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Transition in Electron Physics of Magnetic Reconnection in Weakly Collisional Plasma ARI LE, VADIM ROYTERSHTEYN, HOMA KARIMABADI, SciberQuest, WILLIAM DAUGHTON, LANL, JAN EGEDAL, CARY FOREST, UW-Madison — Using self-consistent fully kinetic simulations with a Monte Carlo treatment of the Coulomb collision operator, we explore the transition between collisional and kinetic regimes of magnetic reconnection in high-Lundquist-number current sheets. Recent research in collisionless reconnection has shown that electron kinetic physics plays a key role in the evolution. Large-scale electron current sheets may form, leading to secondary island formation and turbulent flux rope interactions in 3D. The new collisional simulations demonstrate how increasing collisionality modifies or eliminates these electron structures in the kinetic regimes. Additional basic questions that are addressed include how the reconnection rate and the release of magnetic energy into electrons and ions vary with collisionality. The numerical study provides insight into reconnection in dense regions of the solar corona, the solar wind, and upcoming laboratory experiments at MRX (Princeton) and MPDX (UW-Madison).

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