Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

The kinetic structure of the electron diffusion region observed by MMS during asymmetric reconnection[1] EGEDAL JAN, BLAKE WETHERTON, UW-Madison, ARI LE, WILLIAM DAUGHTON, LANL — During asymmetric magnetic reconnection in the dayside magnetopause in situ spacecraft measurements by NASA's MMS mission provide new detailed information on the electron dynamics within the electron diffusion region. In particular, we report here on observations by MMS4 which traveled the closest on the topological X-line [1] in the event on October 16, 2015, first reported by Burch et al., [2]. In addition to crescent shaped electron distributions [2,3], the measurements include electron beams flowing in toward the diffusion region. These beams of incoming electrons are formed by $E_{\|}$ acceleration along the high-density side separatrices. They penetrate across the electron diffusion region, where their directions are nearly unaffected by the rapid changes in the magnetic field geometry. Matching electron beam features are observed in 2.5D kinetic simulations, revealing their role in breaking the electron frozen-in-law through contributions to the off-diagonal stress in the electron pressure tensor.

[1] Denton et al., Geophys. Res. Lett., 43, 55895596, (2016).

[2] Burch et al., Science 352, 2939, (2016).

[3] Egedal et al., PRL 117, 185101 (2016).

[1]This work was supported by NSF GEM award No. 1405166

Egedal Jan
UW-Madison

Date submitted: 14 Jul 2017 Electronic form version 1.4