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Magnetic Field Generation and Particle Energization in Relativistic Shear Flows[1] EDISON LIANG, Rice University, MARKUS BOETTCHER, Ohio University, IAN SMITH, Rice University — We present Particle-in-Cell simulation results of magnetic field generation by relativistic shear flows in collisionless electron-ion (e-ion) and electron-positron (e+e-) plasmas. In the e+e- case, small current filaments are first generated at the shear interface due to streaming instabilities of the interpenetrating particles from boundary perturbations. Such current filaments create transverse magnetic fields which coalesce into larger and larger flux tubes with alternating polarity, eventually forming ordered flux ropes across the entire shear boundary layer. Particles are accelerated across field lines to form power-law tails by semi-coherent electric fields sustained by oblique Langmuir waves. In the e-ion case, a single laminar slab of transverse flux rope is formed at the shear boundary, sustained by thin current sheets on both sides due to different drift velocities of electrons and ions. The magnetic field has a single polarity for the entire boundary layer. Electrons are heated to a fraction of the ion energy, but there is no evidence of power-law tail forming in this case.

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