General Physics Seminar

Rijnhuizen Seminar Room

Classical plasma analogs of electromagnetically induced transparancy (EIT) and lasing without inversion (LWI)

M.A. Tokman

Institute of Applied Physics,
Russian Academy of Sciences, Nizhny Novgorod, Russia

The development of classical models for the recently popular parametric effects in quantum electronics of EIT and LWI is presented. Based on these models, we consider the EIT effect for EC waves in a classical plasma; similar to the analogous effect in quantum systems, a strong reduction of the group velocity of the probe EC wave in the EIT "window" takes place. Also, we find a classical analog of quantum systems capable of stimulated emission of radiation in the absence of "inversion". This analog is the cyclotron parametric instability under low-frequency modulation of the distribution function of resonant particles.

The results obtained are important from the standpoint of the general theory of radiation processes in electron beams and plasma and for the advancement of microwave electronics.