

A TESS–SOPHIE Survey of Warm Jupiters: Orbital Architectures and Eccentricities

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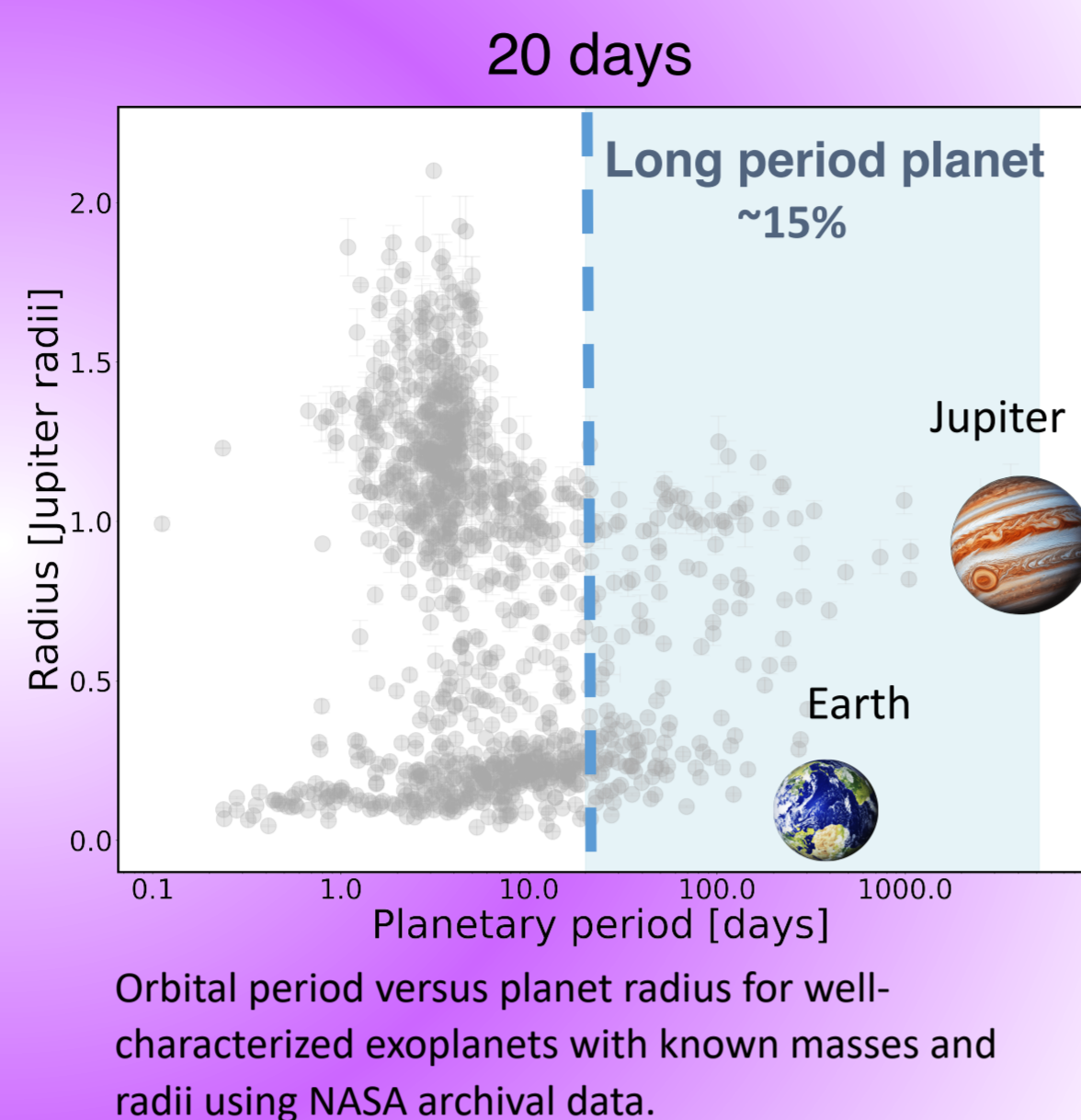
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Current bias:

Among all transiting planets with well-characterized masses (precision < 25%) and radii (precision < 8%), only ~15% have orbital periods longer than 20 days.

