Abstract Submitted
for the APR11 Meeting of
The American Physical Society

Mechanism for spectral break in cosmic ray proton spectrum for the emissions from Supernova remnant W44[1] ROALD SAGDEEV, University of Maryland, MIKHAIL MALKOV, PATRICK DIAMOND, UCSD — Recent observations of the supernova remnant W44 by the *Fermi* spacecraft observatory strongly support the idea that the bulk of galactic cosmic rays is accelerated in such remnants by a Fermi mechanism, also known as diffusive shock acceleration. However, the W44 expands into weakly ionized dense gas, and so a significant revision of the mechanism is required. In this paper we provide the necessary modifications and demonstrate that strong ion-neutral collisions in the remnant surrounding lead to the steepening of the energy spectrum of accelerated particles by *exactly one power*. The spectral break is caused by Alfven wave evanescence leading to the fractional particle losses. The gamma-ray spectrum generated in collisions of the accelerated protons with the ambient gas is also calculated and successfully fitted to the Fermi Observatory data. The parent proton spectrum is best represented by a classical test particle power law $\propto E^{-2}$, steepening to E^{-3} at $E_{br} \approx 7GeV$ due to deteriorated particle confinement.

[1]Supported by NASA, NNX 07AG83G, NNX09AT94G and by DoE, DE-FG02-04ER54738

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Date submitted: 13 Jan 2011 Electronic form version 1.4