German Aerospace Center
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CoRoT discovers extrasolar rocky planet

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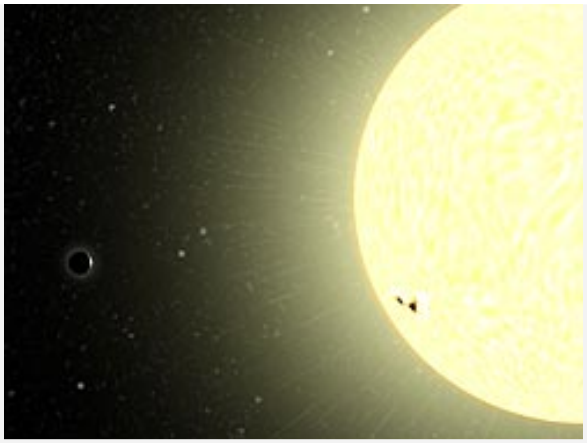
Animation: The CoRoT-7 system – overview and transit

The CoRoT satellite (Convection, Rotation and Planetary Transits) has discovered its first rocky planet outside our solar system. The planet, which has been named CoRoT-Exo-7b, is the smallest extrasolar planet ever detected: it is just under twice the size of the Earth. It orbits its Sun-like parent star in just 20 hours. The German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) developed the on-board software for CoRoT and it participates in the scientific analysis of the data obtained by the satellite.

"This is a really sensational discovery"

As it is located very close to its parent star, the planet probably has a temperature of over 1 000 degrees Celsius. These aspects make CoRoT-Exo-7b fundamentally different from most of the 330 extrasolar planets discovered so far, which usually are gas giants - the so-called 'hot Jupiters'. The density of CoRoT-Exo-7b is still under investigation: scientists think it may be a rocky planet like Earth, or perhaps one that is covered in lava. It may also be that it is made up of water and rock in almost equal amounts and that it has an extremely hot and dense hydrogen atmosphere. CoRoT-Exo-7b and its parent star are 400 light years away from Earth.



Detailed photograph of CoRoT-7b

"It is really sensational to discover such a small planet. This truly meets the high expectations we had of CoRoT", says Professor Heike Rauer, head of the CoRoT project at DLR.

Searching for extrasolar planets from space

Forty days into a 150-day observation period that lasted from October 2007 to March 2008, scientists found the first indications for the existence of this planet. CoRoT uses the transit method to search for extrasolar planets: The space telescope monitors the changes in a star’s brightness over a longer period of time. Such changes may be caused by a planet passing in front of ('transiting') the star, dimming it very slightly but noticeably. Researchers refer to this celestial alignment as 'planetary transit'. A change in a star's brightness can have several different causes, though. Every candidate planet the researchers find using their light curve measurements therefore needs to be confirmed by follow-up measurements. For these follow-up observations, a network of large ground-based telescopes is used that includes the Thuringia State Observatory in Tautenburg. Through these follow-up measurements, researchers have

discovered that another planet orbits the same star with an orbital period of eight days. The mass of this planet is 14 times that of the Earth, which makes it a so-called 'hot Neptune'. Viewed from Earth, this large planet never passes in front of its parent star, which explains why its existence could not have been inferred using the transit method. Due to its large mass, however, it exerts a gravitational pull on its parent star, and scientists were able to observe periodical changes in the star's radial velocity.

CoRoT discovers the smallest extrasolar planet detected so far

During each observation cycle, CoRoT monitors a section of the sky containing thousands of stars to increase chances of discovering extrasolar planets. CoRoT's direction of observation also changes every six months. During the winter it looks towards the Monoceros constellation (the Unicorn), during the summer it looks towards the Aquila constellation (the Eagle) in the centre of the Milky Way.

About CoRoT:

CoRoT was launched from the Baikonur Cosmodrome in Kazakhstan on 27 December 2007. It is the first satellite mission that searches for rocky planets outside our solar system. CoRoT, which carries a 27-cm aperture telescope, is in a polar orbit around the Earth at an altitude of about 900 kilometres. CoRoT's instrumentation is not only suitable for transit searches, but can also be used to detect and investigate stellar vibrations.

The CoRoT mission is led by the French Space Agency, CNES. Researchers from ESA and other research institutes in Belgium, Brazil, Germany, Austria and Spain also take part in it. On behalf of the German government and using funds made available by the DLR Space Agency (DLR-Raumfahrtmanagement), the on-board software for CoRoT was developed and tested at the DLR Institute of Planetary Research (DLR-Institut für Planetenforschung) over a period of five years. In addition to controlling the instruments and fine-tuning the orientation of the satellite, the software also takes care of some of the data processing and data transfer tasks.

Germany's contributions represent a total value of about five million euro. Apart from DLR, the German team also includes researchers of the Thuringia State Observatory in Tautenburg and the Rhenish Institute for Environmental Research at the University of Cologne, who make a substantial contribution to the mission by taking care of data analysis, computer simulations and follow-up observations.

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