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Raman backscattering from subpicosecond laser pulses in a relativistic laser-plasma interaction JUN REN, K. FLIPPO, Los Alamos National Laboratory, S. GAILLARD, Novel micro-cone target collaboration, D. OFFERMANN, J. COBBLE, E. DODD, M. SCHMITT, T. KWAN, Los Alamos National Laboratory, M. GEISSEL, M. SCHOLLMEIER, T. KLUGE, M. BUSSMANN, J. RASSUCHINE, T. BURRIS-MOG, K. ZEIL, S. KRAFT, J. METZKES, T. COWAN, T. LOCKARD, C. PLECHATY, Y. SENTOKU, B. GALL, Novel Micro-Cone Target Collaboration, X. YANG, G. MILEY, UIUC — In the course of a high-intensity short laser pulse interacting with a solid target mediated by laser-generated plasma, back scattered light from Raman backscattering (RBS) can substantially affect the evolution of the laser pulse in the plasma. Therefore, the RBS measurement is important in diagnosing processes occurring in the interaction. We will present time-integrated spectrum and power measurements of back scattered light centered at 1ω, 2ω and 3ω from coupling high-contrast ultra intense lasers (at $\sim 10^{20}$ W/cm^2) to a solid. The backscattered spectra show distributed peaks between 300nm -1750nm with broadened width. From analysis we determine plasma conditions including scale length, density profile and temperature. Collisional particle-in-cell simulations (LSP) reveal the effect of this inhomogeneous plasma on heating and acceleration of electrons through stochastic heating and ponderomotive acceleration, as well as the succeeding ion acceleration through the target normal sheath acceleration (TNSA) mechanism.

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