Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

Slow down of a globally neutral relativistic e-e+ beam shearing the vacuum E.P. ALVES, T. GRISMAYER, GoLP/IPFN, Instituto Superior Tecnico, Universidade de Lisboa, 1049-001 Lisbon, Portugal, M.G. SILVEIRINHA, Universidade de Coimbra, Departmento de Engenharia Electrotecnica, Instituto de Telecomunicacoes, 3030-290 Coimbra, Portugal, R.A. FONSECA, DCTI/ISCTE Instituto Universitario de Lisboa, 1649-026 Lisboa, Portugal, L.O. SILVA, GoLP/IPFN, Instituto Superior Tecnico, Universidade de Lisboa, 1049-001 Lisbon, Portugal — It has been recently found that the development of electromagnetic instabilities between shearing, globally neutral polarisable dielectric slabs, separated by a nanometer-scale gap, can result in an effective non-contact friction force between slavs, which is the classical analogue of the quantum friction effect proposed by Pendry (1997). This effect has been explored analytically in the sub-relativistic regime, where the development of unstable electromagnetic modes parallel to the direction of motion are responsible for the non-contact friction effect. We explore the interaction of a relativistic, globally neutral e-e+ beam streaming through a hollow plasma/dielectric in the absence of overlap (no contact). We show through analytic theory and 3D particle-in-cell simulations that this relativistic scenario excites unstable electromagnetic modes transverse to the direction of propagation. The onset of this electromagnetic instability leads to the conversion of the kinetic energy of the e-e+ beam into electric and magnetic field energy, effectively slowing down a relativistic, globally neutral body in the absence of contact. We demonstrate that this effect be explored using beam properties that are readily available at the SLAC National Accelerator Laboratory.

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Date submitted: 24 Jul 2015 Electronic form version 1.4