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Initial Channeling Studies of a kJ-Class Laser in Long-Scale-Length Plasmas S. IVANCIC, W. THEOBALD, P.M. NILSON, S.X. HU, D.D. MEYERHOFER, C. STOECKL, Laboratory for Laser Energetics, U. of Rochester, L. WILLINGALE, U. of Michigan — A study of kJ-class, short-pulse laser pulses incident on long-scale-length plasmas was performed on OMEGA EP. A short-pulse beam of 1-kJ energy and 10-ps pulse duration was focused into a preformed plasma 1.2 mm in front of the original target surface at a density of $\sim 5 \times 10^{18} \text{ cm}^{-3}$. The plasma was generated by 2.2 kJ of UV light at a 2.8-ns pulse duration, focused to a 800- μm spot size with distributed phase plates onto a 3-mm square plastic foil target. Side-on proton radiography using a stack of radiochromic film sandwiches between Al filters showed the development of field structures in the plasma with 5-ps time resolution. At the nominal focus position, a strong proton beam was observed from the rear surface of the target, whereas for focus positions closer to the target, the intensity of the proton beam was significantly reduced. The proton beam is indicative of significant fast-electron-energy coupling into the overdense plasma. This work was supported by the U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-FC52-08NA28302.

S. Ivancic
Laboratory for Laser Energetics, U. of Rochester

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