

Abstract Submitted
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Inverse Faraday Effect Revisited J.T. MENDONÇA, S. ALI, J.R. DAVIES, Instituto Superior Tecnico — The inverse Faraday effect is usually associated with circularly polarized laser beams. However, it was recently shown that it can also occur for linearly polarized radiation [1]. The quasi-static axial magnetic field by a laser beam propagating in plasma can be calculated by considering both the spin and the orbital angular momenta of the laser pulse. A net spin is present when the radiation is circularly polarized and a net orbital angular momentum is present if there is any deviation from perfect rotational symmetry. This orbital angular momentum has recently been discussed in the plasma context [2], and can give an additional contribution to the axial magnetic field, thus enhancing or reducing the inverse Faraday effect. As a result, this effect that is usually attributed to circular polarization can also be excited by linearly polarized radiation, if the incident laser propagates in a Laguerre-Gauss mode carrying a finite amount of orbital angular momentum.

[1] S. ALi, J.R. Davies and J.T. Mendonça, *Phys. Rev. Lett.*, **105**, 035001 (2010).

[2] J. T. Mendonça, B. Thidé, and H. Then, *Phys. Rev. Lett.* **102**, 185005 (2009).

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