Abstract Submitted
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Optimal Control of Quantum Measurement for Superconducting Phase Qubits[1] FRANK WILHELM, DANIEL EGGER, Saarland University — Pulses to steer the time evolution of quantum systems can be designed with optimal control theory. In most cases it is the coherent processes that can be controlled and one optimizes the time evolution towards a target unitary process, sometimes also in the presence of non-controllable incoherent processes. Here we show how to extend the GRAPE algorithm in the case where the incoherent processes are controllable and the target time evolution is a non-unitary quantum channel. We perform a gradient search on a fidelity measure based on Choi matrices. We illustrate our algorithm by optimizing a phase qubit measurement pulse. We show how this technique can lead to large measurement contrast close to 99%. We also show, within the validity of our model, that this algorithm can produce short 1.4 ns pulses with 98.2% contrast. Work posted at arXiv:1408.6086, in press at Physical Review A

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