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A dynamical description of the quantum measurement process

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We provide a dynamical description of the quantum measurement process by framing it into the mindset of the theory of open quantum systems. The system and the measurement apparatus are considered as interacting quantum objects, such that the former “steals” information from the latter. In this formalism, after a given amount of time, the measurement process emerges in the form of an entangled system–apparatus superposition state whose components correspond to the different outcomes of the measurement. In this respect, we have determined a precise form for the system–apparatus Hamiltonian bringing to a dynamical description of both projective and positive-operator valued measures.

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