ELSEVIER

Physics Letters A 277 (2000) 65–69

PHYSICS LETTERS A

www.elsevier.nl/locate/pla

Resonant absorption instability

Levi Schächter

Department of Electrical Engineering, Technion – Israel Institute of Technology, Haifa 32000, Israel

Received 15 September 2000; accepted 19 October 2000
Communicated by P.R. Holland

Abstract

A new type of instability is demonstrated. It occurs when a space-charge wave develops along an electron beam that in turn propagates in a resonant medium. The space-charge wave grows in space according to the loss associated with the resonance namely, it is directly related to the attenuation of a pure electromagnetic mode in the medium. The spatial growth is proportional to the square root of the current density and for a given current, it is inverse proportional to the normalized momentum to the power of 1.5, i.e., $(\gamma\beta)^{-3/2}$.