Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Synchrotron Cooling in Relativistic Magnetic Reconnection[1]
JAKE FISH, GREGORY WERNER, DMITRI UZDENSKY, Univ of Colorado - Boulder — Radiative processes are typically unimportant to the dynamics of plasmas investigated by most magnetic reconnection studies. However, some astrophysical phenomena exhibit conditions in which radiative cooling is significant over dynamic timescales. For example, strong synchrotron cooling controls the energetics of reconnection in magnetospheres of pulsars with strong magnetic fields, including the Crab pulsar. We performed a series of simulations of reconnection in the presence of radiative cooling using the particle-in-cell code Zeltron which self-consistently includes the synchrotron radiation reaction force. We examine the resulting global particle energy distribution, which is strongly cooled by radiation over time at high energies. Basic plasma parameters, such as the average particle energy and density in the reconnection layer and at magnetic O-points, are also measured as functions of radiative cooling's importance. Our results show strong plasma cooling and compression in plasmoids due to radiation well before the reconnecting layer is significantly affected.

[1]This work is supported by DOE and NASA.

Jake Fish
Univ of Colorado - Boulder

Date submitted: 15 Jul 2016 Electronic form version 1.4