Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Study of Streaming Plasma Instabilities in the Extreme Relativistic Regime[1] J. R. PETERSON, S. GLENZER, F. FIUZA, SLAC National Accelerator Laboratory — Relativistic streaming plasma instabilities are important in a wide range of high-energy astrophysical environments, from blazar jets to gamma-ray bursts. While the linear phase of these instabilities is well studied, important aspects of their saturation and nonlinear evolution are not yet clear. Laboratory experiments using highly relativistic lepton beams (e.g. from FACET-II or laser wakefield beams) could soon shed light on the nonlinear physics of these instabilities and on their ability to produce bright gamma-ray emission. We will present a detailed numerical study, using particle-in-cell simulations, and theoretical analysis of the evolution of streaming plasma instabilities in the extreme relativistic regime (where the Lorentz factor of the lepton beam is ¿ 1000). We will discuss how the background plasma response (including the ions) affects the growth and nonlinear evolution of the instabilities, the slow down of the relativistic beam, and the corresponding high-energy radiation emission.

[1]Funding provided by DE-AC02-76SF00515

John Peterson
Stanford University

Date submitted: 03 Jul 2019 Electronic form version 1.4