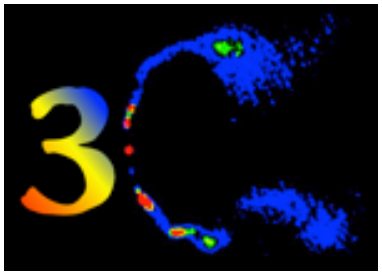

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Reconnection and Associated Flares in Global Relativistic Jets Containing Helical Magnetic Fields with PIC Simulations

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In the study of relativistic jets one of the key open questions is their interaction with the environment on the microscopic level. Here, we study the evolution of both electron–proton and electron–positron relativistic jets containing helical magnetic fields, focusing on their interaction with an ambient plasma. We have performed simulations of "global"jets containing helical magnetic fields in order to examine how helical magnetic fields affect kinetic instabilities such as the Weibel instability, the kinetic Kelvin-Helmholtz instability (kKHI) and the Mushroom instability (MI) using a larger jet radius. In our simulation study these kinetic instabilities are suppressed and new types of instabilities can grow. In the electron-proton jet simulation a recollimation-like instability occurs near the center of jet. In the electron-positron jet simulation mixed kinetic instabilities grow and the jet electrons are accelerated. The evolution of electron-proton jets shows that helical magnetic fields are untangled and electrons are accelerated rapidly. We also investigate mechanisms of flares possibly due to reconnection.

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