Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

An efficient method for studying low-frequency two-state fluctuators FEI YAN, SIMON GUSTAVSSON, XIAOYUE JIN, ARCHANA KAMAL, TERRY ORLANDO, Research Laboratory of Electronics, Massachusetts Institute of Technology, WILLIAM OLIVER, Research Laboratory of Electronics, Massachusetts Institute of Technology; MIT Lincoln Laboratory — We propose a driven-evolution-based pulse sequence as an efficient tool to study low-frequency random telegraph noise. The sequence originates from the two-dimensional chemical exchange experiment in NMR, but dramatically reduces measuring time with a one-dimensional modification. The sequence is also more sensitive to weak fluctuators than the dynamical-decoupling-type sequences. By applying the sequence to a qubit, the existence of a two-state fluctuator is characterized by an oscillating signal, whose frequency and amplitude correspond to the fluctuator's strength and correlation time respectively. The method opens a way to investigate noise in the quasistatic regime, which cannot be resolved by conventional coherence-characterization methods. The pulse sequence can be used to study phenomena in Josephon-junction qubits such as quasiparticle tunneling. The Lincoln Laboratory portion of this work was sponsored by the Assistant Secretary of Defense for Research & Engineering under Air Force Contract number FA8721-05-C-0002. Opinions, interpretations, conclusions and recommendations are those of the author and are not necessarily endorsed by the United States Government.

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Date submitted: 15 Nov 2013 Electronic form version 1.4