Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Finding "The" Electron Diffusion Region: EDR[1] JACK SCUDDER, WILLIAM DAUGHTON, University of Iowa — The diagnostic properties of the EDR are now realistically resolved with full PIC codes using open boundary conditions [Daughton et al. 2006]. Previously, periodic boundary conditions permitted significant unphysical recirculation of electrons along the separatrices through the diffusion region. This paper describes an operational approach to find the distinguishing *observable* properties and/or correlations of observables of the plasma within and outside the EDR. This work represents the "forward" problem for the "inverse" problem facing experimentalists using spacecraft data. The EDR: (i) is *not* rectangular, (ii) on its inflow side meets the separatrices where they are kinked, (iii) contains distinct patterns of strongly enhanced perpendicular electric fields and electron pressure agyrotropy, and (iv) is permeated by low levels of parallel electric fields. The strong perpendicular electric fields that can directly demagnetize the thermal electrons and the parallel E also occur *outside* the EDR; accordingly, detection of these signatures by spacecraft do not necessarily place the spacecraft in the EDR. Incontrovertible *in situ* detections of the EDR will hinge on both correlations between observables in one locale and the simultaneous multipoint measurement of critical plasma parameters of the electrons as planned on the US MMS mission or the ESA CrossScale concept. [Daughton et al, Phys. Fluids, 13, 072101, 2006]

[1]Supported by NSF, DOE, and NASA.

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Date submitted: 24 Jul 2006 Electronic form version 1.4