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Quantum Superinductor with Tunable Nonlinearity¹ MATTHEW BELL, IVAN SADOVSKYY, LEV IOFFE, Rutgers University, ALEXEI KITAEV, Caltech, MICHAEL GERSHENSON, Rutgers University — We report on the realization of a superinductor, a dissipationless element whose microwave impedance greatly exceeds the resistance quantum R_Q . The design of the superinductor, implemented as a ladder of nanoscale Josephson junctions, enables tuning of the inductance and its nonlinearity by a weak magnetic field. The Rabi decay time of the superinductor-based qubit exceeds $1 \mu s$. The high kinetic inductance and strong nonlinearity offer new types of functionality, including the development of qubits protected from both flux and charge noises, fault tolerant quantum computing, and high-impedance isolation for electrical current standards based on Bloch oscillations.

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