S N BOSE NATIONAL CENTRE
FOR BASIC SCIENCES
Block JD, Sector III, Salt Lake, Kolkata 700 106

DEPARTMENTAL SEMINAR

Department of Astrophysics and High Energy Physics

30th May,2024 **11.30 AM** **FERMION / ONLINE**

SPEAKER

Prof. Santabrata Das,
Professor, Indian Institute of Technology
Guwahati

TITLE OF THE TALK

Unveiling the accretion scenario of black hole ultra luminous X-ray sources (BH-ULXs)

ABSTRACT

We develop a model formalism to study the structure of a relativistic, viscous, optically thin, advective accretion flow around a rotating black hole in presence of radiative coolings. We adopt a recently developed effective potential to mimic the spacetime geometry around the rotating black holes. We solve the governing equations to obtain the shock-induced global accretion solutions in terms of flow parameters. Using shock properties, we compute the quasi-periodic oscillation (QPO) frequency ($\nu_{\rm QPO}$) of the post-shock matter pragmatically, particularly when the shock front exhibits quasi-periodic variations. We also calculate the luminosity ($L_{\rm bol}$) of the entire disc for these shock solutions. Utilizing $\nu_{\rm QPO}$ and $L_{\rm bol}$, we constrain the mass of five black hole ultraluminous X-ray sources (BH-ULXs: NGC1313 X-1, NGC5408 X-1, NGC6946 X-1, M82 X-1, and IC342 X-1) by varying their spin ($a_{\rm k}$) and accretion rate ($\dot m$). We find that NGC6946 X-1 and NGC5408 X-1 seem to accrete at sub-Eddington accretion rate provided their central sources are rapidly rotating, whereas IC342 X-1 and NGC1313 X-1 can accrete in sub/super-Eddington limit irrespective to their spin values.

HOST FACULTY

Dr. Ramkrishna Das, Associate Professor
Dept. of ASTROPHYSICS AND HIGH ENERGY PHYSICS

****