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Fast advection of magnetic fields by hot electrons L. WILLINGALE, A.G.R. THOMAS, K. KRUSHELNICK, University of Michigan and Imperial College London, P.M. NILSON, M.C. KALUZA, A.E. DANGOR, R.G. EVANS, P. FERNANDES, M.G. HAINES, C. KAMPERIDIS, R.J. KINGHAM, C.P. RIDGERS, M. SHERLOCK, M-S. WEI, Z. NAJMUDIN, Imperial College London, S. BANDYOPADYAY, M. NOTLEY, Rutherford Appleton Laboratory, S. MINARDI, M. TATARAKIS, Technological Educational Institute of Crete, W. ROZMUS, University of Alberta — Experiments where a laser generated proton beam is used to probe the megagauss strength self-generated magnetic fields from a nanosecond laser interaction with an aluminum target are presented. At intensities of 10^{15} Wcm^{-2} and under conditions of significant fast electron production and strong heat fluxes, the electron mean-free-path is long compared with the temperature gradient scale-length and hence non-local transport is important for the dynamics of the magnetic field in the plasma. The hot electron flux transports self-generated magnetic fields away from the focal region through the Nernst effect [1] at significantly higher velocities than the fluid velocity. Two-dimensional implicit Vlasov-Fokker-Planck modeling shows that the Nernst effect allows advection and self-generation transports magnetic fields at significantly faster than the ion fluid velocity, $v_N/c_s \approx 10$.

[1] A. Nishiguchi *et al.*, Phys. Rev. Lett., **53**, 262 (1984).

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