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From planetesimals to planets: implications for diversity of extrasolar planetary systems and ubiquity of super-Earths

Since 1995, more than almost 700 planets have been discovered in extrasolar planetary systems by ground telescopes and much more candidates have been announced by the space telescope mission “Kepler” . These observations have revealed that the architectures of most of extrasolar planetary systems are very different from our Solar system and that a significant fraction of solar-type stars in our galaxy have terrestrial planets although current detection limit allows us to find only relatively large ones (called “super-Earths”). I will review theories on accretion processes of planets from planetesimals and their orbital migrations in circumstellar protoplanetary disks, after summarising the observations. I will discuss the diversity of extrasolar planetary systems⁽¹⁾ and ubiquity of super-Earths⁽²⁾, comparing the theoretical predictions with observed data of extrasolar planets. Although the theories explain some features of observed data, many observed data are yet to be explained. I will also point out that both theory and observation suggest ubiquity of habitable planets in which an ocean covers the planetary surface and life can exist.

References

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(2) Ida, S. & Lin, D. N. C. (2008) *Astrophysical Journal*, 719, 810–830
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