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Broadband Kinetic Inductance Based Traveling Wave Amplifier for Qubit Readout. MICHAEL VISSERS, ROBERT ERICKSON, HSIANG-SHENG KU, JIANSONG GAO, DAVID PAPPAS, NIST - Boulder — A broadband quantum-limited amplifier is desirable for multiplexed readout of superconducting qubits and detectors. The kinetic inductance traveling-wave parametric amplifier (KIT) is a new type of amplifier that utilizes the intrinsic dissipationless nonlinearity of kinetic inductance of superconductors like NbTiN and TiN for parametric amplification. The amplifier consists of a several meter long CPW transmission line fabricated from a 20nm NbTiN film on an intrinsic Si wafer. The transmission line is dispersion engineered with impedance loadings to achieve the ideal phase matching which leads to broadband gain. We measure over 20dB of gain across several GHz of bandwidth with a high gain-saturation power and dynamic range.

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