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High Energy, Relativistic Intensity Laser Channeling and Direct Laser Acceleration of Electrons from an Underdense Plasma H. TANG, A. MCKELVEY, P. T. CAMPBELL, B. K. RUSSELL, Y. MA, University of Michigan , A. V. AREFIEV, UCSD, G. J. WILLIAMS, H. CHEN, F. ALBERT, LLNL , J. SHAW, P. M. NILSON, LLE, L WILLINGALE, University of Michigan — Direct Laser Acceleration (DLA) of electrons by a relativistically intense laser pulse is a dynamic and complex process. We perform experiments using the OMEGA EP laser and 2D particle-in-cell simulations to study the acceleration of electron beams from underdense plasma using high-energy, picosecond-duration laser pulses. Gas-jet targets were used to control and change the target density and the focusing conditions are altered by apodizing the beam near-field from having a square profile to a round profile. Proton radiography observes the evolution of the electromagnetic fields within the channel formed and magnetic spectrometers measure the electron spectra. 2-D Particle-in-cell simulations investigate how the plasma density and laser parameters, like energy and focusing conditions, affect the interaction and DLA mechanism to help optimize the experiment configuration. This work is support by the Department of Energy / NNSA under Award Number DE-NA0003944.

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