Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Magnetic Field Generation and Particle Energization in Relativistic Shear Flows EDISON LIANG, WEN FU, Rice University, MARKUS BOETTCHER, PARISA ROUSTAZADEH, North-West University, South Africa — This paper summarizes recent results obtained from 2 -and -3 D particle-in-cell (PIC) simulations of relativistic shear boundary layers (SBL). In addition to the creation of sustained, ordered magnetic fields due to counter-current instabilities, we find efficient energization of nonthermal electrons to high energies, making the SBL a strong candidate for enhanced synchrotron emission in relativistic jets, from blazars to gamma-ray bursts. The case of mixed electron-positron-ion shear flows is particularly interesting as it leads to the formation of an electron spectrum with both a high-energy peak near the ion kinetic energy, plus a hard power-law tail of slope near – 3, which strongly resembles electron distributions responsible for the emissions of GRB and blazars. The electron momentum distribution exhibits extreme anisotropy, making the SBL a strong candidate for narrowly beamed synchrotron-self-Compton (SSC) radiation in some cases.

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Date submitted: 11 Jul 2014 Electronic form version 1.4