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**Particle Acceleration in Magnetic Reconnection Using Laser-Powered Capacitor Coils** ABRAHAM CHIEN, LAN GAO, HANTAO JI, BRIAN KRAUS, KENNETH HILL, PHILIP EFTHIMION, Princeton Plasma Physics Laboratory, GENNADY FIKSEL, University of Michigan, ERIC BLACKMAN, University of Rochester, PHILIP NILSON, Laboratory for Laser Energetics, University of Rochester, KAI HUANG, QUANMING LU, University of Science and Technology of China — Magnetic reconnection is a ubiquitous astrophysical phenomenon at low plasma beta that rapidly converts magnetic energy into some combination of flow energy, thermal energy, and non-thermal energetic particles. The latter is often an observational signature of magnetic reconnection environments, which can be more efficient accelerators than competing processes such as isolated collisionless shocks. Experimental diagnostics have long limited most reconnection experiments to focus on the generation of plasma flow or thermal energy, leaving the acceleration of non-thermal particles unknown. To overcome this limitation, we have developed a robust platform for generating and measuring non-thermal energetic electrons from magnetically driven, quasi-axisymmetric reconnection using laser-powered capacitor coils and demonstrated this setup on the OMEGA EP laser facility at the Laboratory for Laser Energetics. Analysis of experimental proton radiographs shows consistency with expected reconnection fields. Further analysis with 2D particle-in-cell reconnection simulations using realistic experimental conditions demonstrates good agreement with experiment in both reconnection electromagnetic fields and the resulting particle acceleration.

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