EPSC Abstracts
Vol. 6, EPSC-DPS2011-1004, 2011
EPSC-DPS Joint Meeting 2011

Evaporation of extrasolar planets

A. Lecavelier des Etangs (1), D. Ehrenreich (2), A. Vidal-Madjar (1), V. Bourrier (1)
(1) CNRS, Institut d'Astrophysique de Paris, France (lecaveli@iap.fr), (2) IPAG, Grenoble, France

Abstract

Among the five hundreds extra-solar planets known, almost 30% orbit closer than 0.1 AU from their parent star. We will review the observations and the corresponding models of the evaporation of these "Hot-exoplanets".

Finally we will also present the latest observations of HD189833b obtained with the repaired HST/STIS.

1 Observations

The observations started with the discovery made with HST that the planet orbiting HD209458 has an extended atmosphere of escaping hydrogen (Vidal-Madjar et al. 2003). Subsequent observations obtained with STIS and ACS and most recently with COS confirm the escape of the gas. And, even more, atomic oxygen, ionized carbon and silicon have been shown to be present at very high altitude in the upper atmosphere (Linsky et al. 2010). Observations of other targets like HD189733b and Wasp-12 show that evaporation is a general phenomenon which could contribute to the evolution of planets orbiting close to their parent stars (Lecavelier et al. 2010, Fossati et al. 2010).

2 Models

To interpret these observations, we developed models to quantify the escape rate from the measured occultation depths. Numerous models have also been published to investigate mechanisms which can lead to the estimated escape rate. In general, the high temperature of the upper atmosphere heated by the far and extreme UV combined with the tidal forces allow a very efficient evaporation of the upper atmosphere (Yelle et al. 2004; Murray-Clay et al. 2009; Guo 2011). We will review the different models and their implications.

3 Latest results

Finally we will also present the latest observations of the gas escaping HD189833b. These observations have been obtained with the repaired HST/STIS.

References

[1] Fossati, L., Bagnulo, S., Elmasli, A., et al.: ApJ, Vol. 720, p. 872, 2010.

[2] Guo, J. H.: ApJ, Vol. 733, p. 98, 2011

[3] Lecavelier des Etangs, A., Vidal-Madjar, A., and Desert, J.-M.: Nature, Vol. 456, p. E1, 2008.

[4] Lecavelier des Etangs, A., Ehrenreich, D., Vidal-Madjar, A., et al.: A&A, Vol. 514, p. A72, 2010.

[5] Linsky, J. L., Yang, H., France, K., et al.: ApJ, Vol. 717, p. 1291, 2010.

[6] Murray-Clay, R. A., Chiang, E. I., and Murray, N.: ApJ, Vol. 693, p. 23, 2009.

[7] Vidal-Madjar, A., Lecavelier des Etangs, A., Désert, J.-M., et al.: Nature, Vol. 422, p. 143, 2003.

[8] Yelle, R. V.: Icarus, Vol. 170, p. 167, 2004.