Contribution ID: **54** Type: **Talk in a parallel session**

Study of the relativistic accretion flow around Kerr-Taub-NUT black hole with shocks

We investigate the properties of relativistic accretion flow in a Kerr-Taub-NUT (KTN) spacetime in presence or absence of shock waves. This spacetime, characterized by the spin parameter or Kerr parameter ($a_{\rm k}$) and the gravitomagnetic charge or NUT parameter (n), can represent either a black hole or a naked singularity depending on the suitable choice of their values. By solving the relevant governing equations, we examine the behavior of accretion flows within the black holes regime. We find that the ingoing subsonic flows from the outer edge experience centrifugal repulsion, leading to the formation of discontinuous shock transitions under appropriate relativistic conditions. The resulting post-shock region exhibits higher entropy compared to the pre-shock flow, indicating a preference for shock-induced solutions. Post-shock compression heats and densifies the flow, forming a post-shock corona (PSC) that emits high-energy radiation through the reprocessing of soft photons via inverse Comptonization. The properties of the PSC, characterized by shock location (r_s), compression ratio (R), shock strength (S), and the dynamics of PSC is controlled by the flow parameters, namely energy ($calE$) and angular momentum (λ) of the flow. We identify the effective region of the parameter space in $\lambda - calE$ plane for shock and observe that shock forms for wide range of flow parameters. Moreover, we find that $a_{\rm k}$ and n act oppositely in determining the shock parameter space. Furthermore, considering free-free emissions, we calculate the disc luminosity and find that global shock solutions are energetically favored due to their relatively higher luminosity compared to shock-free solutions.

Primary author: SEN, GARGI (Indian Institute of Technology Guwahati)

Co-authors: Dr MAITY, Debaprasad (Indian Institute of Technology Guwahati); Prof. DAS, Santabrata (Indian Institute of Technology Guwahati)

Presenter: SEN, GARGI (Indian Institute of Technology Guwahati)

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