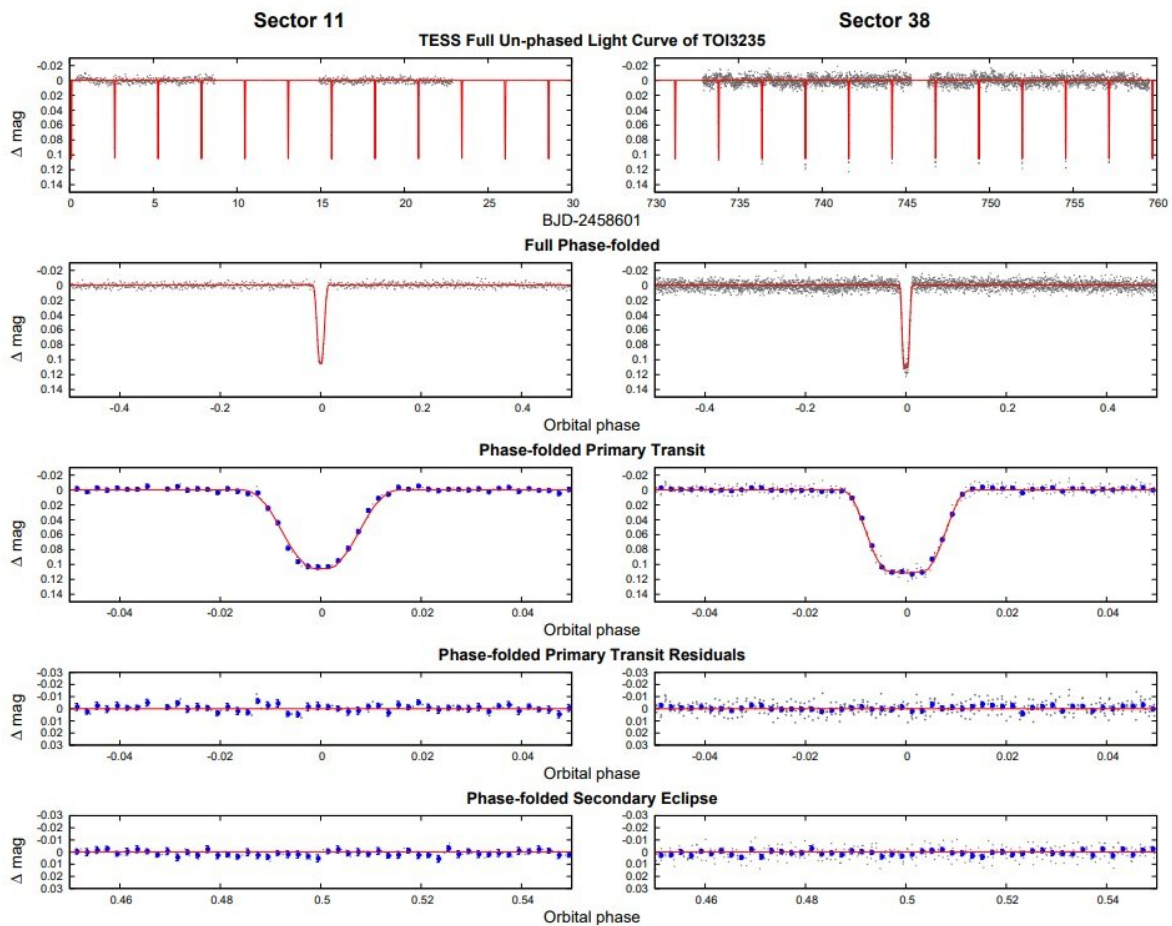


New short-period Jupiter-sized exoplanet discovered

March 2 2023, by Tomasz Nowakowski



TESS long-cadence light curves for TOI-3235, for sector 11 (left, 30-minute cadence) and sector 38 (right, 10-minute cadence). Credit: Hobson et al, 2023

An international team of astronomers reports the discovery of a new gas giant exoplanet using NASA's Transiting Exoplanet Survey Satellite (TESS). The newfound alien world, designated TOI-3235 b is the size of Jupiter and orbits its host star in less than three days. The finding was detailed in a paper published February 20 on the pre-print server *arXiv*.

TESS is currently conducting a survey of about 200,000 of the brightest stars near the sun with the intent to search for transiting exoplanets. So far, it has identified more than 6,100 candidate exoplanets (TESS Objects of Interest, or TOI), of which about 3,000 have been confirmed so far.

Now, a group of astronomers led by Melissa J. Hobson of the Max Planck Institute for Astronomy in Heidelberg, Germany, has recently confirmed another TOI monitored by TESS. They report that a transit signal has been identified in the light curve of an M-dwarf star known as TOI-3235. The planetary nature of this signal was confirmed by follow-up radial velocity measurements and ground-based photometric observations.

"We present the discovery of TOI-3235 b, a short-period Jupiter orbiting an M-dwarf with a [stellar mass](#) close to the [critical mass](#) at which stars transition from partially to fully convective," the researchers wrote in the paper.

TOI-3235 b has a radius of approximately 1.02 Jupiter radii and its mass was measured to be 0.66 Jupiter masses, yielding a density at a level of 0.78 g/cm^3 . The planet orbits its host every 2.59 days, at a distance of some 0.027 AU. The equilibrium temperature of TOI-3235 b is estimated to be 604 K.

The [parent star](#), assumed to be around 400 million years old, is an M dwarf of spectral type M4 with a radius of about 0.37 solar radii and a

mass of around 0.39 solar masses. It has an [effective temperature](#) of 3,389 K and metallicity at a level of 0.26 dex. The distance to the star is estimated to be approximately 236 light years.

The astronomers noted that TOI-3235 b is a peculiar extrasolar world as current planet formation models do not predict the existence of such gas giants around low-mass stars like TOI-3235. They added that the formation of TOI-3235 b would require either an extremely high formation efficiency or a very massive disk.

According to the authors of the paper, TOI-3235 b has a high transmission spectroscopy metric, which makes it suitable for atmospheric characterization studies.

"We compute a Transmission Spectroscopy Metric (TSM, Kempton et al. 2018) of ≈ 160 , assuming a scale factor of 1.15. Comparing it to the group of M-dwarf planets it clusters with in mass-period-radius space, TOI-3235 b has the second-highest TSM, surpassed only by WASP-80 b (TSM ≈ 290), and notably higher than its analog TOI-5205 b (TSM ≈ 100). Atmospheric characterization can help place constraints on the formation and migration history (e.g., Hobbs et al, 2022; Molliere et al, 2022) of this unexpected planet," the researchers concluded.

More information: Melissa J. Hobson et al, TOI-3235 b: a transiting giant planet around an M4 dwarf star, *arXiv* (2023). [DOI: 10.48550/arxiv.2302.10008](https://doi.org/10.48550/arxiv.2302.10008)

© 2023 Science X Network

Citation: New short-period Jupiter-sized exoplanet discovered (2023, March 2) retrieved 23 June 2024 from <https://phys.org/news/2023-03-short-period-jupiter-sized-exoplanet.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.