Contribution ID: **107** Type: **Talk in a parallel session**

Simulating magnetically arrested advective accretion flow (MA-AAF) around black holes: Explaining ULXs in hard states

Friday, 12 July 2024 15:50 (20 minutes)

An optically thin advective accretion disk appears to be indispensable in explaining the hard spectral state of black hole sources. We explore, with the help of general relativistic magnetohydrodynamic (GRMHD) simulations, how a large scale stronger magnetic field helps in transporting angular momentum in disk and outflow/jet, depending on the field geometry and plasma-β parameter, basically by underlying magnetic shear, along with the spin parameter of the black hole. In the present work, we propose a general advective, sub-Eddington, disk-outflow model in the presence of large-scale strong magnetic fields. We start from a magnetized torus around a Kerr black hole and simulate how the accretion disk evolves in time. We also investigate how it can produce jets and outflows via the possible Blandford-Znajek and Blandford-Payne processes. The underlying model simulation based on HARMPI exhibits an outflow efficiency up to 10, depending on black hole spin and magnetic field strength. This, in turn, is able to explain the observed luminosity of Ultra Luminous X-ray sources (ULXs) in their hard states. This model can, in general, explain any bright, hard state of stellar mass black hole sources and their high luminosity without incorporating super-Eddington accretion rates. Total energy, due to matter and magnetic field, is responsible for such high luminosity.

Primary author: RAHA, Rohan (Indian Institute of Science, Bangalore)

Co-authors: Dr CHATTERJEE, Koushik (University of Maryland); MUKHOPADHYAY, Banibrata (Indian Institute of Science)

Presenter: RAHA, Rohan (Indian Institute of Science, Bangalore)

Session Classification: Spectral and temporal properties of accretion flows and jets around compact objects and the theoretical models

Track Classification: Accretion (AC): Spectral and temporal properties of accretion flows and jets around compact objects and the theoretical models