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Correlated Relativistic Current Sheet Systems
CLAUS JAROSCHEK, MASAHIRO HOSHINO, The University of Tokyo — We study the non-linear evolution of interacting Relativistic Current Sheets (RCS) in 1D/2D/3D self-consistent kinetic plasma simulations within the framework of the Particle-In-Cell model. The intention is to extend the existing knowledge about individual RCS in pair plasma - where the physics is determined by the relativistic tearing and drift kink modes as competing RCS instabilities - towards a correlated RCS system. Such RCS systems are the key element of generic 'striped wind' configurations proposed to model relativistic plasma flows like pulsar winds and gamma-ray bursts. Interactions are enforced in head-on collisions of systems consisting of up to ten individual and equi-distantly separated RCS. The global dynamics divides into a weakly and strongly correlated regime. In the weakly correlated case each RCS persists as an entity and non-thermal particle generation is attributed to a stochastic Fermi-type acceleration mechanism. In the complementary strongly correlated regime the RCS interpenetrate thouroughly and efficient magnetic field dissipation is observed within a 1D stratification. Localized regions persist where the electric supersedes the magnetic field, i.e. the transformation of particle orbits towards a de Hoffmann-Teller-frame is then inherently impossible.

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