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Time of Decay in Quantum Mechanics

Quantum mechanics prescribes the probabilities of possible outcomes when a measurement is made at a particular time. The times when events like decay occur are also random, but the theory provides no direct prescription for their probabilities, even though these times are often observed in experiments. We study a model where a system with a decaying state is coupled with a detector. If by itself the initial state decays exponentially, the detected time of decay also has an exponential distribution. If the initial state is in the domain of its Hamiltonian, precisely exponential decay is impossible, and a detector which is too precise retards the decay, i.e., the quantum Zeno effect occurs. But if the decay is approximately exponential, and the detector is not overly precise, the detected time also is approximately exponential.