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Theoretical planetary statistics in the probabilistic mass-radius-diagram

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Abstract

The goal is to understand the surprising properties of the exoplanet population with a minimum number of basic physical principles. Planetary masses are determined by counting the physically possible planetary equilibria in arbitrary gravitationally stable nebulae. Radii are determined by calculating the evolution of all planets found in the mass determination step. The resulting frequencies of planets at given age, mass and radius are confronted to the transiting planets detected so far in a probabilistic mass-radius diagram. For the first time we present these diagrams for the period range of 1 to 128d and discuss how the exoplanet population detected so far can be understood as an evolution of the most frequently occurring theoretical planets.

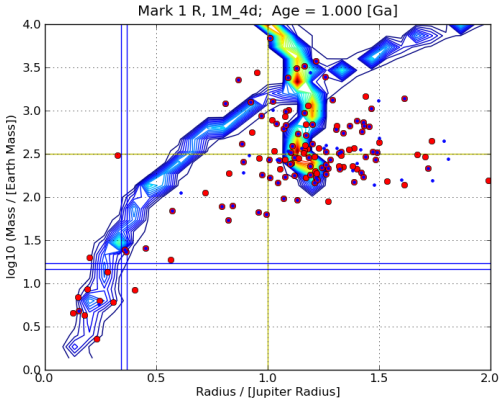

Figure 1: Probabilistic theoretical mass-radius diagram for planets in a 4 day orbit near a solar mass star for an age of 1 Ga. The theoretical number of planets is displayed with equidistant colour-enhanced contours Exoplanets from the *Extrasolar Planets Encyclopedia* are plotted as of Oct. 2010 (blue dots) and Mai 2011 (red dots).

0.1 Note

To be updated after the CoRoT-Symposium (June 17th).