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VORTRAGSANKÜNDIGUNG

Formation of super-Earths and gas giants in the pebble accretion scenario

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Observations of planets around other stars - so called exoplanets - have revealed that so called hot super-Earths (planets of a few Earth masses) on orbits up to 100 days might be the most abundant class of planets. Additionally, Jupiter type planets have been found orbiting their host star on orbits of just a few hours to a few days. These planets are called hot Jupiters. Both type of planets do not exist in our own solar system, indicating that different formation mechanisms have to be at play. In the core accretion scenario, a planetary core of a few Earth masses forms first, which can then allow the accretion of gas from the protoplanetary disc surrounding the young star onto it to form a gas giant. Thus the formation timescale of the planetary cores proves to be critical for the formation of different planetary types.

The growth of these planets can be greatly enhanced due to the accretion of mm-cm pebbles. This allows for a fast and efficient accretion even at distances beyond 10 AU from the central star. As the planets grow they migrate through the protoplanetary disc. Depending on their migration speed, planets can pile-up at the inner edge of their protoplanetary disc and form chains of planets in resonance. After gas disc dispersal these chains can then become unstable and break their resonant configuration. The resulting planetary systems from the simulations can then be compared to observations.

In this talk, I will explain the concept of pebble accretion and how it can help the formation of planetary systems containing multiple planets. I will then discuss, by comparing the simulations to observations of exoplanets, what ingredients we might still be missing in our simulations to fully understand the formation of planetary systems.