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Title: Just How Earth-like are Super-Earths? Constraints on H+He Envelope Fractions from Kepler's Planet Candidates
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Abstract: With 3500 planetary candidates discovered in its first 3 years of data, the Kepler Mission promises to answer one of the most fundamental questions posed in exoplanetary research: what kinds of planets occur most often in our Galaxy? As Kepler primarily yields planetary radii and orbital periods, it has enabled numerous studies of the occurrence rate of planets as a function of these variables. Unfortunately, the full mass distribution, and thus a direct measure of these planets' possible compositions, remains elusive due to the unsuitability of these faint targets for radial velocity follow-up and the relative rareness of transit timing variations. We show, however, that relatively straightforward models of planetary evolution in an irradiated environment can make some progress without this full mass distribution towards understanding bulk compositions of the abundant Super-Earth/Sub-Neptunes that Kepler has discovered. In particular, we constrain the distribution of envelope fractions, i.e. the fraction of a planet's mass that is in a gaseous hydrogen and helium envelope around its rocky core, for this exoplanet population that has no analogs in our Solar System.
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