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国台学术报告 NAOC COLLOQUIUM

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Time: Wednesday 2:30 PM, Sep. 13th Location: A601 NAOC

Toward Realistic Understandings of Protoplanetary Disks

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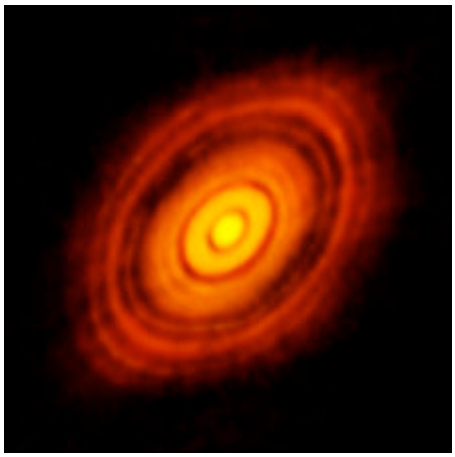
Prof. Xuening Bai graduated from Tsinghua University with a B.S. in 2007 and obtained his PhD from Princeton University in 2012. He was a Hubble Fellow from 2012-2015 and then continued as a research associate and lecturer at Harvard-Smithsonian Center for Astrophysics from 2015-2017. He joined the faculty at the Institute for Advanced Study at Tsinghua University in August 2017, and is jointly affiliated with Tsinghua Center for Astrophysics. Prof. Bai is a theoretical and computational astrophysicist with broad research interest in planetary astrophysics and high-energy/plasma astrophysics, especially on accretion disks, planet formation and cosmic-ray physics. Most of his research involves development and utilization of advanced computational tools on high-performance computing systems.

Abstract



Planet formation takes place in gas-rich protoplanetary disks (PPDs) orbiting newly born stars. The internal density and flow structures of PPDs, as well as their long-term evolution, play a crucial role in almost all stages of planet formation, yet they are far from being well understood largely due to the complex interplay among various microphysical processes. I will review the basic physical processes in PPDs that govern disk structure and evolution, highlighting the fundamental role of disk ionization and magnetic fields, described by non-ideal magnetohydrodynamic (MHD) effects. Incorporating these processes, I will first discuss previous local disk simulations that led to a paradigm shift in understanding PPD gas dynamics, as well as their limitations. I will then present global simulations of PPDs aiming to incorporate most realistic disk microphysics, which demonstrate unusual flow structures with major implications on planet formation. The results will also be discussed in the context of current and future observations.

All are welcome! Tea, coffee, biscuits will be served at 2:15 PM.