

Abstract Submitted
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Micromachined integrated quantum circuit containing a superconducting qubit TERESA BRECHT, YIWEN CHU, CHRISTOPHER AXLINE, WOLFGANG PFAFF, JACOB BLUMOFF, KEVIN CHOU, LEV KRAYZMAN, LUIGI FRUNZIO, ROBERT SCHOELKOPF, Yale University — We demonstrate a functional multilayer microwave integrated quantum circuit (MMIQC¹). This novel hardware architecture combines the high coherence and isolation of three-dimensional structures with the advantages of integrated circuits made with lithographic techniques. We present fabrication and measurement of a two-cavity/one-qubit prototype, including a transmon coupled to a three-dimensional microwave cavity micromachined in a silicon wafer. It comprises a simple MMIQC with competitive lifetimes and the ability to perform circuit QED operations in the strong dispersive regime. Furthermore, the design and fabrication techniques that we have developed are extensible to more complex quantum information processing devices.

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