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Optical deflection and temporal characterization of an ultra-fast laser-produced electron beam[1] SUDEEP BANERJEE, SCOTT SEPKE, Department of Physics and Astronomy, University of Nebraska, Lincoln, Nebraska, ANTHONY VALENZUELA, Nuclear Engineering and Radiological Sciences, University of Michigan, Ann Arbor, Michigan, RAHUL SHAH, Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, Michigan, DONALD UMSTADTER, Department of Physics and Astronomy, University of Nebraska, Lincoln, Nebraska — The interaction of a laser-produced electron beam with an ultra-intense laser pulse in free space is studied. We show that the optical pulse with a_0=0.5 imparts momentum to the electron beam, causing it to deflect along the laser propagation direction. The observed 3-degree angular deflection is found to be independent of polarization and in good agreement with a theoretical model for the interaction of free electrons with a tightly focused gaussian pulse, but only when longitudinal fields are taken into account. This technique is used to temporally characterize a sub-picosecond laser-wakefield-driven electron bunch. Applications to modifying electron-beam properties (i.e., emittance, duration and energy spread) are also discussed.

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Sudeep Banerjee
Department of Physics and Astronomy, University of Nebraska
Lincoln, Nebraska

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