

Abstract Submitted
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Instabilities in counterstreaming plasmas¹ HYE-SOOK PARK,
Lawrence Livermore National Laboratory — We are performing high power laser experiments showing large, stable, reproducible electromagnetic field structures that arise in counter-streaming interpenetrating supersonic plasma flows in the laboratory. Self organization, whereby energy progressively transfers from smaller to larger scales in an inverse cascade, is widely observed in fluid flows, such as in the nonlinear evolution of multimode Rayleigh-Taylor and Kelvin-Helmholtz instabilities. There are many scenarios in astrophysics where self organization involving magnetic or electric fields in collisionless settings is observed. These surprising structures, predominantly oriented transverse to the primary flow direction, extend for much larger distances than the intrinsic plasma spatial scales, and persist for much longer than the plasma kinetic timescales. Their origin may be magnetic field advection from the recompression of the Biermann battery fields in the midplane. Understanding interactions of high velocity plasma flows is interests to the ICF and astrophysics. This paper will present experimental results and interpretation of these counterstreaming plasma experiments.

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