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Negative-result evolution from continuous noisy measurement of a double-dot spin qubit RUSKO RUSKOV, VIATCHESLAV V. DOBROVITSKI, BRUCE N. HARMON, Ames Laboratory — We consider evolution of a double quantum dot (DQD) two-electron spin qubit that is continuously measured with a linear charge detector (quantum point contact). We identify the regime where a non-unitary negative-result evolution of the qubit emerges due to the fact that the system remains in the (1,1) charge state (each dot is occupied by one electron). In this case, the $|T_0(1,1)\rangle$ triplet spin state is spin-blocked, and the transition between $|S(1,1)\rangle$ and $|S(0,2)\rangle$ states is suppressed by the continuous measurement, due to the quantum Zeno effect. Moreover, unitary evolution between $|T_0(1,1)\rangle$ and $|S(1,1)\rangle$ states is induced by the negative-result measurement due to presence of $|S(0,2)\rangle$ state. We demonstrate that these effects exist for both strong and weak coupling between the detector and the DQD system. They can be observed with present-day technologies and can be used for coherent qubit manipulations complimentary to existing methods.

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