Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Fully-kinetic simulations of coherent radio emission in nonrelativistic plasmas FABIO BACCHINI, GU Frankfurt am Main, ALEXANDER PHILIPPOV, Center for Computational Astrophysics, Flatiron Institutes — Coherent radio emission from space plasmas is detected in multiple astrophysical environments. Possible sources of fast radio bursts were only very recently identified as distant galaxies, pulsars, or magnetars. In nonrelativistic plasmas, such emission is detected in Type III radio bursts from solar flares. In any such scenarios the mechanism behind the sudden release of large amounts of energy in the form of coherent radiation is poorly understood. Beam-plasma instabilities driven by the interaction of energetic particles (e.g. fast electrons from flares) with a thermal background (e.g. the solar wind) are among the best candidates to explain this so-called "plasma emission". Such models have been mainly explored with analytic quasi-linear theoretical approaches. Here we approach the problem with fully kinetic Particle-in-Cell (PiC) simulations. We study beam-plasma instabilities in nonrelativistic environments with implicit energy-conserving PiC methods. These allow for stable simulations over unprecedented long times, accurately modelling the energy exchange between particle populations.

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Date submitted: 08 Jul 2019 Electronic form version 1.4