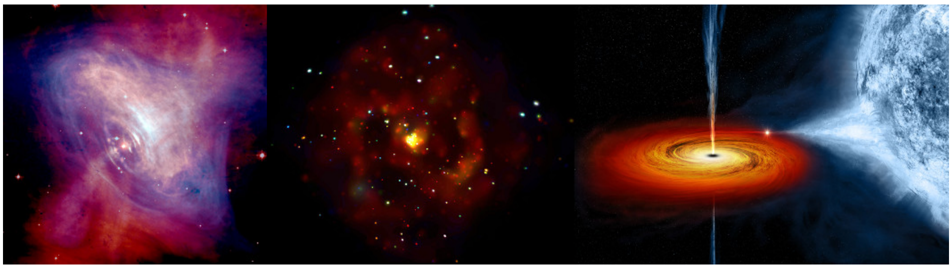

Contribution ID: **138** Type: **not specified**

Origin of core radio emissions from BH in the realm of relativistic shocked accretion flow

Monday, April 3, 2023 12:35 PM (15 minutes)

We study the relativistic, inviscid, advective accretion flow around the black holes and investigate a key feature of the accretion flow, namely the shock waves. We observe that the shock-induced accretion solutions are prevalent and such solutions are commonly obtained for a wide range of the flow parameters, such as energy ($calE$) and angular momentum (λ), around the black holes of spin value $0 \leq a_{\rm k} < 1$. When the shock is dissipative in nature, a part of the accretion energy is released through the upper and lower surfaces of the disc at the location of the shock transition. We find that the maximum accretion energies that can be extracted at the dissipative shock ($\Delta calE^{\rm max}$) are $\sim 1\%$ and $\sim 4.4\%$ for Schwarzschild black holes ($a_{\rm k} \to 0$) and Kerr black holes ($a_{\rm k} \to 1$), respectively. Using $\Delta calE^{\rm max}$, we compute the loss of kinetic power (equivalently shock luminosity, $L_{\rm shock}$) that is enabled to comply with the energy budget for generating jets/outflows from the jet base ($i.e.$, post-shock flow). We compare $L_{\rm shock}$ with the observed core radio luminosity (L_R) of black hole sources for a wide mass range spanning 10 orders of magnitude with sub-Eddington accretion rate and perceive that the present formalism seems to be potentially viable to account L_R of 16 Galactic black hole X-ray binaries (BH-XRBs) and 2176 active galactic nuclei (AGNs). We further aim to address the core radio luminosity of intermediate-mass black hole (IMBH) sources and indicate that the present model formalism perhaps adequate to explain core radio emission of IMBH sources in the sub-Eddington accretion limit.

Presentation Type

Oral

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Session Classification: Black Hole: Theory

Track Classification: Black Hole: Theory