An homogeneous study of 400 exoplanets with CEPAM: evolution and compositions

Mathieu Havel*[1], Tristan Guillot[2], and Vivien Parmentier[3]

[1]Observatoire de la Cote d'Azur (OCA) – CNRS : UMS2202 – B.P. 4229 06304 Nice Cedex 4, France
[2]Laboratoire Lagrange – Université de Nice-Sophia Antipolis, Observatoire de la Cote d'Azur (OCA) – France
[3]Université de Nice-Sophia Antipolis, Observatoire de la Cote d'Azur (OCA) – CNRS : UMS2202 – B.P. 4229 06304 Nice Cedex 4, France

Abstract

The discovery of more than 400 hundred giant exoplanets transiting in front of their parent star allows detailed studies of a statistically significant sample of stars and planets. Using the tools developed to constrain the properties of the CoRoT stars and planets with new equations of state and atmospheric boundary conditions, we calculate homogeneous constraints on the evolutions and compositions of these planets. This allows us to revisit two major problems concerning giant exoplanets: (1) The inflation problem, namely why a large fraction of exoplanets is larger than expected from standard evolution models. (2) The existence of a correlation between the mass of heavy elements present inside exoplanets with the metallicity of their parent stars. We also discuss the future perspectives brought by the PLATO space mission, which should detect _˜1 to 3 thousands new transiting giant planets in various configurations with seismological constraints on their parent stars. This additional piece of information should allow further studies of the different correlations between stellar and planetary properties, and improve significantly the precision on their mass, radius and age.

*Speaker