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Relativistic electron beam transport through cold and shock-heated carbon samples from aerogel to diamond[1] C. M. KRAULAND, M. WEI, General Atomics, S. ZHANG, UCSD, J. SANTOS, P. NICOLAI, CELIA, W. THEOBALD, LLE, J. KIM, P. FORESTIER-COLLEONI, F. BEG, UCSD — Understanding the transport physics of a relativistic electron beam in various plasma regimes is crucial for many high-energy-density applications, such as fast heating for advanced ICF schemes and ion sources. Most short pulse laser-matter interaction experiments for transport studies have been performed with initially cold targets where the resistivity is far from that in warm dense plasmas. We present three experiments that have been performed on OMEGA EP in order to extend fast electron transport and energy coupling studies in pre-assembled plasmas from different carbon samples. Each experiment has used one 4 ns long pulse UV beam (10^{14} W/cm^2) to drive a shockwave through the target and a 10 ps IR beam (10^{19} W/cm^2) to create an electron beam moving opposite the shock propagation direction. These shots were compared with initially cold target shots without the UV beam. We fielded three different samples including 340 mg/cc CRF foam, vitreous carbon at 1.4 g/cc, and high density carbon at 3.4 g/cc. Electrons were diagnosed via x-ray fluorescence measurements from a buried Cu tracer in the target, as well as bremsstrahlung emission and escaped electrons reaching an electron spectrometer. Proton radiograph was also performed in the foam shots. Details of each experiment, available data and particle-in-cell simulations will be presented.

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