

Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Mini-conference Poster: 3D Onset and Propagation of Magnetic Reconnection GIOVANNI LAPENTA, LANL, P. RICCI, Dartmouth College, J.U. BRACKBILL, Particle Solutions, W. DAUGHTON, University of Iowa, G.L. DELZANNO, LANL — A fundamental problem in reconnection physics is how to relate 2D and 3D reconnection. The great majority of studies of reconnection focus on 2D configurations. The state of affair is best described by the cave allegory of Plato. In 2D we look at the reconnection process as if we were studying the real world through its reflections on the walls of a cave [1]. We propose to turn our head away from the familiar wall and face the real world. We do 3D fully kinetic (i.e. both electrons and ions are kinetic) simulations of reconnection. We use the implicit PIC code CELESTE to achieve parameter ranges and system sizes inaccessible to traditional explicit codes. Our results will clarify the fundamental issue: if reconnection is started at one location, does it propagate in the system? How? And what coupling of microscopic and macroscopic processes causes the reconnection onset in the first place? All these effects can only be studied in 3D [2]. The crucial physics missing in 2D simulations is the role of macroscopic equilibrium changes induced by the microinstabilities [3].

1) Plato, Republic, Book VII, Hackett Pub. Co., 1992.

2) P. Ricci, J.U. Brackbill, W.S. Daughton, G. Lapenta, Phys. Plasmas, 11, 4489, 2004.

3) W. Daughton, G. Lapenta, P. Ricci, Phys. Rev. Lett., 93, 105004, 2004.

Giovanni Lapenta
LANL

Date submitted: 25 Aug 2005

Electronic form version 1.4