

Abstract Submitted  
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**Dispersive measurement of a metastable phase qubit using a tunable cavity** JED WHITTAKER, University of Colorado at Boulder, MICHAEL ALLMAN, KATARINA CIOCIK, FABIO DA SILVA, NIST, ADAM SIROIS, University of Colorado at Boulder, JOHN TEUFEL, JOE AUMENTADO, RAY SIMMONDS, NIST — A metastable phase qubit was measured using a tunable cavity by two methods: a tunneling measurement followed by magnetometry readout by the cavity, and a non-destructive dispersive measurement of the qubit by the cavity. The cavity was also used to directly observe the photons radiated by a tunneling measurement. Using a tunable cavity to dispersively measure a metastable phase qubit avoids tunneling measurement radiation and allows for further post-measurement qubit manipulations, two characteristics useful in a quantum processor. The tunable nature of the cavity allows it to be detuned during any single qubit or multi-qubit gate operations in order to maintain long qubit lifetimes by avoiding loss via the Purcell Effect. This architecture is readily expanded for multiplexed readout of many qubits.

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