

A POSSIBLE EXPLANATION OF THE GEV EXCESS

I. Büsching, M. Pohl and R. Schlickeiser

Ruhr-Universität Bochum, 44780 Bochum, Germany.

ib@tp4.ruhr-uni-bochum.de

Acceleration of particles at supernova remnant (SNR) shock waves is regarded as the most probable mechanism to produce galactic cosmic rays up to 10^{15} eV. In this picture the galactic cosmic ray hadron component would result from the injection of relativistic particles from many SNRs. The superposition of individual power law source spectra with dispersion in the spectral index value, which is observed in the synchrotron radio spectra of shell SNR, shows a positive curvature in the total spectrum, in particular a hardening at higher energies. Recent EGRET observations of the diffuse Galactic γ -ray emission reveal a spectrum which is incompatible with the assumption that the cosmic ray spectra measured locally hold throughout the Galaxy: the spectrum above 1 GeV, where the emission is supposedly dominated by π^0 -decay, is harder than that derived from the local cosmic ray proton spectrum. We demonstrate that in case of a SNR origin of cosmic ray nucleons part of this γ -ray excess may be attributed to the dispersion of the spectral indices in these objects. In global averages, as are γ -ray line-of-sight integrals, this dispersion leads to a positive curvature in the composite spectrum, and therefore to modified π^0 -decay γ -ray spectra.