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**Backward-going MeV electrons and gamma rays from $10^{18}$ W/cm$^2$ laser interactions with water**[1] SCOTT FEISTER, Ohio State Univ. (OSU) / Innovative Scientific Solutions, Inc. (ISSI), JOHN T. MORRISON, Fellow, National Research Council, USA, KYLE D. FRISCHE, ISSI, CHRIS ORBAN, OSU / ISSI, VLADIMIR M. OVCHINNIKOV, ISSI, JOHN A. NEES, Univ. of Michigan / ISSI, DRAKE R. AUSTIN, OSU / ISSI, ENAM A. CHOWDHURY, OSU / Intense Energy Solutions, LLC., RICHARD R. FREEMAN, OSU, W. MELVYN ROQUEMORE, Air Force Research Laboratory, Dayton, USA — Gamma rays with ∼1 MeV energy are measured following the relativistic interaction of a 3 mJ, $10^{18}$ W/cm$^2$ short pulse laser with a 30 $\mu$m diameter flowing water column. Contrary to expectations, radiation emission is peaked in the direction opposite to the normally-incident laser propagation (specular direction). Experimental measurements and particle-in-cell (PIC) simulations of laser-plasma interaction show a pre-formed-plasma-dependent, backward-going, beam-like primary electron source. The MeV component of the electron and gamma ray spectrum, which is more than five times the ponderomotive energy scale of the laser, is highly sensitive to the presence of a nanosecond-timescale laser pre-pulse.

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Scott Feister
Ohio State Univ - Columbus

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