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Numerical investigation of instabilities in over-pressured magnetized relativistic jets

Relativistic jets from active galactic nuclei are observed to be collimated on parsec scales. When there is a pressure mismatch between the jet and the ambient medium, recollimation shocks and rarefaction shocks can form. In this talk, I will review the current progress in jet numerical simulation at first. And then I will present our recent relativistic magnetohydrodynamic (RMHD) simulations on the instabilities of nonequilibrium over-pressured relativistic jets with helical magnetic fields. I will discuss how we identify the presence of Rayleigh-Taylor instability (RTI) and current-driven (CD) kink instability. Finally, I will demonstrate my efforts to connect the numerical simulations with observations, offering a perspective on future work in radiation transfer.

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