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Slowing down of electromagnetic transitions of atomic nuclei in metals as a sign of time dilation for these nuclei

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Nuclear conversion transitions (the scattering of atomic electrons on nucleons of excited nuclei with the energy transfer ΔE) for isomeric nuclei 235mU (ΔE = 76 eV), 154mEu (ΔE = 910 eV) and 99mTc (ΔE = 2.1 keV) slow down when atoms with isomeric nuclei are transferred from the surface of metals into the interior of metals (see review [1]). The slowing down of these transitions for nuclei in metals is not explained by a change in the chemical state of their atoms or by the scattering of conversion electrons on metal atoms. This distinguishes the suppression of nuclear transitions in metals from the suppression of atomic transitions in a small metal cavity (see, e.g., review [2] on cavity quantum electrodynamics), when the increase in the lifetime of excited atomic states can in principle be explained by the reverse absorption of emitted photons by atoms when the photons are reflected from the walls of the cavity.
Slowing down of conversion transitions of nuclei in metals can be caused by metals suppression of zero-point fluctuations of the electromagnetic field (ZPFs), which stimulate conversion transitions [3]. Then the slowing down of these transitions can be interpreted as a slowing down of time for atomic nuclei in the metal. In this case, ZPFs act as a global clock, and time intervals are determined by the number of ZPFs quanta stimulating the interaction of particles. This concept of time corresponds to the relational theory, which considers time as a relationship between material objects (see, e.g., [4]).

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