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Investigation of the measurement dynamics of a flux qubit inductively coupled to a readout dc-SQUID PETER GROSZKOWSKI, JAY GAMBETTA, FRANK WILHELM, IQC, University of Waterloo — In this paper we investigate the measurement dynamics of a flux qubit inductively coupled to a capacitively shunted, readout dc-SQUID. We study how the measurement induced dephasing and relaxation rates scale as a function of the qubit operation point and measurement strength. We find analytical solutions when the measurement is quantum-non-demolition (QND) and provide a numerical investigation for non-QND operation. This is of importance as the measurement of the flux qubit when operated at its sweet spot is inherently non-QND. We conclude this with a discussion of the measurement efficiency and signal-to-noise ratio.

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