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Fine scale structure in the current sheet and electrostatic fields during driven magnetic reconnection on the VTF experiment. WILLIAM FOX, JAN EGEDAL, NOAM KATZ, MIKLOS PORKOLAB, MIT PSFC — We have conducted a series of experiments in the VTF reconnection experiment[1] to measure with high resolution the current channel and electric structures that form in response to driven reconnection. Preliminary measurements have revealed that the current sheet is not symmetric across the X-line, contradicting an assumption fundamental to nearly every reconnection theory. Importantly, effects related to this asymmetry can account for momentum balance for the electrons at the X-line (i.e. fulfillment of the generalized Ohm's law) via convective inertia ($mnv_{\perp} \cdot \nabla v_{||}$). Measurements of strong in-plane electric field structures ($E_{\perp} \sim 1$ kV/m) near the X-point reveal a mechanism to efficiently heat ions, as has been recently observed by laser induced fluorescence (LIF) measurements of the ion distribution function[2].

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[1] J. Egedal, *et. al.* (2001), *Rev. Sci. Instrum.* 71, 3351
[2] A. Stark, W. Fox, J.Egedal, O. Grulke, T. Klinger, (2005), submitted to Phys. Rev. Lett.

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