

Abstract Submitted
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Development of Integrated Single Flux Quantum - Superconducting Qubit Circuits EDWARD LEONARD JR., TED THORBECK, SHAOJIANG ZHU, Univ of Wisconsin, Madison, CALEB HOWINGTON, MATTHEW HUTCHINGS, JJ NELSON, BRITTON PLOURDE, Syracuse University, ROBERT MC-DERMOTT, Univ of Wisconsin, Madison — Significant theoretical and experimental progress has been made in recent years towards a scalable superconducting quantum circuit architecture. Here we present a first attempt to integrate classical control elements from the single flux quantum (SFQ) digital logic family with a superconducting transmon qubit on a single chip. The SFQ driving circuit is fabricated in a six-layer high- J_c Nb/Al-AlO_x/Nb junction process while the transmon qubit is subsequently formed using submicron Al-AlO_x-Al junctions grown by double-angle evaporation. We investigate sources of decoherence associated with the more complex fabrication process and describe first attempts to perform coherent qubit manipulations using resonant trains of SFQ pulses.

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