

Planets Formation via Gravitational Instability: Magnetic Fields, Opacity Limited Fragmentation, and the Mass Distribution

Wednesday 7 May 2025 12:00 (20 minutes)

This talk revisits the mass scales for planets that form through the action of gravitational instability in circumstellar disks. After including the effects of magnetic fields, we show that several alternate ways to specify the mass of forming planets converge to the same result under the constraint that the parental disks are marginally stable (with stability parameter $Q=1$). Next we show that the well-known constraint that the formation of secondary bodies requires rapid cooling is equivalent to that of opacity limited fragmentation. These results are then used to derive a mass function for planets forming through disk instability. The resulting distribution is relatively narrow, with gaussian-like shape and a characteristic mass scale of order 10 Jovian masses.

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