

Seminar

ifa Institutul de Fizică Atomică

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

III. Gamma Laser Controlled by High-Intensity External Fields

M. APOSTOL

Institute of Physics and Nuclear Engineering,
Magurele-Bucharest



It is shown that a gamma lasing effect may arise, in principle, 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 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 are expected to improve appreciably upon the pumping rate. A detailed analysis is given of the particularities of this lasing effect, such as the level population (macroscopic occupation), energy balance, etc. The quantitative 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 formally optimistic and, to a bit larger realistic extent, definitely pessimistic.

Joi 13.05.2010, ora 10⁰⁰, Sala de Consiliu, Bloc Turn, etaj 9