Consequently, our current view of planetary systems is strongly biased toward short-period planets.



Key questions:

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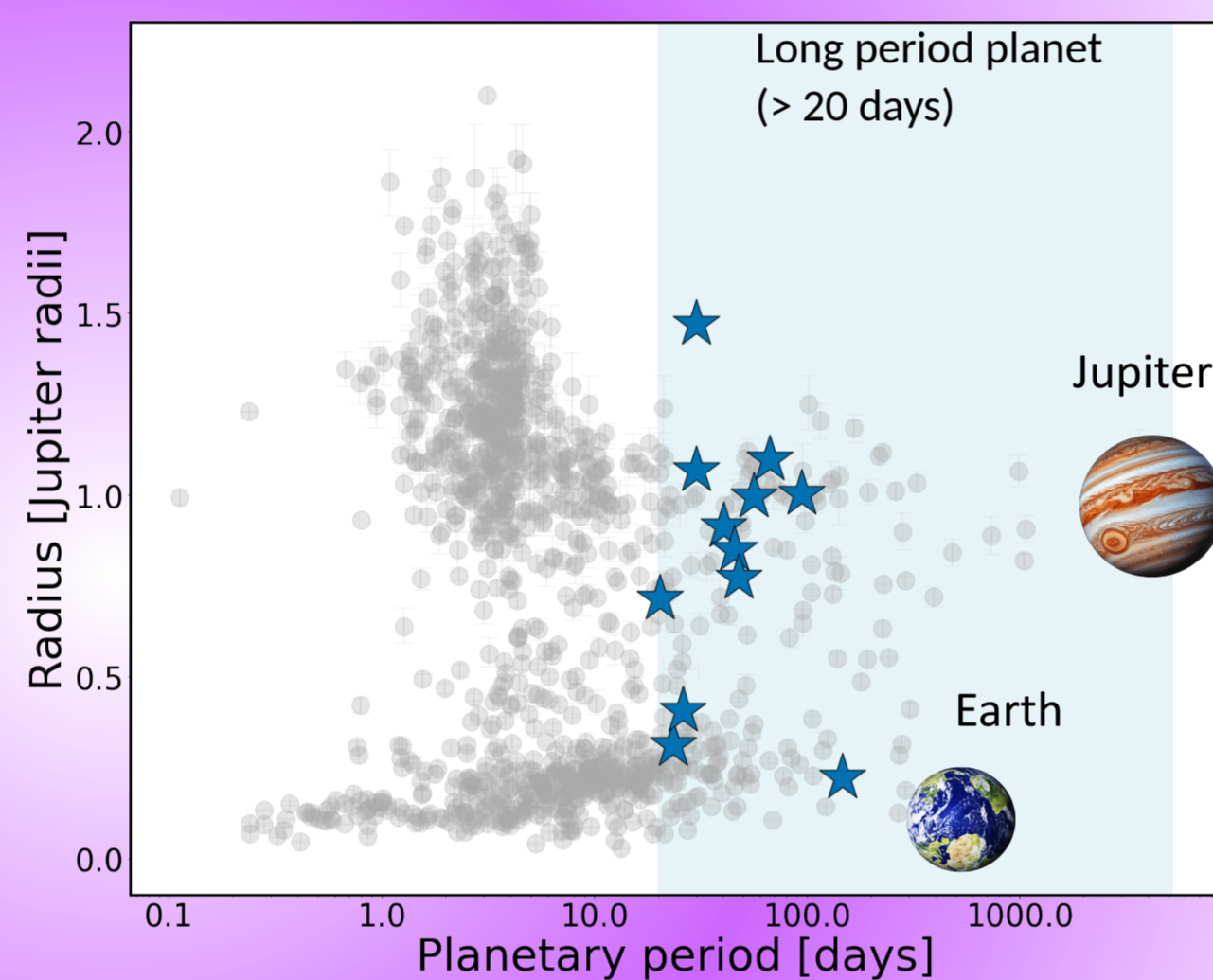
- How do planetary systems form and evolve?
- How common are habitable-zone planets ?
- Is the Solar System typical?

