Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

**Transient fields produced by a cylindrical electron beam flowing through a plasma** MARIE-CHRISTINE FIRPO, LPP, CNRS-Ecole Polytechnique, Palaiseau, France — Fast ignition schemes (FIS) for inertial confinement fusion should involve in their final stage the interaction of an ignition beam composed of MeV electrons laser generated at the critical density surface with a dense plasma target. In this study, the out-of-equilibrium situation in which an initially sharp-edged cylindrical electron beam, that could e.g. model electrons flowing within a wire [1], is injected into a plasma is considered. A detailed computation of the subsequently produced magnetic field is presented [2]. The control parameter of the problem is shown to be the ratio of the beam radius to the electron skin depth. Two alternative ways to address analytically the problem are considered: one uses the usual Laplace transform approach, the other one involves Riemann's method in which causality conditions manifest through some integrals of triple products of Bessel functions.

[1] J.S. Green et al., *Surface heating of wire plasmas using laser-irradiated cone geometries*, Nature Physics **3**, 853–856 (2007).
[2] M.-C. Firpo, http://hal.archives-ouvertes.fr/hal-00695629, to be published (2012).

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Date submitted: 30 Jul 2012 Electronic form version 1.4