

Dust in Protoplanetary Disks

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The early evolution of solids in protoplanetary disks is governed by dust aggregate collisions and by the interaction between the solids and the gas through drag forces. The complicated interplay between these effects determines the sizes of the solid particles and their distribution within the disk. This distribution of solid material sets the initial condition for planet formation, it represents an important ingredient for the chemical evolution of the disk, and furthermore it determines the observational appearance of protoplanetary disks. This way, solids enable us to observationally probe the physical processes involved in the formation of planets and the evolution of disks.

This review summarizes our current understanding of the evolution of dust aggregates in protoplanetary disks, taking into account insights from laboratory experiments and recent modeling efforts. Methods to constrain these effects through observations are discussed and recent observational studies that probe the mechanisms of dust evolution, planet formation, and disk evolution are summarized.