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PRESS RELEASE

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A HAIRY PLANET LIKE A COMET



Astronomers from the University of Geneva (UNIGE) and members of the NCCR -for *National Centre of Competence in Research*- PlanetS discovered an immense cloud of hydrogen escaping from an exoplanet the size of Neptune. This phenomenon generates like a tail or a head of hair giving it the appearance of a giant comet. Already observed in some very large and very hot exoplanets, this phenomenon is viewed for the first time with such a magnitude. The cloud might explain the formation of some hot and rocky super-Earths. It would also be an indicator for detecting extrasolar oceans. Finally, it would be used to envisage the future of our atmosphere. These results are published in the latest edition of the journal *Nature*.

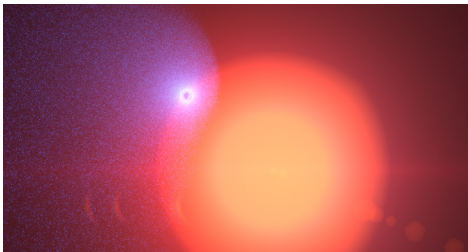
With a mass approximately 23 times that of our Earth, the exoplanet GJ436b rotates around its star in only three days and has an atmosphere which leaves behind a gigantic trail of hydrogen. “This cloud is very spectacular; it’s as if, after carrying the planet’s atmosphere at a high temperature, causing the hydrogen to evaporate, the radiation of the star was too weak to blow away the cloud that accumulated around the planet”, comments David Ehrenreich, an astrophysicist with UNIGE and lead author of an article reporting on these observations in the latest issue of *Nature*.

The cloud’s shadow

Indeed, scientists see the cloud’s shadow when it passes in front of the star. Essentially comprised of hydrogen, it absorbs the ultra violet light emitted by the star and the phenomenon remains invisible on Earth because the ultra violet light is blocked by the atmosphere. It was therefore necessary to use the Hubble spatial telescope for these observations: “When you’re searching in the visible region you only see the shadow of a planet whose size is equivalent to four times that of Earth like Neptune. But if the sensitive eye is pointed toward the Hubble ultra violet light, the planet is transformed into a veritable monster, far bigger than the star”, explains David Ehrenreich. Evaporation is spectacular, but it would not threaten the atmosphere of GJ436b, an exoplanet which was formed several thousands of years ago and which would have only lost 10% of its atmosphere.

Massive evaporation

But evaporation might, however, explain the disappearance of atmospheres observed on rocky exoplanets, which rotate very close to their star and are extremely hot, such as the famous “super-Earths” discovered by the Corot and Kepler spatial telescopes. Just like the GJ436b, these might have been hot Neptunes orbiting around more luminous stars which would have circulated in their atmosphere that ended up leaving the rocky centre of the planet bare.



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A comet destiny?

This type of observation is very promising in the search of habitable planets since “hydrogen from the ocean water that evaporate on slightly hotter terrestrial planets than the Earth could be detected”, as Vincent Bourrier suggests, the second author of these results.

The phenomenon might even explain the disappearance of hydrogen outside our atmosphere, an element that abounded there more than 4 billion years ago.

Finally, such observations might help to envisage the distant future of our planet, when, in 3 or 4 billion years, the Sun will become a red giant and will circulate in our atmosphere making life impossible on Earth. Astrophysicists now hypothesize that our planet would be transformed into a giant comet, thus resembling a «hairy» star just like GJ436b.

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