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Optimal control of single flux quantum (SFQ) pulse sequences PER LIEBERMANN, FRANK WILHELM, Saarland University — Single flux quantum (SFQ) pulses are a natural candidate for on-chip control of superconducting qubits [1]. High accuracy quantum gates are accessible with quantum optimal control methods. We apply trains of SFQ pulses to operate single qubit gates, under the constraint of fixed amplitude and duration of each pulse. Timing of the control pulses is optimized using genetic algorithms and simulated annealing, decreasing the average fidelity errorby several orders of magnitude. Furthermore we are able to reduce the gate time to the quantum speed limit. Leakage out of the qubit subspace as well as timing errors of the pulses are considered, exploring the robustness of our optimized sequence.This takes usone step further to a scalable quantum processor.
[1] R. McDermott and M.G. Vavilov, Phys. Rev. Appl. 2, 014007 (2014)

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