



## Physics & Astronomy Colloquium

Spring 2012

# ***Planet Embryos in Vortex Wombs***

It is a remarkable fact that planets start out as microscopic grains within the protoplanetary disks of gas and dust in orbit around newly-formed protostars, somehow growing roughly 40 orders of magnitude in mass in a period no more than 10 million years corresponding to disk lifetimes. There is no one physical process that can explain growth over this enormous range of sizes: the very smallest grains (micron to millimeter sizes) can grow via collisional agglomeration in which the sticking mechanism is electrostatic in nature; whereas, on the other end of the size spectrum, objects in the kilometer to tens of kilometers regime can grow via gravity-enhanced collisions. The least understood stage of growth is how millimeter size particles grow to kilometer-size; grains in this regime are too large for sticking via electrostatic forces, yet far too small to have any significant self-gravity. One exciting possibility is that vortices (like the Great Red Spot on Jupiter) thrive in protoplanetary disks and trap and concentrate dust particles at their centers, seeding the formation of planetesimals. I will present 3D hydrodynamic simulations of the settling of dust into thin layers and the capture into the quiescent eyes of protoplanetary disk hurricanes.

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**Thursday, February 2, 2012**

**4:00-5:20 PM - MND 1015**

**Open & Free to all Students, Faculty & Public**