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Dust particle dynamics in MRI turbulent disks with ambipolar diffusion

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Turbulence in protoplanetary disks affects various stages of planet formation. First, it prevents particles' settling to the disk midplane, making planetesimal formation more difficult. Second, it causes stochastic planet migration and prevents gap opening by planets. By carrying out global MHD simulations with dust particles, we have studied settling and radial drift of dust particles in MRI turbulent disks with either ideal MHD or non-ideal MHD with ambipolar diffusion (AD). After a giant planet has formed in the disk, the planet opens a gap in the turbulent disk. In disks dominated by AD, the edge of the planet-induced gap is unstable to vortex formation. Such a vortex can efficiently trap dust particles, which is consistent with recent ALMA transitional disk observations.

Author: Dr ZHU, Zhaohuan (Princeton University)

Co-authors: Prof. STONE, James (Princeton University); Dr BAI, Xuening (Harvard-Smithsonian Center for Astrophysics)

Presenter: Dr ZHU, Zhaohuan (Princeton University)

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