**Excitation Rates For Nuclear Isomers In Hot Plasma And Photon-plasmon Transitions In Positronium**

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# EXCITATION RATES FOR NUCLEAR ISOMERS IN HOT PLASMA AND PHOTON-PLASMON TRANSITIONS IN POSITRONIUM

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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 ( 235U, 193Ir, 87,88Y) and photon-plasmon transitions in positronium. We use the consistent quantum approach, namely relativistic energy formalism (e.g. look: Glushkov A. In: 2013 Quantum Systems in Chemistry and Physics: Progress in Methods and Ser.: Springer PTCP, Eds. K.Nishikawa, J. Maruani, E.Brandas, G. Delgado-Barrio, P.Piecuch: Vol.26, 231), 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(ph-pl)with emission of photon and Langmuir quanta in astrophysical plasma are estimated. Our value P(ph-pl) is 5.3x10(6) 1/s, where U is density of Langmuir waves energy. It is agreed with earlier estimates by Tsytovich et al: P(ph-pl)=6x10(6)1/s.