Contribution ID: **29** Type: **not specified**

Where do grains grow in binary systems ? A 3D hydrodynamical approach

Thursday 28 August 2025 10:40 (20 minutes)

Most of young stars are part of multiple stellar systems, where star-disc interactions shape protoplanetary disc and impact the planet formation processes. In particular, tidal perturbations from companion stars imprint high dust velocity dispersion, hindering dust particle growth. However the formation of substructures, like spiral arms or horseshoes, leads to the creation of regions of high density that enhance dust growth. The balance of these competing effects remains unclear. We performed 3D hydrodynamical simulations of binary systems accounting for the dust growth and fragmentation. Binary stars were initialized with varying eccentricity, with either circumstellar or circumbinary discs. Our analysis focused on dust spatial and size evolution, linking substructures to grain growth and assessing the potential for streaming instability. Preliminary results suggest that substructures can mitigate high collisional velocity and allow for dust aggregation. Solids within circumstellar discs face growth complications due to companion star perturbations, while circumbinary discs circumbinary discs can concentrate dust at the cavity edge, promoting growth. Conditions favorable to planet formation are present but occur over smaller regions than in single-star systems. This work contributes to a better understanding of the early stages of planetesimal formation in the complex environments of multiple stellar systems.

Presenter: Mr ALAGUERO, Antoine (CNRS / IPAG)

Session Classification: Discs in multiple systems