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Quantum Noise in a Chirped Superconducting Nonlinear Resonator KATER MURCH, R. VIJAY, QNL, UC Berkeley, IDO BARTH, LAZAR FRIEDLAND, Racah Institute of Physics, Hebrew University, IRFAN SIDDIQI, QNL, UC Berkeley — A nonlinear Josephson junction oscillator driven near resonance can exhibit bistability, forming the basis for sensitive, digital quantum state readout. We consider the case of a high-Q resonator embedded with a Josephson junction excited with a chirped frequency signal. For sufficient drive amplitude, the resonator phase locks with the drive signal and enters the high amplitude oscillation state, a phenomenon known as autoresonance. The probability of capture in a given chirped pulse depends on the initial phase difference between the drive signal and of the fluctuation induced oscillations of the resonator. We find that the width of this threshold is in agreement with recent theoretical predictions and is set by zero-point fluctuations of the resonator. Autoresonant capture forms the basis for fast readout of a superconducting qubit coupled to a high-Q resonator.

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