Abstract Submitted
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Experimental Generation of Backward-Propagating MeV Electrons in Ultra-Intense Laser Interactions[1] SCOTT FEISTER, Ohio State Univ. / Innovative Scientific Solutions, Inc. (ISSI), JOHN T. MORRISON, Fellow, National Research Council, USA, VLADIMIR M. OVCHINNIKOV, KYLE D. FRISCHE, ISSI, JOHN A. NEES, Univ. of Michigan / ISSI, CHRIS ORBAN, Ohio State Univ. / ISSI, ENAM A. CHOWDHURY, Ohio State Univ. / Intense Energy Solutions, LLC., W. MELVYN ROQUEMORE, Air Force Research Laboratory, Dayton, USA — Electron beams with peak energies exceeding 1 MeV have been produced with kHz repetition by the interaction of normally-incident, intensely-focused ($10^{18} W/cm^2$), 30 fs duration laser pulses with water-jet targets. A high-charge electron beam has been produced in the direction opposite laser propagation. Through interaction with aluminum in the parabolic focusing optic, this backward-going beam creates a $\sim$ 1 rem/hr secondary X-ray source with $>$ 800 keV peak spectral power density. A standing wave acceleration mechanism, originally identified for its relevance to forward-going electrons, acts to inject electrons into the reflected light where additional acceleration occurs. Experimental X-ray yield is drastically reduced when laser pre-pulse at nanosecond level is suppressed, which is corroborated by simulations showing similar reduction in accelerated electron energies and quantity in the absence of pre-plasma scale length.

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Scott Feister
Ohio State Univ - Columbus

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