Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Spectral analysis of PIC simulations of the filamentation instability[1] MICHAEL SITARZ, MIKHAIL MEDVEDEV, Univ of Kansas, ALEXANDER PHILIPPOV, CCA, Flatiron Institute — The Weibel or, in general, the filamentation instability is ubiquitous of plasmas with high-energy-density content. It is present in laser-produced plasmas and astrophysical sources, such as in collisionless shocks of cosmic blasts (gamma-ray bursts and supernovae), possibly in outskirts of galaxy clusters and others. The is generated in unmagnetized and weakly-magnetized plasmas by anisotropy of the particle distribution function, e.g. by anisotropic temperature or multi-stream configurations. The generated electromagnetic fields reside on the plasma skin-depth scale which is smaller than the effective larmor scale. Radiation from such sub-Larmor-scale fields is known as the jitter radiation; it markedly differs from the cyclotron or synchrotron radiation. Its spectrum carries wealth of information about the magnetic field properties. Here we present the spectral analysis of state-of-the-art PIC simulations of the Weibel instability. It demonstrates the generation of high-frequency electromagnetic fluctuations. We discuss the spectrum, the temporal and angular distribution of the emitted power. The origin and nature of these waves is discussed.

[1]Supported by the DOE grant DE-SC0016368 and the DOE EPSCOR grant DE-SC0019474. MM thanks the Razumovsky Moscow State University, NRC Kurchatov Institute and Moscow Institute of Physics and Technology.

Mikhail Medvedev
Univ of Kansas

Date submitted: 29 Jun 2020 Electronic form version 1.4