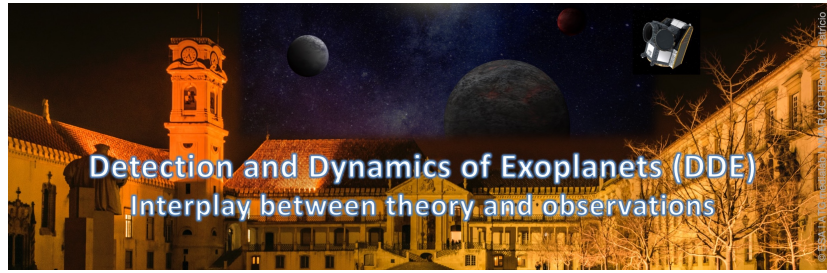


Detection and Dynamics of Exoplanets (DDE): Interplay between theory and observations



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TESS Timings of 31 Hot Jupiters with Ephemeris Uncertainties

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Accurate transit ephemeris serves as the premise for follow-up exoplanet observations. We compare TESS Object of Interest (TOI) transit timings of 262 hot Jupiters with the archival ephemeris and find 31 of them having TOI timing offsets, among which WASP-161b shows the most significant offset of -203.7 ± 4.1 minutes. The median value of these offsets is 17.8 minutes, equivalent to 3.6σ . We generate TESS timings in each sector for these 31 hot Jupiters, using a self-generated pipeline. The pipeline performs photometric measurements to TESS images and produces transit timings by fitting the light curves. We refine and update the previous ephemeris, based on these TESS timings (uncertainty ~ 1 minute) and a long timing baseline (~ 10 yr). Our refined ephemeris gives the transit timing at a median precision of 0.82 minutes until 2025 and 1.21 minutes until 2030. We regard the timing offsets to mainly originate from the underestimated ephemeris uncertainty. All the targets with timing offset larger than 10σ present earlier timings than the prediction, which cannot be due to underestimated ephemeris uncertainty, apsidal precession, or Rømer effect as those effects should be unsigned. For some particular targets, timing offsets are likely due to tidal dissipation. Our sample leads to the detection of period-decaying candidates of WASP-161b and XO-3b reported previously.

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