

# TrES-4b

**TrES-4b** is an extrasolar planet, and one of the largest exoplanets ever found, after WASP-12b, WASP-17b, CT Chaemaeleontis b (though the latter may be a brown dwarf), GQ Lupi b and HD 100546 b. It was discovered in 2006, and announced in 2007, by the Trans-Atlantic Exoplanet Survey, using the transit method. It is approximately 1,400 light-years (430 pc) away orbiting the star GSC 02620-00648, in the constellation Hercules.<sup>[1]</sup>

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## Orbit

A 2008 study concluded that the GSC 06200-00648 system (among others) is a binary star system allowing even more accurate determination of stellar and planetary parameters.<sup>[2]</sup>

TrES-4 orbits its primary star every 3.543 days and eclipses it when viewed from Earth.

The study in 2012, utilizing a Rossiter–McLaughlin effect, have determined the planetary orbit is probably aligned with the equatorial plane of the star, misalignment equal to 6.3 ± 4.7<sup>∘</sup>.<sup>[3]</sup>

## Physical characteristics

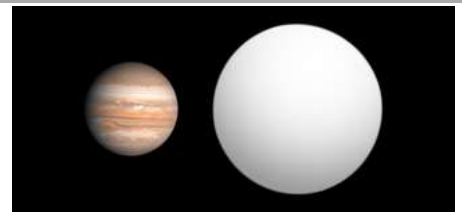
The planet is slightly less massive than Jupiter (0.919 ± 0.073 *M*<sub>J</sub>) but its diameter is 79.9% larger; it was considered the largest planet ever found at the time, giving it an average density of only about 1/3 gram per cubic centimetre, approximately the same as Saturn's moon Methone. This made TrES-4 both the largest known planet and the planet with the lowest known density at the time of its discovery.<sup>[2][1]</sup>

TrES-4's orbital radius is 0.05091 AU, giving it a predicted surface temperature of about 1782 K. This by itself is not enough to explain the planet's low density, however. It is not currently known why TrES-4 is so large. The probable causes are the proximity to a parent star that is 3–4 times more luminous than the Sun as well as the internal heat within the planet.<sup>[2][1]</sup>

## See also

- [List of exoplanet extremes](#)

TrES-4b



Size comparison of TrES-4 with Jupiter

### Discovery

**Discovered by** Mandushev *et al.*<sup>[1]</sup>

**Discovery date** 2006-2007

**Detection method** Transit

### Orbital characteristics

**Semi-major axis** 0.05091 ± 0.00071 AU (7,616,000 ± 106,000 km)<sup>[2]</sup>

**Eccentricity** 0

**Orbital period (sidereal)** 3.553945 ± 0.000075 d

**Inclination** 82.86 ± 0.33<sup>[2]</sup>

**Semi-amplitude** 86.1

**Star** GSC 02620-00648 A<sup>[2]</sup>

### Physical characteristics

**Mean radius** 1.799 ± 0.063<sup>[2]</sup> *R*<sub>J</sub>

**Mass** 0.919 ± 0.073<sup>[2]</sup> *M*<sub>J</sub>

**Surface gravity** 7.04 ± 1.12 m/s<sup>2</sup> (23.1 ± 3.7 ft/s<sup>2</sup>)  
0.718 ± 0.114 g

**Temperature** 1782 ± 29<sup>[2]</sup>

- [WASP-17b](#), another large exoplanet


## References

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1. Mandushev, Georgi; et al. (2007). "TrES-4: A Transiting Hot Jupiter of Very Low Density". *The Astrophysical Journal Letters*. **667** (2): L195–L198. [arXiv:0708.0834](#) (<https://arxiv.org/abs/0708.0834>). [Bibcode:2007ApJ...667L.195M](#) (<https://ui.adsabs.harvard.edu/abs/2007ApJ...667L.195M>). [doi:10.1086/522115](#) (<https://doi.org/10.1086%2F522115>). [S2CID 6087170](#) (<https://api.semanticscholar.org/CorpusID:6087170>).
2. Daemgen, S.; Hormuth, F.; Brandner, W.; Bergfors, C.; Janson, M.; Hippler, S.; Henning, T. (2009). "Binarity of transit host stars - Implications for planetary parameters" (<http://www.mpia.de/homes/henning/Publications/daemgen.pdf>) (PDF). *Astronomy and Astrophysics*. **498** (2): 567–574. [arXiv:0902.2179](#) (<https://arxiv.org/abs/0902.2179>). [Bibcode:2009A&A...498..567D](#) (<https://ui.adsabs.harvard.edu/abs/2009A&A...498..567D>). [doi:10.1051/0004-6361/200810988](#) (<https://doi.org/10.1051%2F0004-6361%2F200810988>). [S2CID 9893376](#) (<https://api.semanticscholar.org/CorpusID:9893376>).
3. Albrecht, Simon; Winn, Joshua N.; Johnson, John A.; Howard, Andrew W.; Marcy, Geoffrey W.; Butler, R. Paul; Arriagada, Pamela; Crane, Jeffrey D.; Shectman, Stephen A.; Thompson, Ian B.; Hirano, Teruyuki; Bakos, Gaspar; Hartman, Joel D. (2012), "Obliquities of Hot Jupiter Host Stars: Evidence for Tidal Interactions and Primordial Misalignments", *The Astrophysical Journal*, **757** (1): 18, [arXiv:1206.6105](#) (<https://arxiv.org/abs/1206.6105>), [Bibcode:2012ApJ...757...18A](#) (<https://ui.adsabs.harvard.edu/abs/2012ApJ...757...18A>), [doi:10.1088/0004-637X/757/1/18](#) (<https://doi.org/10.1088%2F0004-637X%2F757%2F1%2F18>), [S2CID 17174530](#) (<https://api.semanticscholar.org/CorpusID:17174530>)

## External links

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 Media related to [TrES-4](#) at Wikimedia Commons

- "Team finds largest exoplanet yet" (<http://news.bbc.co.uk/1/hi/sci/tech/6934603.stm>). [BBC News](#). 7 August 2007.
- "New monster planet 'could float on water' " (<http://abc.net.au/news/stories/2007/08/08/1999558.htm>). [ABC News \(Australia\)](#). 7 August 2007.
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- Muir, Hazel (August 6, 2007). "Largest known exoplanet puzzles astronomers" (<https://www.newscientist.com/article/dn12430-largest-known-exoplanet-puzzles-astronomers.html>). [NewScientist.com news service](#). Retrieved 2007-08-07.

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