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Quantum Zeno stabilization in weak continuous measurement of two qubits RUSKO RUSKOV, Penn State University, ALEXANDER N. KOROTKOV, University of California, Riverside, ARI MIZEL, Penn State University — We have studied quantum coherent oscillations of two qubits under continuous measurement by a symmetrically coupled mesoscopic detector. The analysis is based on a Bayesian formalism that is applicable to individual quantum systems. Measurement continuously collapses the two-qubit system to one of the sub-spaces of the Bell basis. For a detector with linear response this corresponds to measurement of the total spin of the qubits. In the other extreme of purely quadratic response the operator $\sigma_y^1\sigma_y^2 + \sigma_z^1\sigma_z^2$ is measured. In both cases, collapse naturally leads to spontaneous entanglement which can be identified by measurement of the power spectrum and/or the average current of the detector. Asymmetry between the two qubits results in evolution between the different measurement subspaces. However, when the qubits are even weakly coupled to the detector, a kind of quantum Zeno effect cancels the gradual evolution and replaces it with rare, abrupt switching events. We obtain the asymptotic switching rates for these events and confirm them with numerical simulations. We show how such switching affects the observable power spectrum on different time scales.

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