What Long-period planets provide:

- Primordial architectures
- Habitable-zone access
- Solar-System analogs

Results:

Orbital period versus planet radius for well-characterized exoplanets with known masses and radii using NASA archival data. The dark blue star symbols highlight systems discovered and characterized in this project (Heidari et al, 2024, 2025, 2026, and submitted).



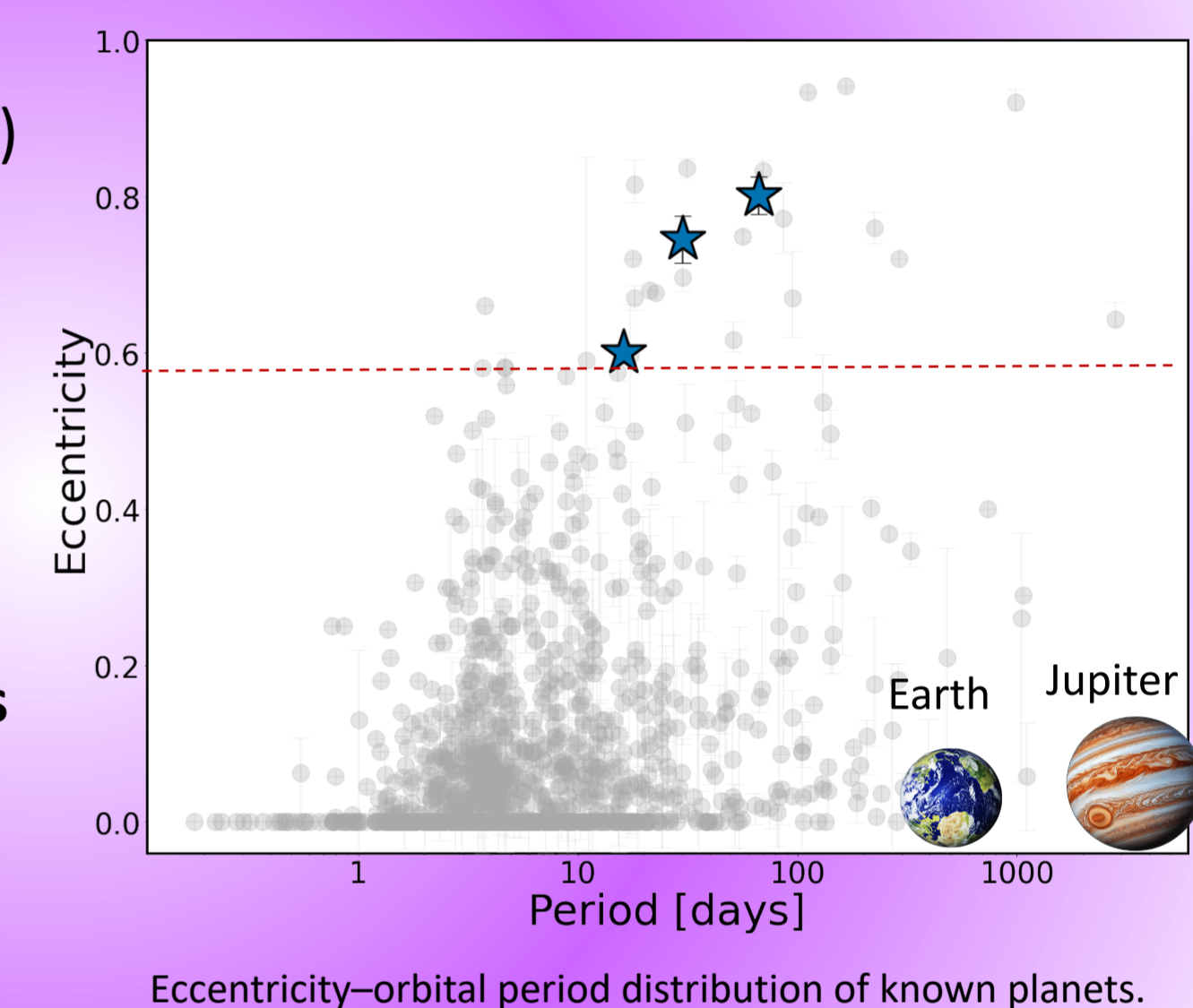
Highly eccentric planets:

