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Nonthermally Dominated Electron Acceleration during Magnetic Reconnection in a Low-β Proton-Electron Plasma XIAOCAN LI, The University of Alabama in Huntsville, FAN GUO, HUI LI, Los Alamos National Laboratory, GANG LI, The University of Alabama in Huntsville — By means of fully kinetic simulations, we investigate electron acceleration during magnetic reconnection in a nonrelativistic proton-electron plasma with conditions similar to solar corona and flares. We demonstrate that reconnection leads to a nonthermally dominated electron acceleration with a power-law energy distribution in the nonrelativistic low-β regime but not in the high-β regime. A guiding-center current description is used to reveal the role of electron drift motions during the bulk nonthermal energization. We find that the main acceleration mechanism is a Fermi-type acceleration accomplished by the particle curvature drift motion along the electric field induced by the reconnection outflows. Although the acceleration mechanism is similar for different plasma β regime, the reconnection in the low-β regime drives much faster electron energization because of the faster Alfvénic outflows. The nonthermally dominated acceleration resulting from magnetic reconnection in the low-β regime may have strong implications to the highly efficient electron acceleration in solar flares and other astrophysical systems.

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