

Dust Dynamics in Protoplanetary Discs after Stellar Flybys

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An open problem in planet formation theory is the growth of dust grains from centimetre to metre sizes. The streaming instability has been proposed as a mechanism to overcome barriers in dust grain growth; however, it is only triggered in regions of sufficiently high dust to gas ratio. We therefore require protoplanetary discs to contain substructures where dust grains can collide and planetesimal formation can be triggered. In this talk I will discuss the substructures induced in discs perturbed by stellar flybys, i.e. interactions with an unbound stellar-mass companion. I will present the results of 3D smoothed particle hydrodynamics simulations of discs after a range of flyby encounters, and study the dust dynamics in flyby-induced substructures. I will demonstrate that dust particles remain in the dust overdensities induced by the flyby for long periods of time and that their dust to gas ratios reach values sufficient to trigger the streaming instability and planetesimal formation.

Presenter: Ms PRASAD, Vasundhara (Institute of Astronomy, University of Cambridge)

Session Classification: Interactions with the environment