Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Correlated whistlers and electron phase space holes during magnetic reconnection[1] M.V. GOLDMAN, D.L. NEWMAN, University of Colorado, Boulder, G. LAPENTA, Katholieke Universiteit Leuven, L. ANDERSSON, J.T. GOSLING, S. ERIKSSON, University of Colorado, Boulder, S. MARKIDIS, KTH Royal Institute of Technology, Stockholm — Simulations of magnetic reconnection reveal whistler waves near the boundary of the outflow exhaust. The whistler source region is just inside the separatrix, co-located with electron phase space holes which are just beginning to disappear after propagating part way towards the x-point. The whistler wavefronts in the source region are sometimes conical and their phase velocity is on the order of the hole velocity. The whistlers are likely driven by a new mechanism: Cerenkov emission from e-holes. They propagate towards the x-pt., crossing the separatrix into the inflow region. In the source region they have higher frequencies (closer to the electron cyclotron frequency) and higher wavenumbers (greater than the inverse electron inertial length); in the inflow region they have lower frequencies and wavenumbers. Their phase velocity is surprisingly uniform throughout their trajectories, which are mapped in detail. These results can be significant for satellite detection of magnetic reconnection in the magnetotail, since whistlers in the inflow region indicate proximity to an x-point and to the electron current sheet which appears after the ambient cross-tail current sheet has torn. In addition, their location near the x-pt. may enable the whistlers to affect the reconnection rate.

[1]Work supported by NASA and NSF.

M.V. Goldman
University of Colorado, Boulder

Date submitted: 11 Jul 2013

Electronic form version 1.4