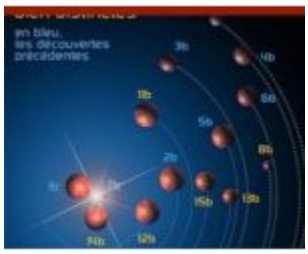
Discovery of 6 new planets and a brown dwarf, by the CoRoT satellite



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On June 14, the CoRoT team announces the discovery of a brown dwarf and six new exoplanets, with very different characteristics. CoRoT, satellite operated by the CNES, allows to discover exoplanets from space, by the detection of their passage in front of their star. The observation of these transits is followed up by ground observations, in particular with spectrographs HARPS at ESO and Sophie of INSU-CNRS : the astronomers then obtain a precise measurement of the size, mass and orbit of these new planets, without seeing them directly. This is why, of all known exoplanets, the transit ones* provide the most complete information on the nature and the modes of formation and evolution of these new worlds.

The new objects discovered by transit have physical characteristics very different from each other, and allow to better clarify the theoretical models of the formation of these systems. The 7 new bodies are the following :

CoRoT-8b : the smallest of the series At about 70% of the size and mass of Saturn, CoRoT-8b is moderately small among the previously known transiting exoplanets. Its internal structure should be similar to that of icy giant planets, like Uranus and Neptune in the Solar System. It is the second smallest exoplanet discovered by the CoRoT team so far after CoRoT-7b, the first transiting Super-Earth.

CoRoT-15bÂ : the brown dwarf CoRoT-15b's mass is about 60 times that of Jupiter. This makes it incredibly dense, about 40 times more than that of Jupiter. For that reason, it is classified as a brown dwarf Intermediate in nature between planets and stars, brown dwarfs are much rarer than planets, which makes this discovery all the more exciting. This discovery will help astronomers understand the nature of brown dwarfs and their relationship to planets.

CoRoT-10bÂ : a giant with a very elongated orbit It is one of the very few transiting planets with a substantially elongated orbit that brings the planet very close to its host star. The large variation in the orbital distance results in a tenfold increase in the amount of stellar radiation received by the planet. Scientists estimate that the surface temperature of the planet may increase from 250 to 600°C, in a mere 13 days (the length of the year on CoRoT-10b).

CoRoT-11bÂ : a giant around a star in rapid rotation Its star rotates rapidly around its axis, completing one rotation every 40 hours. By comparison, the Sun's rotation period is 26 days. It is particularly difficult to confirm planets around rapidly rotating stars, so this detection marks a significant achievement for the CoRoT team.

CoRoT-12b, CoRoT-13b et CoRoT-14b : 3 giant planets close to their star, but with very different properties. CoRoT-13b is smaller in size than Jupiter, and therefore twice as dense. This suggests the presence of a massive rocky core inside the planet. With a radius that is 16 times larger than the Earth, CoRoT-12b belongs to the family of `bloated hot Jupiters', whose anomalously large sizes are probably due to intense stellar radiation they receive. Amazingly, CoRoT-14b, which is even closer to its parent star, has a size similar to Jupiter's. Its mass, however, is 7.5 times the mass of Jupiter making the planet 6 times denser. Such a combination, very massive and very hot, is rare and CoRoT-14b is only the second planet of this type discovered so far.

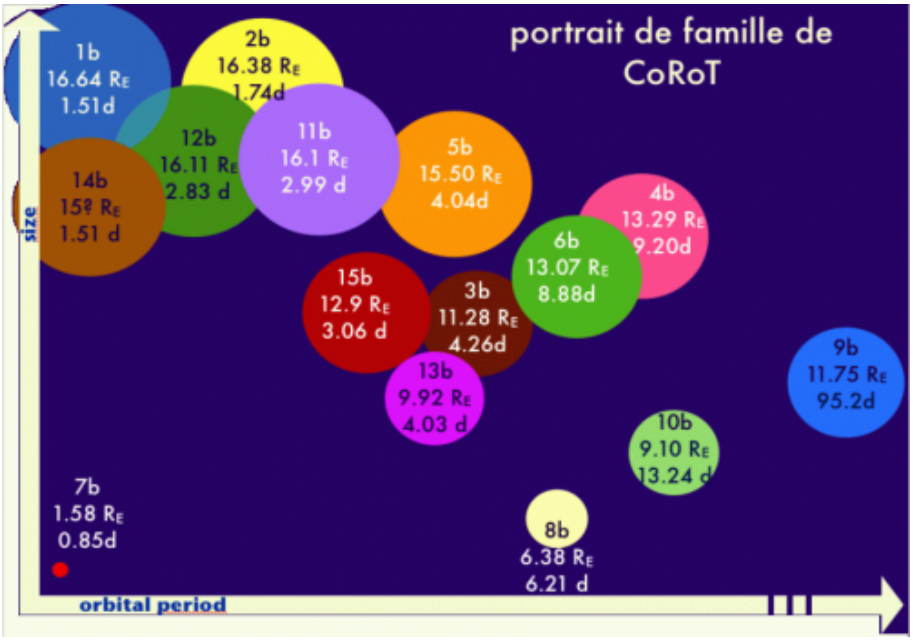

Figure 1 : Gauche : Portrait de famille des 15 premières planètes ou naines brunes CoRoT. La taille des corps est portée en fonction de leur période de révolution autour de leur étoile. RE est le rayon terrestre. Droite : une représentation d'artiste des 15 premières planètes ou naines brunes CoRoT, crédit Patrice Amoyel.

The detection of exoplanets with CoRoT by the method of transits is a long enterprise, with its complementary observations (with spectro HARPS on the ESO 3.6m, or the spectro SOPHIE at the 1.93m of the Observatoire de Haute Provence, or the VLT at ESO), but it has a considerable advantage because it allows to obtain the diameter and the mass of the planet, and thus its density, essential to understand the nature of the detected planets. The characteristics of the orbit are also precisely described. Since fifteen years, 450 exoplanets have been discovered ; only 82 of them present a transit, of which 15 were highlighted by the CoRoT satellite.

See also press release from CNRS/INSU and CNES

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