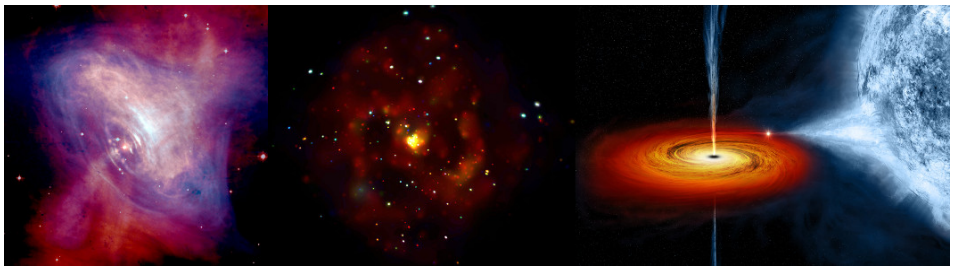

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Effect of the fluid composition on the Magnetized Astrophysical flows

Time-dependent fluid equations can describe a wide range of astrophysical problems like accretion flow around a compact object, outflows emanating from Young stars, or Active Galactic Nuclei (AGN). The strong gravity and high magnetic fields present in these flows make them particularly interesting for study. Numerical simulation of fluid equations provides an efficient way to study these complicated problems by allowing us to go beyond the steady-state approach.
While most simulation codes are based on the fixed adiabatic index equation of state (EoS), which can be a poor approximation in transonic flows. To address this issue, we have developed a new MHD simulation code with Chattopadhyay & Ryu EoS (2009) having a variable adiabatic index, which allows us to consider the composition and thermodynamics of multispecies plasma. We use this code to show that for a jet having the same injection parameters, its propagation speed and internal structures significantly vary depending on the plasma composition, whether it is made of a pure electron-proton pair or pure electron-positron pair, or a mixture of electron, proton, and positron.

Presentation Type

Poster

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