

# Seminar

*ifa* Institutul de Fizică Atomică

## **PULSE and IMPULSE of ELI** *(Extreme Light Infrastructure)*

### **III. Gamma Laser Controlled by High-Intensity External Fields**

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It is shown that a gamma lasing effect may arise in two-level nuclear systems under the action of high-intensity external fields. Two ideas are combined to show this: a coherent interaction and an excitation of the nuclei with virtual phonons in the bremsstrahlung radiation created by energetic electrons accelerated by high-intensity laser pulses. In principle, both the coherent interaction and the high-intensity field may improve appreciably upon the pumping rate. A detailed analysis is given of the particularities of this lasing effect, such as the population inversion (macroscopic occupation), energy balance, etc. Preliminary estimations show however that the efficiency is extremely low. The mechanism of the coherent interaction is presented, numerical estimations are given for the interaction with the bremsstrahlung radiation from electron pulses, and other technical issues (like the cross-section, Doppler effect, etc) are briefly discussed. The expectations are slightly optimistical and, to a bit larger extent, rather pesimistical.

**Joi 13.05.2010, ora 10<sup>00</sup>, Sala de Consiliu, Bloc Turn, etaj 9**

