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What Causes Electron Holes During Magnetic Reconnection and What Can We Learn From Them[1] MARTIN V. GOLDMAN, DAVID L. NEWMAN, University of Colorado at Boulder, GIOVANNI LAPENTA, ANDRE DIVIN, Katholieke Universiteit Leuven, Belgium, FRANCESCO CALIFANO, University of Pisa, Italy, HAIHONG CHE, University of Colorado — Weak bipolar electrostatic fields are commonly observed in association with magnetic reconnection. Recent attention has focused on their origin due to nonlinear evolution of electrostatic instabilities.[2,3,4] We present evidence from both older and new reconnection simulations for the SPATIAL dependence of electrostatically unstable electron distributions along the separatrix during guide-field magnetic reconection. Particle distributions further from the reconnection region tend to be Buneman (electron-ion) unstable, while distributions closer to the reconnection region tend to be two-stream (electron-electron) unstable. It may be possible to infer properties of the particle distributions from measurements of the speed, half-width, amplitude and aspect ratio of weak electron holes.

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[3]Newman, D. L. and M. V. Goldman, SM31B-1735, AGU Fall Meeting (2008).
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