

Origin of Close-in Super-Earths Having Atmospheres: Effects of Planetary Migration and Disk Evolution

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Close-in super-Earths are common among over 3,700 exoplanets. Most of them have low mean-densities, which means the existence of an atmosphere onto a core; if some of them possess hydrogen-rich, namely, primordial atmospheres, their atmospheres likely originated from a disk gas. Two ideas for the origin of short-period low-mass planets having atmospheres have been proposed so far: in-situ formation, including giant impacts, and Type I migration. Based on both scenarios, we have investigated a theoretical relationship between planetary mass/semi-major axis and the final mass fraction of a H₂/He atmosphere accreted from a protoplanetary disk. In this talk, we discuss whether observed super-Earths can have/retain the primordial atmospheres.

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