

Magnetic Field Generation and Particle Acceleration in Relativistic Shear Boundary Layers

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Abstract

We will report exciting new results of Particle-in-Cell Simulations of relativistic shear flows. We obtain efficient generation of ordered magnetic fields and nonthermal particle acceleration at shear boundary layers. The peak fields reach approximately equipartition values and are sustained by the free energy and vorticity of the shear flow. The nonthermal particles are accelerated by cross field electric forces, thus emitting synchrotron radiation efficiently. We will discuss the astrophysical implications for blazar and gamma-ray burst jets. We will also briefly describe some conceptual designs of laboratory experiments using ultraintense lasers.

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