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Interpreting the results of transit surveys to characterize giant planets

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Transiting extrasolar planets are now discovered jointly by photometric surveys and by radial velocimetry, allowing measurements of their radius and mass. We simulate directly a population of stars corresponding to the OGLE transit survey and assign them planetary companions based on the list of extrasolar planets discovered by radial velocimetry. We use a model of the evolution and structure of giant planets that assumes that they are made of hydrogen and helium and of a variable fraction of heavy elements. The output list of detectable planets of the simulations is compared to the real detections. We show that evolution models fitting present observational constraints predict a lack of small giant planets with large masses. We also identify that the lack of planets oribiting metal-poor stars is even more marked at short periods (less than 10 days). We further confirm the relative absence of low-mass giant planets at very small orbital distances. Testing these results and the underlying planetary evolution models requires the detection of a statistically significant number of transiting planets, which should be provided over the next few years by continued ground-based photometric surveys, the space missions CoRoT and Kepler, and combined radial velocity measurements.