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Magnetic dissipation in short gamma-ray burst jets

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The multimessenger event GRB 170817A confirmed that short gamma-ray burst jets can be launched from the remnants of a binary neutron star merger environment. The electromagnetic properties of such jets are expected to strongly affect their structure and propagation. In particular, the impact of a finite conductivity may play a key role in the early stages of propagation, i.e. when the jet propagates in the post-merger remnant.

Here I present a systematic numerical study of the propagation of astrophysical magnetized relativistic jets, in the context of resistive relativistic magnetohydrodynamics (RRMHD) simulations. First, I will briefly discuss the investigation of different values and models for the plasma resistivity coefficient, Here I will assess their impact on the level of turbulence, the formation of current sheets and reconnection plasmoid, and the electromagnetic energy content, demonstrating how a physical resistivity model can lead to the formation of current sheets and potential reconnection sites.
I will then discuss the propagation of short gamma-ray burst jets beyond the ideal magnetohydrodynamics assumption, assessing the impact of the resistivity on the jet propagation and dynamics. By employing different resistivity models I will present 2D and 3D simulations which show the role of magnetic resistivity in the energetics and evolution of the jet.

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