Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Kinetic Inductance Traveling-wave Parametric Amplifier for Qubit and Detector Readout JIANSONG GAO, MIKE VISSERS, MARTIN SANDBERG, NIST - Boulder, SAPTARSHI CHAUDHURI, Stanford University, CLINT BOCKSTIEGEL, University of California at Santa Barbara, CHRISTOPHER ABELES, University of Colorado at Boulder, KENT IRWIN, Stanford University, DAVID PAPPAS, NIST - Boulder — A broadband quantum-limited amplifier is desired for multiplexed readout of superconducting qubits and detectors. Kinetic inductance traveling-wave parametric amplifier (KIT) is a new type of amplifier that utilizes the intrinsic nonlinearity of kinetic inductance of superconductor for parametric amplification. By applying dispersion engineering, KIT amplifier can achieve quantum-limited noise over a broad bandwidth. We have designed a KIT amplifier which consists of a 2-m long coplanar waveguide fabricated from 20 nm NbTiN film on Si wafer. We have achieved over 10dB gain in a bandwidth from 5 to 11 GHz. We have found the maximum gain is limited by abrupt breakdown at defects in the transmission line. By cascading two devices, more than 20 dB of gain was achieved from 5 to 12 GHz. We are also designing a travel-wave version of Josephson parametric amplifier with GHz bandwidth by applying dispersion engineering.

Jiansong Gao
NIST - Boulder

Date submitted: 14 Nov 2013 Electronic form version 1.4