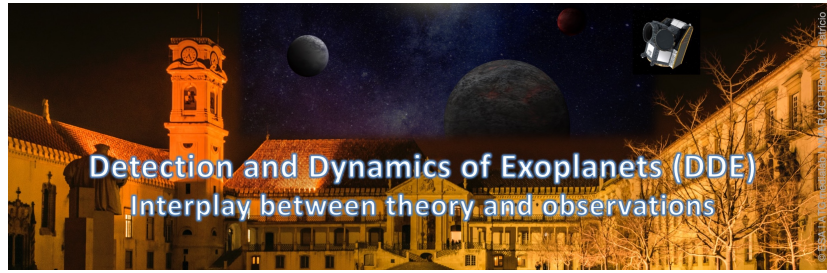


Detection and Dynamics of Exoplanets (DDE): Interplay between theory and observations



Contribution ID: 82

Type: **not specified**

Formation and evolution of planetary systems around stars of different masses and metallicities

Friday, July 11, 2025 2:00 PM (15 minutes)

The formation and evolution of planetary systems are linked to their host stellar environment. Here we employ a pebble accretion planet formation model to explore the correlation between planetary properties and stellar mass/metallicity. Our numerical results reproduce several main aspects of exoplanetary observations. First, we find that the occurrence rate of super-Earths η_{SE} follows an inverted V-shape in relation to stellar mass: it increases with stellar mass among lower-mass dwarfs, peaks at early-M dwarfs, and declines toward higher-mass GK stars. Second, super-Earths grow ubiquitously around stars with various metallicities, exhibiting a flat or weak η_{SE} dependence on stellar metallicity. Third, giant planets, in contrast, form more frequently around stars with higher-mass/metallicity. Lastly, we extend a subset of simulations to 1 Gyr to investigate the long-term evolution of the systems' architecture. By converting our simulated systems into synthetic observations, we find that the eccentricities and inclinations of single-transit systems increase with stellar metallicity, while these dependencies in multi-planet systems remains relatively weak. The alignment between our results and observations provides key insights into the connection between planet populations and stellar properties.

Presenter: LIU, Beibei (Zhejiang University)

Session Classification: Formation and evolution of planetary systems