Abstract Submitted
for the DNP11 Meeting of
The American Physical Society

Discharge of metastable nuclei during negative muon capture: Energy approach ALEXANDER GLUSHKOV, Odessa University and Troitsk ISAN, Russian Acad.Sci. — A negative muon captured by a metastable nucleus may accelerate the discharge of the latter by many orders of magnitude. For a certain relation between the energy range of the nuclear and muonic levels a discharge may be followed by muon ejection and muon participates in discharge of other nuclei. We present relativistic energy approach to description of a discharge of nucleus with emission of gamma quantum and further muon conversion. Besides, the external laser (graser) effect on cited processes is studied. The decay probability is linked with imaginary part of the "nucleons subsystem-photon-muon$^-$" system energy. One should consider 3 channels: 1). radiative purely nuclear 2j-poled transition (probability P1); 2). Non-radiative decay, when a proton transits into the ground state and muon leaves a nucleus with energy E=E(p-N1J1)-E(i), where E(p-N1J1) is an energy of nuclear transition, E(i) is the bond energy of muon in 1s state (P2); 3). A transition of proton to the ground state with muon excitation and emission of gamma quantum with energy E(p-N1J1)-E(nl) (P3). As example, the probabilities for different channels in a case of the Sc, Tl nuclei are presented. The Dirac-Wood-Saxon model is used. The key features of the possible high-power monochromatic γ radiation sources on the studied processes basis are analyzed.

Alexander Glushkov
Odessa University and Troitsk ISAN, Russian Acad.Sci.

Date submitted: 12 Jul 2011 Electronic form version 1.4