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Press Release

Super-Earth sighted!
The smallest extrasolar planet ever discovered

A planet hardly any larger than Earth has just been discovered by CNES's CoRoT satellite. *But is it rocky or a sauna-planet?* In any case, it is certainly an extraordinary find. It is the companion of an orange star and is less than twice as large as the Earth. This is the smallest size ever measured for an exoplanet. With such a high temperature (over 1000 degrees) it must be covered with either lava or water vapour.

The CoRoT satellite, operated by CNES, has led to the discovery of the smallest exoplanet ever described, with a size similar to that of Earth. Until now, most of the 330-odd planets discovered have been giant planets, similar to Jupiter or Neptune, made up mostly of gas. This new body, which has been named *CoRoT-Exo-7b,* is very different: its diameter is close to twice that of our Earth. With a revolution period of or 'year' of only 20 hours, it is located very close to its star, which is why it has very high temperatures of between 1000 and 1500°C. The planet's existence was detected from the very slight dimming of the star's luminosity as it passes regularly in front of it. Its density has not yet been determined with any certainty: it could be a rocky object like Earth, covered in liquid lava. It could also belong to a predicted class of planets formed half of water and half of rock; in this case it would be a 'Sauna-Planet", considering its extraordinarily high temperature.

"Finding such a small planet was not altogether a surprise," says Daniel Rouan, a research scientist at the Paris Observatory's LESIA laboratory, who is coordinating the work with Alain of the IAS, "*CoRoT-Exo-7b falls into a category whose existence has been conjectured for some time. In fact, CoRoT was designed precisely with the hope that it would detect a few specimens. CoRoT has demonstrated its ability to detect these very slight variations in brightness,"* he adds.

It has now been fifteen years since astronomers first detected planets in orbit around other stars. More than 330 have now been listed, most of them fairly massive, up to 20 times the mass of Jupiter. On the other hand, we still know of only a very few with a mass similar to that of the Earth and the other telluric planets (Venus, Mars and Mercury) as they are extremely difficult to detect. "*Most of the methods used until now are sensitive to the planet's mass, whereas CoRoT is sensitive to its surface, which is more helpful*" explain Roi Alonso and Magali Deleuil, researchers at LAM. "Another of CoRot's advantages is the fact of being in Space, where disturbances are much smaller and the period of uninterrupted observation much longer than from the ground," adds Hans Deeg, a member of the scientific team and a researcher at the Canary Islands Astrophysics Institute.

The internal structure of CoRoT-Exo-7b is of special interest to scientists. "*It is a question that has puzzled the astronomical community for several years: Are there also 'ocean planets'? These would be objects originally half composed of ice that would have drifted towards their star, the ice then melting to form a fluid envelope,*" says Alain Léger.

Jean Schneider, a researcher from the Universe and Theories Laboratory at the Paris Observatory, explains the significance of this new object for planet hunters: "*Recent measurements indicated the existence of planets of small mass but their size had never been determined. This has now been done.*"

Eike Guenther, from the Tautenburg Observatory, remarks that "*this program benefited from a significant number of complementary measurements from the ground: many European telescopes and instruments were called upon to determine what phenomenon other than a small planet could explain CoRoT's data.*" "*This monitoring phase was an essential, meticulous one,*" concludes Daniel Rouan, "*which is the reason why this result is only being announced now. You can easily imagine our excitement every time a new measurement came out and didn't invalidate our hypothesis!*"

The discovery benefited from complementary observations made thanks to an extensive European telescope network operated by various institutes and countries: the European Southern Observatory at Paranal and La Silla (Chile), the 80cm telescope at the Canary Islands Astrophysics Institute, and the Canada-France-Hawaii Telescope on Mauna Kea, Hawaii (CNRS, CNRC and University of Hawaii).

CoRoT in brief:

The CoRoT satellite was developed by a CNES integrated team and laboratories associated with CNRS, the principal ones being the Laboratory for Space Studies and Astrophysics Instrumentation (Paris Observatory), the Marseille Astrophysics Laboratory (Marseille-Provence Astronomical Observatory), Institute of Space Astrophysics, Orsay (University Paris-Sud 11) and the Midi-Pyrénées Observatory, Toulouse (INSU). Since many hands make light work, the project also benefited from an important European participation (Austria, Belgium, ESA, Germany, and Spain) together with that of Brazil.

CoRoT -- for Convection, Rotation & (planetary) Transits -- is a telescope placed in orbit around the Earth. It was designed to detect tiny variations in the luminosity of stars. The instrument has two scientific goals:

-- the search for planets orbiting stars other than our Sun and in particular planets similar to the Earth;

-- the detection of star vibrations in order to determine their composition (stellar seismology).

Ref. "Transiting exoplanets from the CoRoT space mission VII. CoRoT-Exo-7b: the first Super-Earth with Radius characterized" by A. Léger, D. Rouan, J. Schneider, R. Alonso, B. Samuel, E. Guenther, M. Deleuil, H.J. Deeg, M. Fridlund et al. (soon to be submitted to A&A for a special 'CoRoT' edition)

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