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Entangled Schrodinger cats in circuit QED: Experimental Architecture CHEN WANG, YVONNE Y. GAO, PHILIP REINHOLD, REINIER W. HEERES, NISSIM OFEK, KEVIN CHOU, CHRISTOPHER AXLINE, LUIGI FRUNZIO, MICHEL H. DEVORET, ROBERT J. SCHOELKOPF, Yale University — The development of quantum information technology relies on creating and controling entanglement over an increasingly large Hilbert space. Superconducting cavities offer high-dimensional spaces for quantum states in a low-loss and hardware-efficient fashion, making it an ideal memory of quantum information and an important element towards fault-tolerant quantum computation. In this talk we present a cQED architecture that allows quantum control over the coherent state basis of two superconducting cavities with millisecond coherence. In particular, we show deterministic entanglement of coherent-state microwave fields in two superconducting cavities of the form: $\frac{1}{\sqrt{2}}(|\ \beta_a\rangle\,|\ \beta_a\rangle \pm |-\ \beta_a\rangle\,|-\ \beta_a\rangle)$. We engineer the capability to measure the joint photon number parity to achieve complete state tomography of the two-cavity state. Following widespread efforts of realizing "Schrodinger's cat"-like mesoscopic superposition in various physical systems, this experiment demonstrates mesoscopic entanglement between two "Schrodinger's cats".

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