

***THE UNIVERSITY OF CHICAGO  
DEPARTMENT OF ASTRONOMY AND ASTROPHYSICS***

***Presents A Special Seminar***

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***Zonal Flows and Vortices in Circumstellar Disks:  
The Formation of Planetesimals in Starving Mode***

The formation of kilometer-sized planetary building blocks, called planetesimals, is still a hotly debated problem. A pure “hit and stick” model of dust grains faces several difficulties: from drift barrier, to bouncing and fragmentation barrier, to finally the 10km barrier. Thus, models have been invoked that lead swiftly to 100km-sized planetesimals from cm-sized objects via turbulent concentration and gravitational collapse. In this talk I will highlight the role of zonal flows in magnetohydrodynamical (MHD) active regions of circumstellar disks and of vortices in the MHD-dead zones. In the latter, radial and vertical stratification is the key to understanding the hydrodynamical stability of these disks. The fact that these features are able to concentrate the tiniest amount of small dust in an amount sufficient to trigger a streaming and gravitational instability enables us to work out a size distribution for initial planetesimals that resembles observational findings in the asteroid and Kuiper belts.

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