EPSC Abstracts
Vol. 6, EPSC-DPS2011-987, 2011
EPSC-DPS Joint Meeting 2011

The exosphere of CoRoT7b

E.W. Guenther

Thüringer Landessternwarte Tautenburg, 07778 Tautenburg, German

(guenther@tls-tautenburg.de/ Fax 0049-36427-86329)

Abstract

CoRoT-7b is a rocky planet that orbits a solar-like star at a distance of only 4.5 stellar radii. It may thus resemble an extreme form of Mercury and may even have an exosphere. Alternatively it may be an extreme version of Io. Using in an out of transit spectroscopy firm upper limits for the exosphere is derived, and future prospects are discussed.

1. Introduction

Two years ago, the small but high-density planet CoRoT-7b was discovered. Current models suggest that it is the first transiting rocky planet found outside the solar system. However, the planet orbits a solar-like star at a distance of only 4.5 stellar radii. The planet thus could well be like Mercury but more extreme. If that were the case, CoRoT7b might even have an exosphere like Mercury. The properties of the exosphere are constrained by observing the planet in- and out-of-transit. Detecting the exosphere of CoRoT-7b would for the first time allow us to study the material originating in the surface of a rocky extrasolar planet. The entire optical spectrum was scanned in order to detect any lines originating from the planet, focusing particularly on spectral lines such as those detected in Mercury and Io in our solar system.

2. Observations

Since lines originating in the exosphere like CaI, CaII or Na, are expected to be narrow CoRoT-7b was observed with UVES at a high spectral resolution. The presence of emission and absorption lines originating in the exosphere of CoRoT-7b was searched for by subtracting the two spectra from each other.

3. Results

Since the signal-to-noise ratio (S/N) of the spectra is as high as 300, the upper limits derived are surprisingly low. It was found that the fluxes of CaI, CaII and Na have to be lower than 3 10^{-18} Wm^{-2}. The upper limit for CaO is 10^{-17} Wm^{-2}. No emission lines originating in the plasma tours fed by volcanic activity was detected either.

4. Conclusions

Except for CaO, the upper limits derived correspond to 2-6 10^{-6} L_*, demonstrating the capability of UVES is in detecting emission lines from the exosphere. The observations certainly exclude the extreme views of CoRoT-7b, such as an exosphere that emits 2000 times as brightly as Mercury. Future prospects for this type of research are discussed.