Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Jitter radiation produced by electrons with anisotropic distribution in Weibel turbulence of GRBs and lab experiments[1] S. REYNOLDS, S. GRAHAM, S. POTHAPRAGADA, M.V. MEDVEDEV, University of Kansas — Radiation emitted by relativistic electrons propagating through the random, skin-depth-scale magnetic fields produced by the Weibel instability is referred to as the Jitter radiation. These fields are associated with current filaments and, hence, their spatial distribution is anisotropic. This anisotropy of fields has been shown to result in anisotropic radiation spectrum (even if the electron distribution is isotropic) that depends on the angle between the line of sight and the direction of current filaments. The study of the electron distribution in the Weibel turbulence shows that the electron PDF is also anisotropic, with the direction of anisotropy being along the filament orientation. Therefore, accurate calculation of the emitted spectra shall account for the PDF angular structure as well. Here we formulate the jitter radiation theory in a general set-up, thus generalizing previous results to an arbitrary PDF. We calculate model spectra and discuss implications of the results to emission from ultra-relativistic shocks of gamma-ray bursts and to Laboratory Astrophysics experiments with petawatt-scale lasers.

[1]Supported by DoE grants DE-FG02-04ER54790 and DE-FG02-07ER54940 and by NASA grant NNX07AJ50G.

Mikhail Medvedev

Date submitted: 20 Jul 2007 Electronic form version 1.4