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Study of Hot Electron Propagation in Low Density Foams in Ultra Intense Laser Pulse Interaction B. RAMAKRISHNA, P.A. WILSON, K. QUINN, L. ROMAGNANI, M. BORGHESI, The Queen's University of Belfast, UK, A. PIPAHL, O. WILLI, Heinrich Heine Universitat, Germany, L. LANCIA, J. FUCHS, Ecole Polytechnique, France, M. NOTLEY, R.J. CLARKE, Rutherford Appleton Laboratory — Ultrashort bursts of high energy charged particles produced from high intensity laser matter interactions have many potential applications in advanced science and technology areas. A vital application of laser produced MeV electrons is in inertial confinement fusion [1]. Scaling laws for the fast electrons produced during ultrahigh intensity interactions give electron temperatures KBThot $\sim$ Upond $\sim$ 1MeV$\times$ $(\mathrm{I}^2/10^{19}\mathrm{Wcm}^2\mu\mathrm{m}^2)^{0.5}$, with up to 30% of the laser energy converted into these relativistic electrons. Electric effects may cause a reduction of the range of fast electrons as compared to what is predicted taking into account collisional effects only. These arise from the electric field E generated by charge separation and by inductive effects, as the fast electrons propagate into the target. These electrons carry a current density Jhot of magnitude which can be as large as 10^{12} A/cm^2. The electric field E depends on the conductivity σ of the target material, because a return current balancing the current of fast electron must be set up to maintain quasi-neutrality (i.e. Jhot + J return $\sim$0) and allow propagation [2]. We present here recent results obtained from experiments carried out in the Petawatt laser facility at the Rutherford Appleton Laboratory.

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