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**Crossover of phase qubit dynamics in presence of negative-result weak measurement** RUSKO RUSKOV, ARI MIZEL, Penn State University, ALEXANDER N. KOROTKOV, University of California, Riverside — Coherent dynamics of a superconducting phase qubit is considered in the presence of both unitary evolution due to microwave driving and continuous non-unitary collapse due to negative-result measurement. In the case of a relatively weak driving, the qubit dynamics is dominated by the non-unitary evolution, and the qubit state tends to an asymptotically stable point on the Bloch sphere. This dynamics can be clearly distinguished from conventional decoherence by tracking the state purity and the measurement invariant (“murity”). When the microwave driving strength exceeds certain critical value, the dynamics changes to non-decaying oscillations: any initial state returns exactly to itself periodically in spite of non-unitary dynamics. The predictions can be verified using a modification of a recent experiment.

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