

# A harvest of exoplanets for the TRAPPIST robotic telescope

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Credit: TRAPPIST E.Jehin ULg

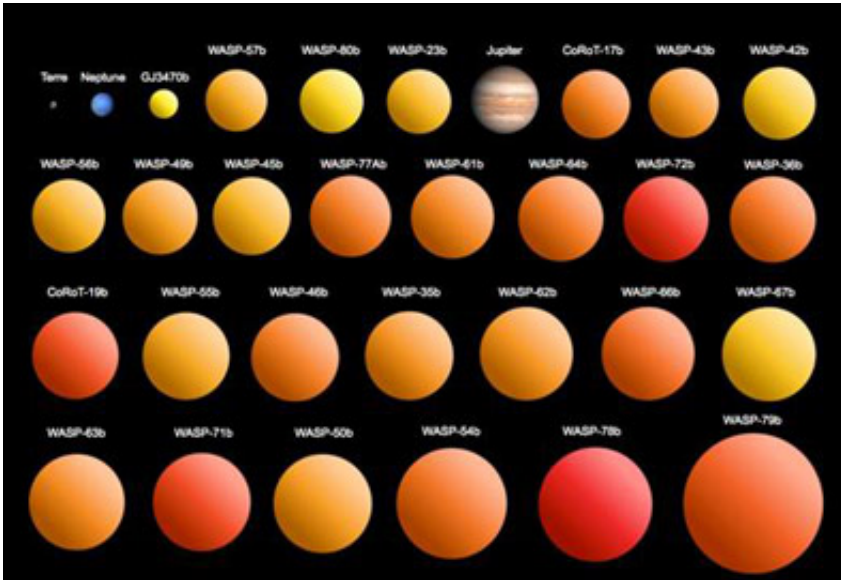
Among the many planets detected orbiting other stars (exoplanets) over the last twenty years, a little less than three hundred periodically pass in front of their star. This is what astronomers call a planetary transit. Exoplanets that "transit" their stars are key objects for the study of other planetary systems, because they are the only planets beyond our solar system that can be studied in detail, both in terms of their physical parameters (mass, radius, orbital parameters) and their atmospheric properties (thermal structure, dynamics, composition).

The University of Liege (ULg) is deeply involved in this exciting research topic, notably through its TRAPPIST [robotic telescope](#) installed in 2010 in one of the best astronomical sites of the world, the La Silla [European Southern Observatory](#) in the Chilean Atacama desert. One of

the scientific objectives of this telescope is the detection and study of exoplanets via the [accurate measurement](#) of their transits. In just three years, it has fully demonstrated its great potential in this area. Indeed, TRAPPIST participated in the detection of thirty [planets](#), representing ten percent of all transiting exoplanets known to date. This important contribution is the result of the excellent expertise of the Liege astronomers, and their active collaboration with other international teams of "[planet hunters](#)", including the prestigious Swiss team of Professor Didier Queloz, co-discoverer of the first [exoplanet](#) in 1995.

Among the thirty exoplanets co-detected by TRAPPIST, most are [gas giants](#) similar to Jupiter, but in much closer orbits. "With the [intense radiation](#) that they undergo from their star, these planets are real gold mines for the study of other worlds," says Michaël Gillon, Principal Investigator of the TRAPPIST exoplanets program. "Indeed, it makes possible a number of measurements that give us access to valuable information on their atmospheric properties. TRAPPIST also detected the transit of a planet twice smaller than Jupiter orbiting a nearby star much less massive than the Sun. "The name of this small planet is GJ3470b" continues Michaël Gillon, "and it has a mass and a size comparable to those of Uranus and Neptune, suggesting a composition rich in water ice. The detection of this planet much smaller than Jupiter is very exciting, not only for its own study, but also because it demonstrates that by focusing on even less massive stars, TRAPPIST should be able to detect rocky planets similar in size and mass to Earth. Our current projects go in that direction. "

Probably dreaming of other Earths too, TRAPPIST continues to observe the gorgeous Chilean sky night after night, to the delight of Liege astronomers that analyze its valuable data thirteen thousand kilometers away ...



## The diversity of the 28 planets co-detected by TRAPPIST

- **The smallest:** GJ3470b, ~2.3 times smaller than Jupiter, or barely larger than Neptune and Uranus.
- **The largest:** WASP-79b, ~2.1 times larger than Jupiter.
- **The least massive:** GJ3470b, with a mass  $\pm$  equal to Uranus', or 23 times less massive than Jupiter.
- **The most massive:** WASP-36b, ~2.3 times more massive than Jupiter.
- **The coolest:** GJ4370b, with a temperature of  $\sim 420^\circ$  Celsius, similar to Venus' surface temperature.
- **The hottest:** WASP-78b, with a temperature of  $\sim 2080^\circ$  Celsius.
- **The nearest:** GJ3470b, at  $\sim 100$  light-years.
- **The farthest:** CoRoT-17b, at  $\sim 3000$  light-years.
- **The closest to its star:** WASP-43b,  $\sim 65$  times closer to its star than Earth from the Sun. It completes its [orbit](#) in a bit more than

19h !

The last two exoplanets co-detected by TRAPPIST are presented in the following paper, just published in the scientific journal *Astronomy and Astrophysics*:

Gillon M. et al. 2013, WASP-64b and WASP-72b: two new transiting highly irradiated giant planets, *Astronomy and Astrophysics*, 552, A82.  
Lien : [arxiv.org/abs/1210.4257](https://arxiv.org/abs/1210.4257)

The complete list of scientific publications based on TRAPPIST data is available via the following link: [www.ati.ulg.ac.be/TRAPPIST/Tra ... in/Publications.html](http://www.ati.ulg.ac.be/TRAPPIST/Tra...in/Publications.html)

Provided by University de Liege

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