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Electron Energization Induced by Magnetic Reconnection in Laboratory Laser-Driven Plasmas SAMUEL TOTORICA, Stanford University; Kavli Institute for Particle Astrophysics and Cosmology, TOM ABEL, Kavli Institute for Particle Astrophysics and Cosmology; Institut Lagrange de Paris, FREDERICO FIÚZA, SLAC National Accelerator Laboratory — The potential to study electron energization in laser-driven plasma experiments of magnetic reconnection is studied using two and three dimensional particle-in-cell simulations for realistic laboratory parameters and boundary conditions. It is demonstrated that electrons with energies several orders of magnitude larger than the thermal energy may be produced in plasma conditions currently accessible in the laboratory. Electrons are primarily accelerated by the reconnection electric field and their spectrum is affected by trapping in plasmoids and by the escape from the finite-sized system, giving rise to a non-thermal component with a power-law shape. We identify the optimal conditions for observing electron acceleration in the laboratory and derive a scaling law for the maximum electron energy, paving the way for a new platform for the experimental study of particle acceleration by magnetic reconnection.

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