Twisted waves in a plasma: photons, plasmons and phonons

J.T. Mendonça

IPFN, Instituto Superior Técnico, Av. Rovisco Pais 1, 1049-001 Lisboa, Portugal

Abstract

We discuss the properties of twisted waves in a plasma, carrying orbital angular momentum. Angular momentum states of electrostatic and electromagnetic fields are described. These states can be excited by various methods, including plasma rotation and nonlinear wave mixing. The exchange of angular momentum between photon, plasmon and phonon modes in a plasma, can be achieved by stimulated Raman and Brillouin scattering processes. Here we focus on the modified Landau damping of twisted plasmons, and on the excitation of wake fields by intense laser pulses carrying a finite orbital angular momentum. New results associated with particle acceleration and wave damping will be presented.

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