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Do We Understand Physics of Non-Exponential Decay?[1] VLADIMIR ZELEVINSKY, Michigan State University, ALEXANDER VOLYA, Florida State University — In practical evaluations of the mean lifetime the exponential behavior of the survival probability is assumed. Quantum mechanics, however, predicts that the survival probability of the decaying state, given by the squared overlap of the initial wave function and the evolved wave function at a later time, cannot be strictly exponential. Although it is hard to observe experimentally, in a quantum system with the finite expectation values of energy and its mean square fluctuation, both the initial stage of decay and its long-time limit are non- exponential. Using an exactly solvable quantum model we show that even at intermediate times the decay is not strictly exponential. This could be due to interfering components in the decay wave function, interfering decay channels, recurrent returns of the system to the quasi-bound states including those different from the original one, and due to exchange terms in cluster decays. In the presence of intrinsic degrees of freedom coupled to different decay channels we observe the oscillations superimposed on the power tail in the long-time limit, which is similar to the so-called GSI oscillations.

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