SEMINÁŘ OTF ÚJF, ŘEŽ

OLEKSII DZYUBLYK

(Institute for Nuclear Research, Kiev)

Role of electrons in excitation and decay of nuclei

Abstract

The nuclear excitation by electron transition (NEET) is analyzed about the ionization threshold of the atomic K-level by x-rays. All the peculiarities of NEET, observed by Kishimoto et al., are explained. A theory is presented of the shake-off effect for conductivity electrons in metals, following β-decay. The low-energy peak in the energy distribution of emitted electrons from the metal, observed by Kovalik et al., is reproduced. The role of the electron screening in the Coulomb excitation of nuclei in hot plasma as well as in the α-decay of nuclei is studied. Both bound and free electrons are taken in consideration. It is shown that the α-decay rate does not depend on temperature, while the half-life $T_{1/2}$ of the bare nucleus is smaller by about 0.1% than $T_{1/2}$ for the nucleus in an atom.

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A. Cieplý/otf