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**Entangling ISWAP gate using frequency shifted anharmonic qubits** FELIX MOTZOI, JAY GAMBETTA, SETH MERKEL, AMIRA ELTONY, FRANK WILHELM, University of Waterloo — In this talk, we examine the coupling between frequency separated qubits, typical of superconducting implementations. We show how to correct for errors coming from finite turn-on time (corresponding to bringing the qubits into resonance) as well as leakage error (corresponding to exciting population out of the qubit manifold), namely by bringing the qubits in and out of resonance repeatedly to cancel out the unwanted parts of the Hamiltonian. The gates presented are smooth and robust and represent a whole class of analytic and numeric solutions for the evolution of the composite system.

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