Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Statistical Properties of Magnetic Reconnection in MHD turbulence SERGIO SERVIDIO, Univ. of Calabria, WILLIAM MATTHAEUS, Univ. of Delware, PAUL CASSAK, Univ. of West Virginia, MICHAEL SHAY, Univ. of Delaware, PABLO DMITRUK, Univ. of Buenos Aires — Magnetic reconnection is an integral part of MHD turbulence[1] in that the fragmentation of magnetic eddies into smaller structures necessarily involves change of magnetic topology. To better understand this relationship, recently the properties of thousands of magnetic reconnection events in moderate Reynolds number MHD turbulence have been studied [1] using 2D spectral method simulations of compressible and incompressible MHD. Reconnection between magnetic islands, different in size and energy, occurs locally and sporadically in time. The associated reconnection rates are distributed over a wide range of values and scale with the geometry of the diffusion region. Matching classical turbulence analysis with the Sweet-Parker theory, the main statistical features of these multi-scale reconnection events are identified. Magnetic reconnection in turbulence can be described through an asymmetric Sweet-Parker model, in which the parameters that control the reconnection rates are determined by turbulence itself. This new and general perspective on reconnection is relevant in space and astrophysical systems, where plasma is generally in a fully nonlinear regime. [1] W. Matthaeus and S. Lamkin, Phys. Fluids, 29, 2513 (1986). [2] S. Servidio et al, PRL, 102, 115003 (2009).

William Matthaeus
Univ. of Delaware

Date submitted: 17 Jul 2009 Electronic form version 1.4