Black hole accretion in axisymmetric spacetime as an analogue gravity model.

Kalyanbrata Pal, Souvik Ghose, Ripon Sk, Arpan krishna Mitra, Tapas Kumar Das

Harish-Chandra Research Institute (HRI)

We investigate axially symmetric accretion of low angular momentum hydrodynamic matter onto a rotating black hole (BH). We have used a pseudo Kerr potential to mimic the spacetime geometry of the black hole. A relativistic equation of state with information about different species is used in this work. Our aim is to construct and solve the hydrodynamical conservation equations governing such a flow, and find out the corresponding stationary solutions corresponding to the steady state accretion flow. For large scale astrophysical fluid flow under strong gravity, however, the flow may experience external perturbations of various kinds. The acceptability of stationary solutions are, thus, to be tested by studying the stability of such solutions subjected to external perturbations. Therefore, we plan to perform linear stability analysis of the said stationary solutions by perturbing the flow for various disk geometry and as a consequence we will also construct acoustic metric describes the propagation of the acoustic perturbation inside the accretion flow.