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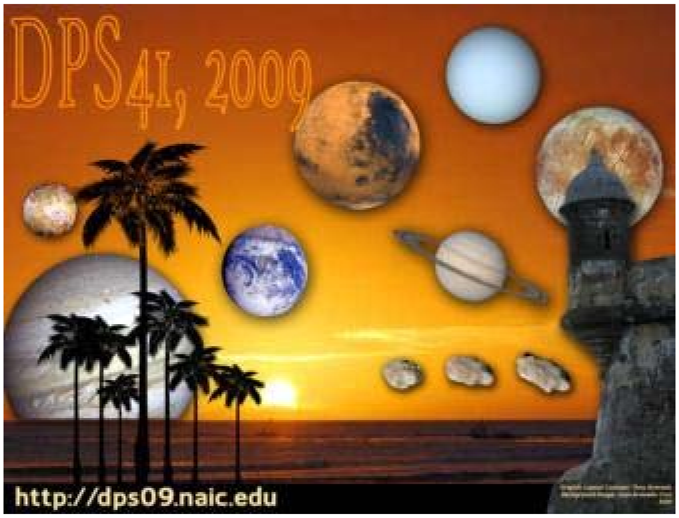

Presentation Abstract

Title **The super-Earth Mass-Radius Relationship: Constraints from Giant Impacts**

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Abstract The late stage of planet formation is dominated by giant impacts. There is evidence for giant impacts on several planets in the solar system, including Mercury, which may have suffered a catastrophic impact event that changed its bulk density. We present the results of smoothed particle hydrodynamics simulations of high-velocity (up to about five times the escape velocity) giant impacts onto super-Earths (up to 10 Earth masses). The collision outcomes are divided into two regimes: a disruption regime (when the impact parameter is small or the impact velocity is extremely high) and a hit-and-run regime (a grazing inelastic collision and projectile escape). In the disruption regime, we derive scaling laws for (1) the mass of the largest post-collision remnant and (2) the change to the bulk composition (iron-to-silicate ratio) of the largest remnant resulting from collisional stripping of the mantle as functions of impact energy scaled to the catastrophic disruption energy (Q*RD). During the formation of super-Earths, some fraction of planets will experience mantle stripping by a late giant impact. Using the two new scaling laws, we determine the expected lower envelope in the super-Earth mass-radius relationship; that is, the minimum expected radius for rock+iron planets as a function of mass.