

# Seminar



# Institutul de Fizică Atomică

## **PULSE and IMPULSE of ELI**

*(Extreme Light Infrastructure)*

### **V. Compton Backscattering by a Polaritonic Pulse**

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The relativistic polariton concept introduced recently is revisited, and presented in another, more physically intuitive, form. The presentation makes use of Lorentz transformations to the rest frame, the evanescent wave arising in a plasma under critical conditions and the oscillating polarization produced by the electromagnetic field. The propagation of the polariton pulse is then described with regard to electron transport in matter with relativistic velocities. One main aspect the seminar is devoted to consists in establishing the quasi-rigidity of the electrons and ions polarized inside the polaritonic pulse. This rigidity opens the way of performing coherent Compton (Thomson) scattering on relativistic polaritonic pulses. Consequently, highly-brilliant coherent beams of hard X- and gamma rays can be obtained by coherent Compton backscattering. The possibility of an X- or gamma laser is therefore put forward in this seminar, together with the new concept of localized, polaritonic pulse propagating in plasma. At the same time, a few suggestions of possible experiments are made, in order to further characterize these concepts.

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