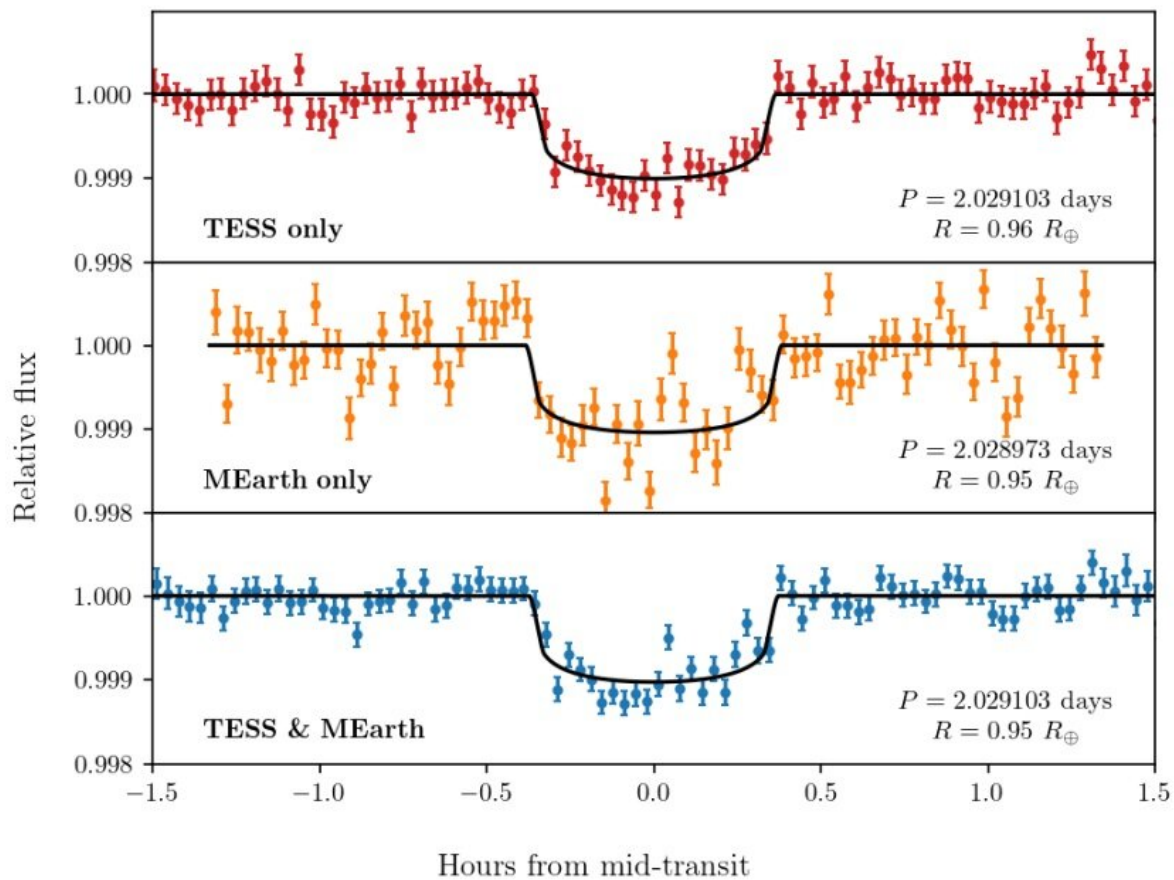


# TESS discovers a Venus-sized exoplanet orbiting nearby star

April 14 2023, by Tomasz Nowakowski



Phase-folded photometry of LHS 475 highlighting the 3-hour window surrounding the planetary transits. Credit: Ment et al, 2023

Using NASA's Transiting Exoplanet Survey Satellite (TESS), a team of

astronomers from Harvard-Smithsonian Center for Astrophysics (CfA) in Cambridge, Massachusetts, and elsewhere has detected a new exoplanet. The newfound alien world, designated LHS 475 b, is about the size of Venus and orbits a nearby M-dwarf star. The discovery was reported April 4 on the *arXiv* pre-print repository.

TESS is conducting a survey of about 200,000 of the brightest stars near the sun with the aim of searching for transiting exoplanets. So far, it has identified nearly 6,400 candidate exoplanets (TESS Objects of Interest, or TOI), of which 3,031 have been confirmed so far.

Now, a group of astronomers led by CfA's Kristo Ment reports the discovery of another extrasolar planet with TESS. They reveal that a transit signal was detected in the light curve of LHS 475—a main-sequence [red dwarf](#) belonging to the M3 spectral class. The planetary nature of this signal was confirmed by follow-up ground-based photometry using the M<sub>Earth</sub>-South telescope array at the Cerro Tololo Inter-American Observatory in Chile.

"Here we present the discovery and subsequent ground-based validation observations of LHS 475 b, a Venus-sized planet orbiting a nearby M dwarf," the researchers wrote in the paper.

LHS 475 b has a radius of approximately 0.955 Earth radii and orbits its host every 48.7 hours, at a distance of about 0.02 AU from it. The planet's equilibrium temperature was estimated to be some 587 K, thus LHS 475 b is likely too hot to be habitable.

However, the mass of LHS 475 b remains to be determined as the existing radial velocity data of LHS 475 does not have the necessary precision to calculate the mass of the planet. The astronomers noted that exoplanets of this size are highly likely to be terrestrial and might also have a similar interior composition to that of the Earth's.

Therefore, in order to calculate the mass of LHS 475 b, the researchers adopted a simple two-layer composition model with an Earth-like core mass fraction (CMF) of 0.33. They inverted the empirical radius-mass relation (by Zeng et al. (2016)) and derived a planetary mass at a level of approximately 0.84 Earth masses.

"In accordance with the observed mass-radius distribution of exoplanets as well as planet formation theory, we expect this Venus-sized companion to be terrestrial, with an estimated RV [radial velocity] semi-amplitude close to 1.0 m/s," the authors of the paper explained.

When it comes to the star LHS 475 b, it has a radius of 0.286 solar radii and its mass is about 0.274 [solar masses](#). The star has a luminosity at a level of 0.0087 solar luminosities, [effective temperature](#) of 3,295 K and is located some 40.7 light years away from the Earth.

**More information:** Kristo Ment et al, LHS 475 b: A Venus-sized Planet Orbiting a Nearby M Dwarf, *arXiv* (2023). [DOI: 10.48550/arxiv.2304.01920](#)

© 2023 Science X Network

Citation: TESS discovers a Venus-sized exoplanet orbiting nearby star (2023, April 14) retrieved 25 April 2024 from <https://phys.org/news/2023-04-tess-venus-sized-exoplanet-orbiting-nearby.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.