Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Scaling Laws in Magnetohydrodynamics: Simulations vs Observations JEAN C. PEREZ, University of New Hampshire, STANISLAV BOLDYREV, University of Wisconsin, JOHN PODESTA, JOSEPH BOROVSKY, Los Alamos National Laboratory — A comparison between spectral scaling laws in MHD turbulence simulations and solar wind observations at 1 AU is presented. Distributions of spectral indices for the velocity, magnetic field, and total energy, computed both from high resolution numerical simulations and solar wind observations, show remarkable agreement. The results show the magnetic field spectrum Eb is steeper than the velocity spectrum Ev, while the residual energy Eb-Ev decreases more rapidly following a $k_{\perp}^{-2}$ scaling. The agreement between simulations and observations persists for both balanced and imbalanced turbulence, that is, when one considers regions with and without cross helicity. In light of these results, it will be discussed to what extent incompressible MHD can adequately describe random magnetic and velocity fluctuations measured in the solar wind at 1 AU.

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Date submitted: 21 Jul 2011 Electronic form version 1.4