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Electron heating mechanisms for a relativistic intensity laser pulse interacting with a near-critical plasma[1] L. WILLINGALE, Univ of Michigan, A.V. AREFIEV, Univ of Texas, Austin, C. ZULICK, NRL, A. MAKSIMCHUK, Z. ZHAO, Univ of Michigan, G.J. WILLIAMS, H. CHEN, A.U. HAZI, E. MARLEY, LLNL, F.J. DOLLAR, UC Irvine, W. NAZAROV, Univ of St Andrews
— Two and three dimensional particle-in-cell simulations have been performed to understand the electron heating mechanisms taking place when a picosecond duration, relativistically intense laser pulse interacts with a near-critical density plasma. Results from experiments using the Titan laser (LLNL) interacting with very low-density foam targets indicated that from very overdense targets the electron temperature, T_e, was close to the expected ponderomotive potential energy, but an increase in T_e was observed as the plasma density was reduced towards the critical density. Numerical modeling will be presented to show that the differences in the electron heating for different target densities can be understood in terms of the complex interplay between the laser fields and evolving plasma fields as the interaction progresses.

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Louise Willingale
Univ of Michigan

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