



Contribution ID: 32

Type: **Contributed**

## TOI-837 b as a Benchmark for Future Characterisations with PLATO

*Tuesday, 14 May 2024 17:00 (20 minutes)*

We present the detailed characterisation of TOI-837 b, a transiting exoplanet orbiting a  $35 \pm 5$  Myr star. Utilising an integrative approach combining TESS photometry, ground-based observations, and HARPS spectroscopy, this study presents the precise determination of TOI-837b's radius, mass, and (a relatively high) density. Given the precise age estimate of the system, we can estimate that the planet's density is indicative of a substantial core comprising 60% of the planet's total mass. This composition and density are unexpected for a planet of this age and are in tension with evolutionary models. As TOI-837b emerges as a cornerstone in exoplanet science, this research highlights the critical need for high-precision stellar parameters and age determination to unlock the mysteries of planet formation and evolution. With PLATO on the horizon, TOI-837b exemplifies the profound impact that precise stellar ages can have on exoplanet characterisation.

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**Session Classification:** From Stars to Planets