

ON THE POSSIBILITY OF CHANGE AND CONTROL OF NUCLEAR RADIOACTIVE DECAY RATE

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The main idea consist in using the interference of quantum-mechanical wave functions of the initial nucleus and nuclei identical to decay products and forming the solid state environment. The first experiments have been performed with the alpha-decay of Po-212 ($T_{1/2} = 0.3$ mksec) implanted into metallic natural lead. An increase in the decay rate of $\sim 10^{-3}$ has been registered as compared with that in Ni-environment. It corresponds to a decrease the amplitude of the lead nucleus wave function with distance as r^{-2} in the space between the atoms in solid state. The observed effect exceeds two statistical errors only. For increasing the observed effect we propose use of crystal lead compounds which can serve as waveguides for the lead wave functions. It is also very important to use lead highly enriched with the Pb-208 isotope.

The problem is very difficult. The paradigm of constant radioactive decay rate seems to be immovable. But the possibility of informational (without essential energy consumption) control of a nuclear decay rate via operation of a wave function flux looks very attractive for scientific research and practical purposes.