



Contribution ID: 181

Type: Poster

Excitation rates for nuclear isomers in hot plasma and photon-plasmon transitions in positronium and astrophysical plasma

Thursday, 3 September 2015 16:30 (1h 30m)

The short-lived excited states of nuclei in a hot plasma with excitation energies on the order of the temperature of the plasma reach thermal equilibrium with the nuclear ground state and their relative population is determined by a Boltzmann distribution. These states are usually taken into account in standard nucleosynthesis calculations, though the data about their nucleonic reaction properties are not sufficient. The aim of our work is to study the rates for electromagnetic excitation of the isotopes of several isomers of interest both in astrophysics and nuclear physics (^{235}U , ^{193}Ir , $^{87,88}\text{Y}$) and photon-plasmon transitions in positronium. We use the consistent quantum approaches [1] to estimate the key characteristics of the electromagnetic processes, namely, photo-absorption, inverse internal conversion, inelastic electron scattering, Coulomb excitation etc. Further the photon-plasmon transitions probabilities $P(\text{ph-pl})$ with emission of photon and Langmuir quanta in astrophysical plasma are estimated. Our value $P(\text{ph-pl})$ is $5.3 \times 10(6) \text{ 1/s}$, where U is density of Langmuir waves energy. It is agreed with other estimates [2]: $P(\text{ph-pl}) = 6 \times 10(6) \text{ 1/s}$.

[1] A. Glushkov, L. Ivanov, Phys. Lett. A 170, 33 (1992); A. Glushkov et al., Int. J. Quant. Ch. 104, 562 (2005); J. Phys. CS 11, 188 (2005).

[2] S. Kaplan, V. Tsytoich, Astrophysical Plasma (Moscow, 1987); V. Gol'danskiy, V. Letokhov, JETP 67, 533 (1974); L. Letokhov, L. Ivanov, Preprint ISAN N3, Troitsk (1987).

Primary author: BUYADZHI, Vasily (Odessa State University -OSENU)

Co-authors: Dr IGNATENKO, Anna (Odessa State University -OSENU); Dr FLORKO, Tatyana (Odessa State University -OSENU)

Presenter: BUYADZHI, Vasily (Odessa State University -OSENU)

Session Classification: Poster