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Can one infer the presence of a hydrogen corona around a CO_2-dominated exoplanetary atmosphere ?

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Among the new exoplanets found every week, more and more are in the Earth/super-Earth mass regime. Some of these planets like the Kepler-11 system exhibit very low densities, which can be explained by a high content in water ("waterworld") or a large hydrogen/helium atmosphere.
Recent work has been done to explain how a low mass planet could sustain such an atmosphere for several Gy. On the other hand, some authors have proposed methods based on transit absorption spectroscopy to detect and characterize these possible atmospheres.

Here, we explore the possibility of inferring the presence of a hydrogen corona by looking at its influence on thermospheric emissions of a lower CO_2 atmosphere. We use a 1D transport code coupled to a radiative transfer one to calculate the emissions of the planet and the contrast with its parent star in two emission lines. In the case of a telluric planet at 1 AU from a G-type star, these emissions cannot yet be detected. In the case of a close-in telluric planet around an active M-dwarf, the contrast between the planet and the star approaches the sensitivity of current facilities.

Considering the development of new instruments with better sensitivities, this method could be applied to detect or confirm the presence of a massive hydrogen corona around a CO_2-dominated atmosphere.