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Ground State Misidentification in Superconducting Qubits JAMES WENNER, Y. CHEN, J. KELLY, H. WANG, E. LUCERO, B. CHIARO, R. BARENDS, M. LENANDER, M. MARIANTONI, A. MEGRANT, C. NEILL, P. O'MALLEY, P. ROUSHAN, D. SANK, A. VAINSENCHER, T. WHITE, Y. YIN, J. ZHAO, A.N. CLELAND, JOHN M. MARTINIS, UC Santa Barbara —
To achieve fault tolerant quantum computation, it is necessary to maximize measurement fidelity and minimize readout-induced measurement errors. A new protocol was developed to measure $P_1(|g>)$, the probability of measuring the excited state without exciting the qubit, while not including stray tunneling present in superconducting phase qubits. We have confirmed the expected trend in $P_1(|g>)$ with device temperature. We then compared $P_1(|g>)$ for phase qubits with different readout mechanisms and found that it is $\sim$3% for our dispersive readout scheme and $\sim$1.5% for our prior SQUID-based readout scheme. We have further applied microwave power to the flux bias and microwave drive lines to understand the source of this difference.

[X] Prefer Oral Session
[ ] Prefer Poster Session

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