Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Test particle acceleration in three-dimensional Hall MHD turbulence PABLO DMITRUK, W.H. MATTHAEUS, Dept of Physics and Astronomy, University of Delaware — Numerical experiments of test particle acceleration are performed using turbulent magnetic and electric fields obtained from direct numerical solutions of the compressible three-dimensional Hall magnetohydrodynamic (MHD) equations. Comparisons are made of the results for the test particles momentum distribution function with and without the Hall term in the MHD solution. Electrons and protons are considered for the test particles at short times before particles leave the simulation box (with length size of the order of a few turbulent correlation lengths). The particles momentum distribution functions develop long tails in a short time. No substantial difference it is found between results with and without the Hall term in the MHD solution. When a background uniform magnetic field (guide field) is added, the particles acceleration is anisotropic. Electrons develop large parallel momentum, while protons develop large perpendicular momentum. A discussion of the basic particle acceleration mechanisms in this system is made.

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Date submitted: 24 Jul 2006 Electronic form version 1.4