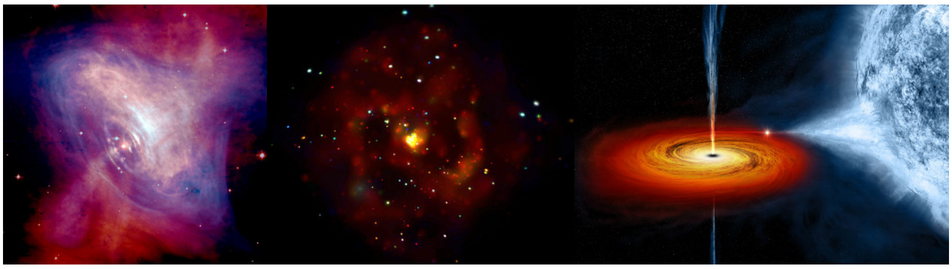

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Properties of relativistic hot accretion flow around rotating black hole with radially varying viscosity.

Monday, April 3, 2023 10:00 AM (15 minutes)

We examine the effect of variable viscosity parameter (α) in relativistic, low angular momentum advective accretion flow around rotating black holes. Following the recent simulation studies of magnetohydrodynamic disk that reveal the radial variation of $\alpha(r)$, we theoretically investigate the properties of the global transonic accretion flow considering a one-dimensional power law prescription of viscosity parameter as $\alpha(r) \propto r^{\theta}$, where the viscosity exponent θ is a constant. In doing so, we adopt the relativistic equation of state and solve the fluid equations that govern the flow motion inside the disk. We find that depending on the flow parameters, accretion flow experiences centrifugally supported shock transition and such shocked accretion solutions continue to exist for wide ranges of the flow energy, angular momentum, accretion rate and viscosity exponent, respectively. Due to shock compression, the hot and dense post-shock flow (PSC) can produce the high energy radiations after reprocessing the soft photons from the pre-shock flow via inverse Comptonization. PSC is usually described using shock radius (r_s), compression ratio (R) and shock strength (S), we study the role of θ in deciding r_s , R and S, respectively. Moreover, we obtain the parameter space for shock and find that possibility of shock formation diminishes as θ is increased. Finally, we compute the limiting value of θ (i.e., θ^{max}) that admits shock and find that flow can sustain more viscosity when it accretes onto rapidly rotating ($a_k \to 1$) black hole in comparison to weakly rotating ($a_k \to 0$) black hole.

Presentation Type

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