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CoRoT-9b, a temperate exoplanet

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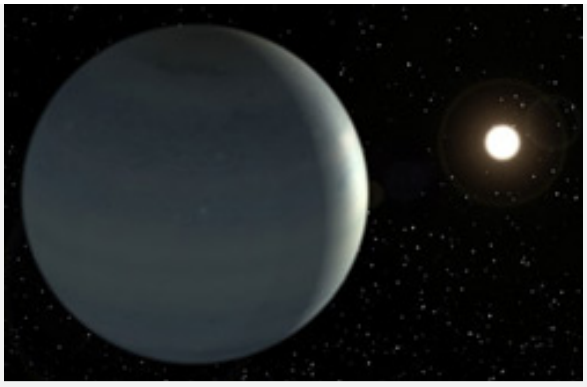
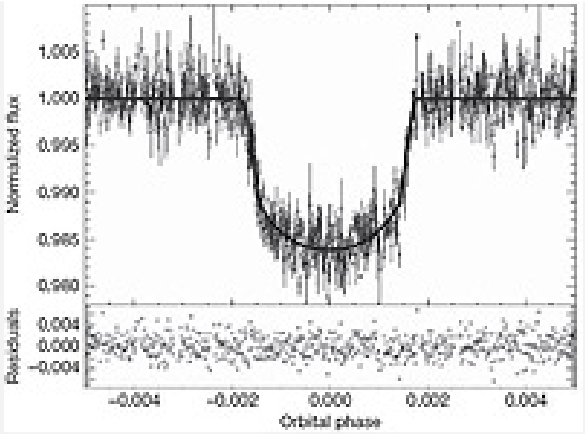


CoRoT-9b and its parent star

CoRoT-9b, a Jupiter-sized exoplanet thats orbits its star every 95 days, is the latest discovery of the CoRoT satellite, a project in which the German Aerospace Center (DLR) is a participant. "This exoplanet stands out by virtue of its 'normality'. It is a very close approximation of the planets in our own solar system," says Professor Heike Rauer from the DLR Institute of Planetary Research in Berlin, who manages the German contribution to CoRoT.

CoRoT-9b lies far away from our Solar System, some 1500 light-years from Earth, and orbits a star in the constellation of the Serpent. From the duration of its orbit, it would appear that the distance between planet and star is roughly the same as the distance separating Mercury from our Sun. CoRoT-9b is therefore an entirely normal planet - presumably a gaseous planet with relatively moderate temperatures anywhere from -20° to 160° Celsius, depending on whether or not it is shrouded in a highly reflective cloud layer. The differences between its day and night sides are probably only slight. CoRoT-9b is therefore substantially different from the class of 'hot Jupiters', which orbit their central star about every three days. A planet with a short orbital period is located very close to its star and is therefore exposed to powerful stellar radiation. It is from this that the names of the planetary classes 'hot Jupiters' and 'hot Neptunes' are derived.

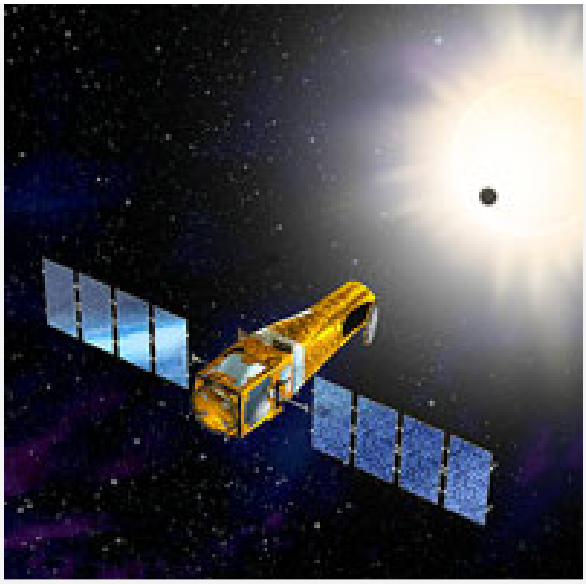


CoRoT-9b's transit light-curve

Waiting for the eclipse

With this discovery of a transiting exoplanet with a long orbital period (long-period planet), CoRoT has accomplished another mission objective. The mission's first such objective was accomplished with the discovery of a rocky exoplanet, CoRoT-7b, which was announced in February last year. CoRoT has now discovered a total of eight planets and has also tracked down a 'brown dwarf' star. With the planetary transit technique, the space telescope observes several thousand stars over a period of 150 days. Whenever the orbital path of a planet causes it to traverse the line of sight between the telescope and the central star, it darkens the image of that star slightly for several hours. CoRoT measures this reduction in brightness. For example, a planet like Earth darkens the Sun by a factor of one ten-thousandth during such a transit, and does so just once a year. Since each star is also subject to fluctuations in its luminosity, the search for 'transit events' of this kind is a long and laborious process.

The measurements that culminated in the discovery of this new planet were carried out in the summer of 2007, during a 150-day observation period. The task was made particularly difficult by the planet's wide orbit: The greater the orbital radius of a planet, the lesser the likelihood of the orbit to carry it across the line of sight from the telescope to the star. The discovery of CoRoT-9b has proved that the planetary transit technique is also useful for discovering exoplanets of this kind. "Once you have observed an exoplanet in transit, you can determine its radius. This is one of the fundamental parameters of a planet, one that can only be measured directly on transiting planets. Not only that, but transiting planets also provide an opportunity to learn something about their atmospheres. This is the key to the search for Earth-like planets on which life as we know it may be possible," says Professor Rauer. The discovery of CoRoT-9b has been published in an article in the journal Nature.



CoRoT, an artist's impression

On the trail of extrasolar planets

To date, we are aware of the existence of more than 400 planets outside our Solar System. Transit events can be observed in about 70 of these. With a transit measurement, it is possible to derive the orbital period, the orbital inclination and the radius of a planet. If this method is supplemented with other observation techniques - for example, the radial speed method - the mass and therefore the density of the exoplanet can be determined. This enables scientists to distinguish between gaseous and rocky planets. Subsequent measurements of CoRoT-9b were carried out at the Teide Observatory on Tenerife, while radial velocity measurements were carried out using the high-resolution HARPS spectrometer on the European Southern Observatory (ESO) 3.6-metre telescope in Chile.

The CoRoT mission is led by the French Space Agency (Centre National d'Études Spatiales; CNES) and includes researchers from ESA and other research institutes from Austria, Belgium, Brazil, Germany and Spain. The onboard software was developed and tested during a five-year period by the DLR Institute for Planetary Research in Berlin on behalf of the German government and with financial support from the DLR Space Agency. Apart from the control of instruments and precision alignment of the satellite, the software also handles some of the data processing and transmission.

The total German contribution to CoRoT amounts to about five million euro. The German team also includes the Tautenburg Observatory (Thueringer Landessternwarte Tautenburg) in Thuringia and the Rhenish Institute for Environmental Research (Rheinische Institut für Umweltforschung) at the University of Cologne, both of which played a major role in data analysis work, simulation calculations and subsequent observations.

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