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Crosstalk in superconducting quantum circuits CHRISTIAN KRAGLUND ANDERSEN, YVES SALATHE, JOHANNES HEINSOO, SEBASTIAN KRINNER, ANDRIAN BECKERT, ETH - Zurich, ALEXANDRE BLAIS, Universite de Sherbrooke, ANDREAS WALLRAFF, ETH - Zurich — Quantum information protocols beyond the simplest tests requires a large number of qubits to be implemented in a scalable way with a design that allows for high fidelity one- and two-qubit gates and single-shot readout. However, practical designs typically suffer from unwanted crosstalk between the qubits. In this talk we analyze the crosstalk from a theoretical point of view. We divide the crosstalk into three main contributions: a constant qubit-qubit interaction, cross-driving leading to AC-stark shifts and cross-flux dependence leading to unwanted phase changes of the qubits. We address how the crosstalk influences the performance of the chip and, in particular, how the crosstalk can be mitigated when scaling up the system to multiple qubits to achieve a set of gates with minimal-crosstalk. Finally, we apply the analysis to an experimentally implemented qubit design.

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