TOI-5110b, TOI-7025b, TOI-6883Ab (Heidari, Hébrard, et al, 2025, submitted)

Among the **highest eccentric** giant planets ($e \sim 0.6-0.8$)

Strong candidates for **proto-hot Jupiters**

Constraining Hot Jupiter formation: **in situ or migration?**

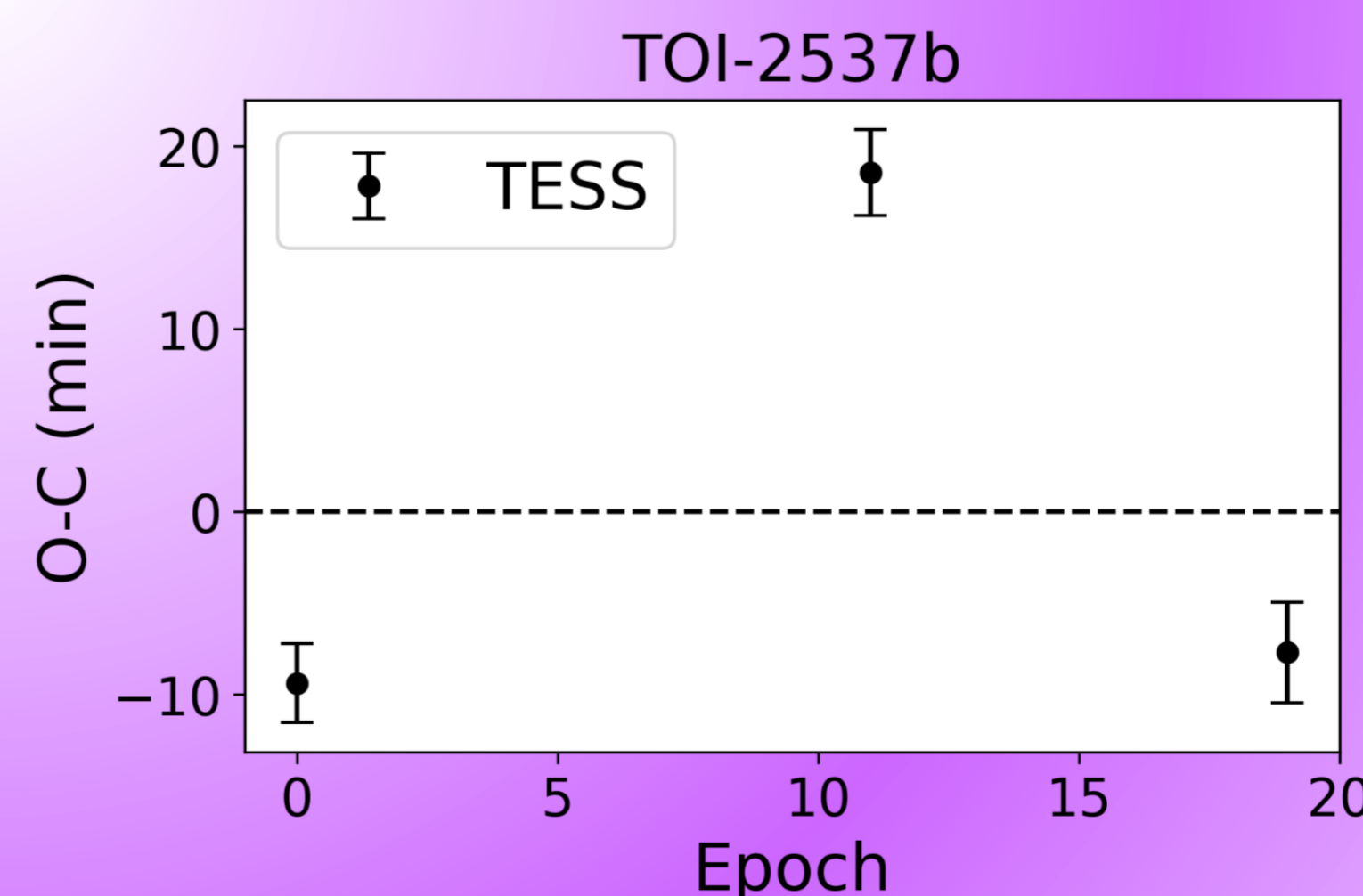
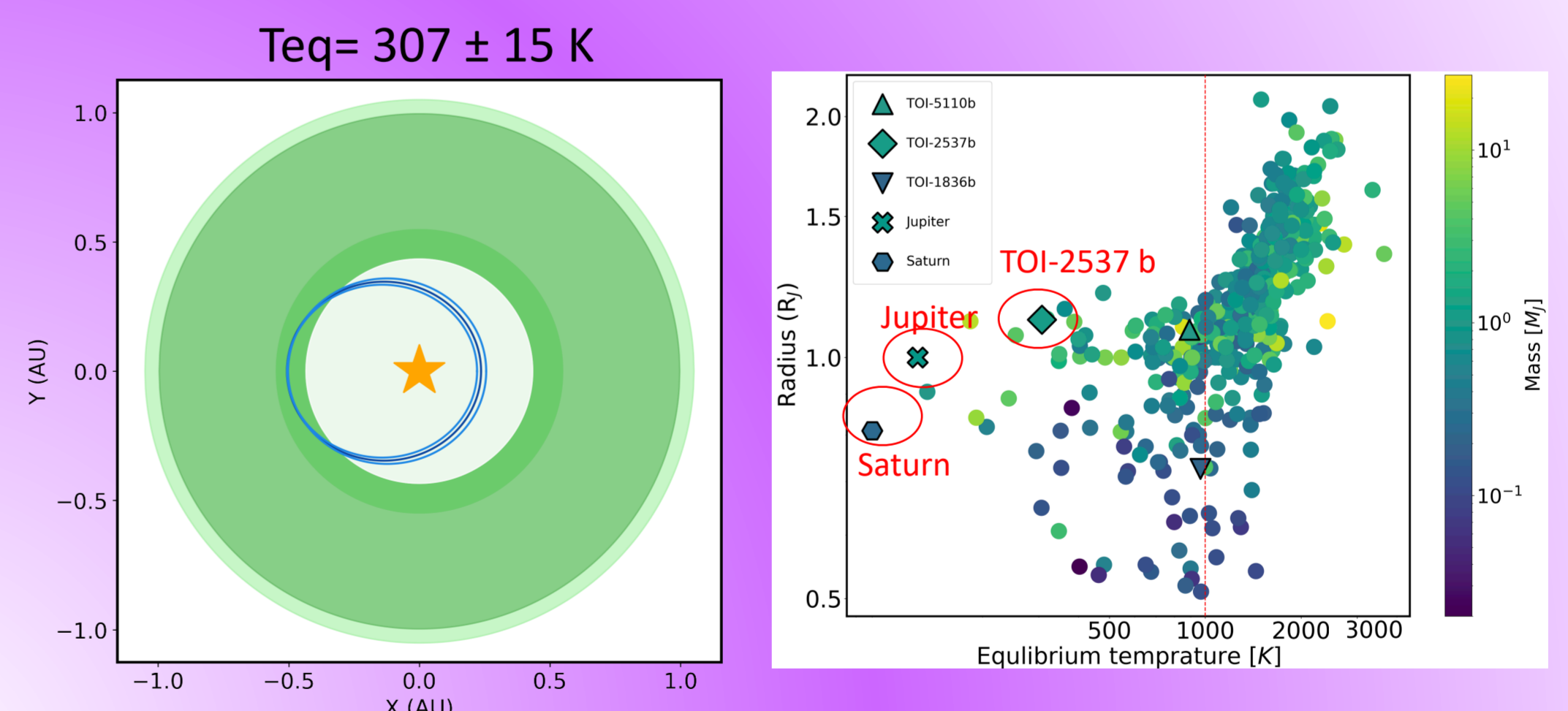
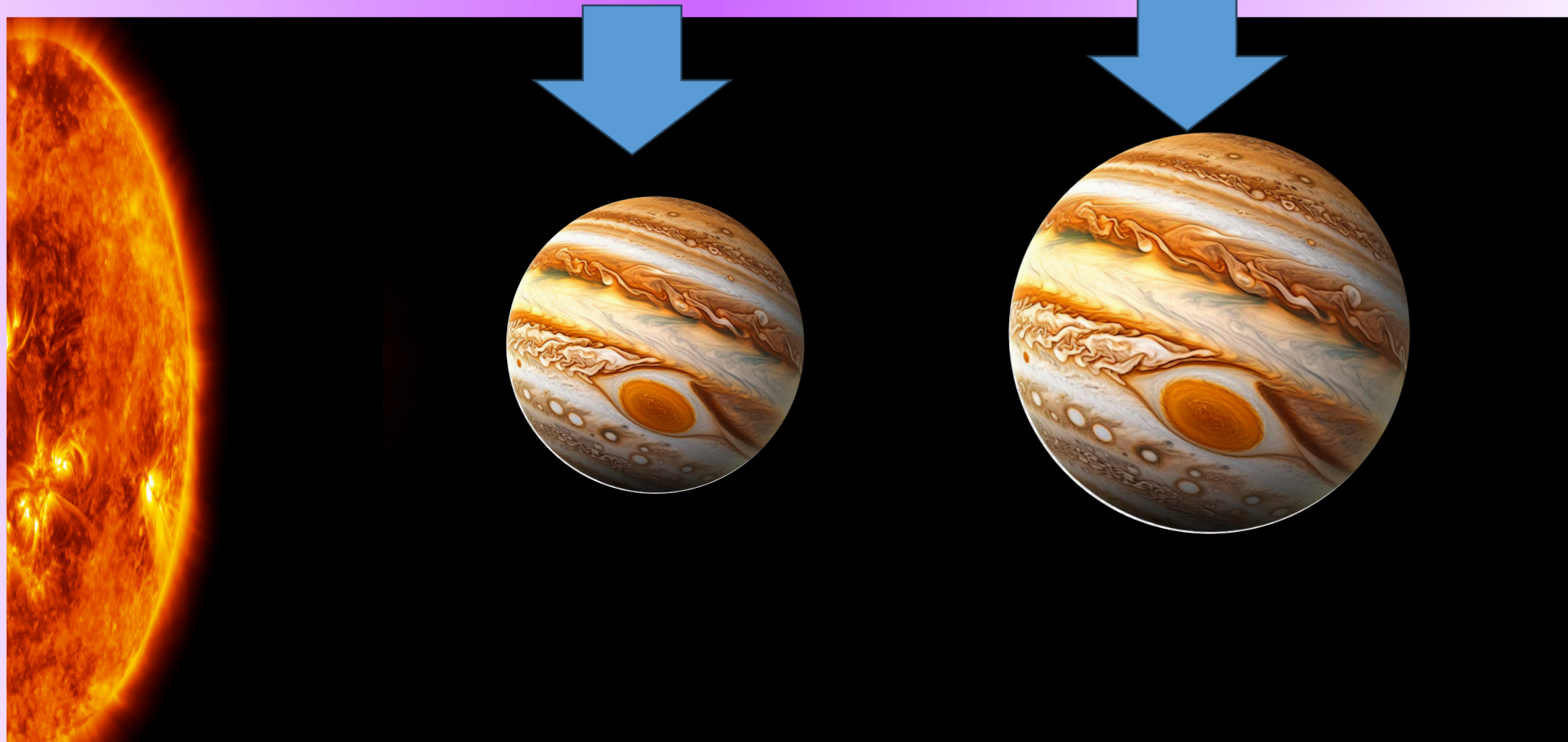


Multi-planetary system:

TOI-2537 b & c : (Heidari, Hébrard, et al 2024)

P_planet c (d)	1572 ± 15
sini_planet c (Mj)	8.10 ± 0.80
e	0.29 ± 0.06

P_planet b (d)	94.1 ± 0.2
R_planet b (RJ)	1.00 ± 0.03
M_planet b (MJ)	1.31 ± 0.09
e	0.36 ± 0.04



The difference between the predicted and observed midtransit times for TOI-2537b.