Seminar Notice

On 21st October, 2022 [Friday]

Time: 3:00 PM

Venue- PAMU Seminar Room

Physics and Applied Mathematics Unit
Indian Statistical Institute, Kolkata- 700108

Speaker: Dr Indrani Das

University of Western Ontario, Canada

Title: *Mapping the Role of the Magnetic Fields and Episodic Accretion in Star-Formation*

Abstract: Molecular clouds are the cradles for star-formation. The stars are formed as a result of the gravitational collapse of compact gas-dust prestellar cloud cores. Magnetic fields are one of the important components in molecular clouds for regulating star-formation. Protostellar disks are formed very quickly after the collapse of a molecular cloud core. The formation and evolution of the disks play a crucial role in the formation of the planetesimals. My work focuses on the fundamental properties of core collapse and the evolution of protostar and a disk via analytic and numerical models, and comparing with observations in order to extract new insights. We investigate the fragmentation scales of gravitational instability of a rotationally supported self-gravitating protostellar disk as well as for the molecular cloud using linear perturbation analysis in the presence of nonideal magnetohydrodynamic (MHD) effects. Nonideal MHD effects result in the diffusion of magnetic flux. We show that the influence of the magnetic field and nonideal MHD on the preferred fragmentation mass for collapse leads to a modified threshold, as opposed to a Jeans mass, that might lead to giant planet formation in the early embedded phase. Our results also indicate that the trend found in the observed lifetime for the prestellar cores and fragmentation mass cannot be explained in a purely hydrodynamic scenario. Furthermore, I will also talk about the episodic mass accretion (therefore episodic luminosity) from a disk to star, which is considered to be one of the most important processes in mass growth of protostar. Our analytic work provides insight into global MHD simulations of protostellar disks that we carry out using the FEOSAD simulation code. Our results using FEOSAD demonstrate the long-term evolution of disks, and especially the episodic nature of accretion, which might explain the origin of observed knots in the molecular jet outflows. All of our studies from various perspectives might fill in many gaps of our knowledge of how the pre-main sequence stars formed over time and consolidate the broad picture of star formation.

All are Cordially Invited to Attend

(Head, PAMU)