for an exomoon candidate. In addition to providing insights into the possible diversity and the formation of moon systems in the universe, this study advances the larger effort to characterize planetary systems outside of our solar system.

Section

Solar System/Exoplanets

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