

Seminar

ifa Institutul de Fizică Atomică

PULSE and IMPULSE of ELI

(Extreme Light Infrastructure)

Electron Pulses Accelerated by Polaritonic Laser Beams

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The propagation of the electromagnetic waves in polarizable matter is briefly reviewed, with emphasis on plasmon and polariton modes. The mechanism of constructing wave packets (pulses) out of extended waves is presented, and the group velocity is introduced. It is shown that polariton wave packets created by intense laser pulses may accelerate the trapped electrons up to appreciable energies, provided the medium behaves as a rarefied classical plasma. The electron energy is given by the polaritonic group velocity, which is close to the velocity of light in this case. The trapped electrons are distributed over the pulse surface and their flux goes like the square root of the laser intensity. The role of the key parameters – plasma density, laser intensity and the size of the laser spot – is discussed in the context of controlling the performances of laser accelerated electron pulses.

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