

# GLOBAL RELATIVISTIC PLASMA JETS WITH HELICAL MAGNETIC FIELDS - PIC SIMULATIONS

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One of the key open questions in the study of relativistic jets is the jet's plasma interaction with its ambient environment, on the microscopic level. In this presentation studies of the initial evolution of both electron-proton and electron-positron relativistic jets containing helical magnetic fields, focusing on their interaction with ambient plasma will be shown. Simulations of global jets containing helical magnetic fields are presented in order to examine how helical magnetic fields affect kinetic instabilities such as the Weibel instability and the kinetic Kelvin-Helmholtz instability (kKHI). In an initial stage, these kinetic instabilities are suppressed and new types of plasma instabilities can grow and importantly in the electron-proton jet case simulation, one can see a recollimation-like instability occurring near the center of jet. On the other hand, in the electron-positron jet simulation, mixed kinetic instabilities grow and the jet electrons are accelerated. Finally I will discuss the evolution of electron-ion jets with different mass ratios and point different mechanisms of flares, possibly due to reconnection.

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