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Measuring Electromagnetic Fields in Laboratory Plasmas Using Laser-Wakefield-Accelerated Electrons CARLTON KIM, University of California, Irvine, WILL FOX, Dept. of Astrophysical Science, Princeton University, Princeton Plasma Physics Laboratory, DEREK SCHAEFFER, Dept. of Astrophysical Science, Princeton University, SOPHIA MALKO, Princeton Plasma Physics Laboratory, Centro de Laseres Pulsados (CLPU), Spain, COURTNEY JOHNSON, Rowan University — Particle radiography is a diagnostic method to obtain crucial information about the magnetic field of plasmas. Radiography involves sending a beam of particles through an electromagnetic field and imaging the resulting deflections of the particles on a detector. Laser-Wakefield-Accelerated (LWFA) electrons may be an accessible, high-energy source for particle radiography diagnostics. Compared to traditional proton radiography, the relativistic speeds associated with the LWFA electrons allow a wider range of magnetic field strengths to be probed. Additionally, LWFA electrons can penetrate thicker material filters and are compatible with high-repetition-rate applications. In this work, electron radiography is studied through synthetic calculations to determine the required energy, fluence, and source size, to properly probe the electromagnetic fields of laboratory plasmas using LWFA electrons.

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