Abstract Submitted
for the APR07 Meeting of
The American Physical Society

Phase-space distribution of accelerated electrons in relativistic GRB shocks[1] S. GRAHAM, S. POTHAPRAGADA, S. REYNOLDS, M.V. MEDVEDEV, University of Kansas — The shock model of gamma-ray bursts (GRBs) contains two equipartition parameters: the magnetic energy density and the kinetic energy density of the electrons relative to the total energy density of the shock, ϵ_B and ϵ_e, respectively. These are free parameters within the model. Whereas the Weibel shock theory and numerical simulations fix ϵ_B at the level of $\sim$few$\times(10^{-3}...10^{-4})$, no understanding of ϵ_e existed until recently. Medvedev (2006) has demonstrated that it inevitably follows from the Weibel shock theory that $\epsilon_e \simeq \sqrt{\epsilon_B}$, thus explaining why the electrons are close to equipartition in GRBs. The GRB afterglow data fully agree with this theoretical prediction. It has been suggested that the $\epsilon_e - \epsilon_B$ relation can be used to reduce the number of free parameters in afterglow models. Here we further develop the model of non-Fermi acceleration of electrons in prompt GRBs. We developed a numerical code, which computes full phase space distribution of electrons in Weibel electromagnetic fields. This distribution is further used to compute the electron energy distribution, the distribution over pitch-angle, the angular pattern of jitter emissivity, and so on. Relevance of the results to modeling of GRBs is discussed.

[1]Supported by DoE via grant DE-FG02-04ER54790.

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Date submitted: 16 Jan 2007 Electronic form version 1.4