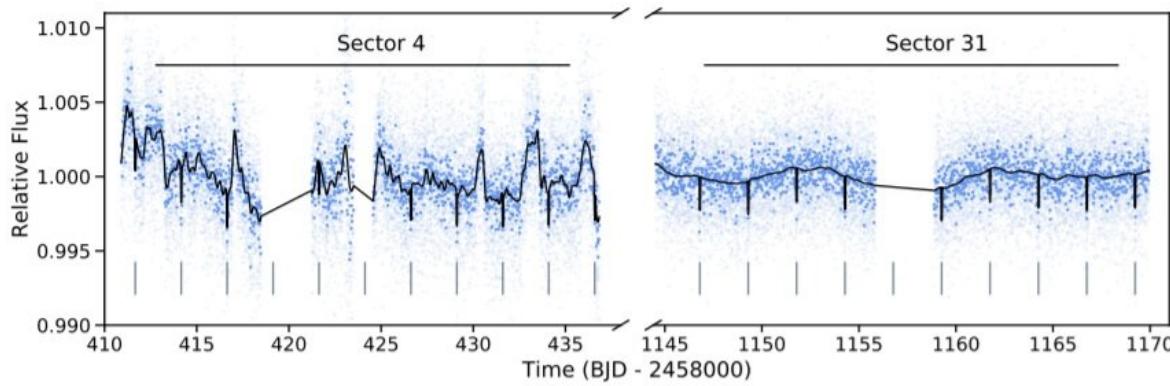


# New warm mini-Neptune exoplanet detected by TESS

September 28 2021, by Tomasz Nowakowski



Full TESS photometry for TOI-1201. Credit: Kossakowski et al., 2021.

Using NASA's Transiting Exoplanet Survey Satellite (TESS), an international team of astronomers has detected a new warm mini-Neptune alien world transiting a bright M-dwarf star. The newly found exoplanet, designated TOI-1201b, is estimated to be about six times more massive than the Earth. The finding is detailed in a paper published September 20 on arXiv.org.

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 over 4,500 candidate exoplanets (TESS Objects of Interest, or TOI), of which 155 have been confirmed so far.

Now, a group of astronomers led by Diana Kossakowski of the Max Planck Institute for Astronomy in Heidelberg, Germany, confirm another TOI monitored by TESS. While observing a bright M-dwarf designated TOI-1201 (also known as TIC-29960110), a transit signal was identified in the light curve of this star. The planetary nature of this signal was confirmed by follow-up photometric observations.

"The planetary signature of TOI-1201b was detected in the Science Processing Operations Center (SPOC; Jenkins et al. 2016) transit search pipeline on January 16, 2019 and was issued as an alert by the TESS Science Office (TSO) on January 31, 2019," the paper reads.

According to the study, TOI-1201b has a mass of approximately 6.28 Earth masses and is about 2.41 times larger than the Earth; therefore, its density is around  $2.45 \text{ g/cm}^3$ . The planet orbits its parent star every 2.49 days, at a distance of about 0.0287 AU from it. The equilibrium temperature of this object is estimated to be some 703 K. Hence, the astronomers classified TOI-1201b as a warm-Neptune.

The host is a primary star of the binary system TOI-1201 located some 122.5 light years away, estimated to be around 600-800 million years old. The primary has a spectral type M2.0 and is about half the size and mass of the sun. The observations show that this M dwarf has an effective temperature of approximately 3,476 K and its rotational period was calculated to be between 19 and 23 days. The secondary star in this system is of spectral type M2.5 and turned out to be slightly smaller than the primary object.

The astronomers suppose that there may be another planet orbiting the primary star of TOI-1201. This assumption is based on the radial velocity (RV) measurements that exhibited a long-term signal with a high semi-amplitude at about 102 days. It was noted that if this signal is of planetary nature, then the minimum mass of that object would be 27 Earth masses. However, additional studies of the TOI-1201 system are required in order to confirm this hypothesis.

"Further RV measurements are, however, necessary to falsify or to prove a planetary origin of the signal, which could provide more insight into the architecture of multi-planetary systems," the researchers concluded.

**More information:** D. Kossakowski et al, TOI-1201 b: A mini-Neptune transiting a bright and moderately young M dwarf.  
arXiv:2109.09346v1 [astro-ph.EP], [arxiv.org/abs/2109.09346](https://arxiv.org/abs/2109.09346)

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