Electrostatic Microinstabilities within the Electron Diffusion
Layer\textsuperscript{1} J. JARA-ALMONTE, Princeton Plasma Physics Lab, W. DAUGHTON, Los
Alamos National Laboratory, H. JI, M. YAMADA, Princeton Plasma Physics Lab-
oratory — Both numerical simulations and laboratory experiments have extensively
studied the electron skin-depth scale structure of the electron diffusion layer, but
neither have fully resolved both the scale-seperation and physics on scales between
the Debye length and the skin-depth. Here, the first fully kinetic 2D simulations of
anti-parallel magnetic reconnection at realistic electron temperatures ($c/v_{\text{the}} = 64$
and $\omega_{pe}/\Omega_e = 32$) are presented. Macroscopic features such as the reconnection rate
or layer width are found to be insensitive to the electron temperature. When the
electron temperature becomes sufficiently low, the electron diffusion layer becomes
unstable to electrostatic instabilities involving multiple streaming populations near
the X-line. This leads to multiple electron holes within the electron diffusion layer
which interact non-linearly to generate turbulence which may be important in un-
derstanding the electron heating within the diffusion layer observed in experiments.

\textsuperscript{1}This research is supported by DoE Contract Number DE-AC02-09CH11466 and by
the Center for Magnetic Self-Organization (CMSO)