

Particle Transport and Thermal Processing during FU Orionis Events in the Solar Nebula

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Solar-type young stars undergo ~100-year-long FU Orionis outbursts roughly every ~ 0.01 Myr during their early evolution. Such outbursts are thought to be caused by rapid mass accretion by the protostar during phases when the disk is marginally gravitationally unstable (MGU). We study here the trajectories of particles embedded in the solar nebula during a MGU phase of disk evolution.

These trajectories have profound cosmochemical consequences, ranging from large-scale outward transport of refractory grains, such as the calcium, aluminum-rich inclusions (CAIs) found in Comet Wild 2 by the Stardust Mission, to an explanation for a CAI found in Allende whose variations in oxygen isotopes imply repeated passages both inward and outward in the disk, to time scales (~ 10 yr) for sublimation of CAIs similar to those inferred for a Leoville CAI, as well as for the transport and mixing of ices throughout the nebula.

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