Characterization of a Wide-Band Microstrip Parametric Amplifier Utilizing 4-Wave-Mixing Techniques

E. Linden,[1] N. Klimovich,[2] S. Shu, B. Eom,[3] C. Kim,[3] R. DeLuc,[3] and P. Day[3]

[1]*Department of Physics, The College of Liberal Arts and Sciences, Arizona State University, Tempe, AZ, 85281*

[2]*The Division of Physics, Mathematics and Astronomy, California Institute of Technology, Pasadena, California 91125, USA*

[3]*Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California 91109, USA*

Kinetic Inductance Traveling Wave Parametric Amplifiers (KI-TWPA) are being developed that can achieve quantum-limited sensitivity over wide fractional bandwidths, while being able to amplify signals of the level needed for sensitive astronomical measurements. We present initial measurements on the KI-TWPA through 4 Wave Mixing (4WM) of a superconducting NbTiN microstrip transmission line using the nonlinear kinetic inductance inherent in the NbTiN material, measured at 1K. The target of our design is to produce gain in a signal bandwidth of 4-12GHz for use as a detector readout amplifier, or as an IF amplifier in a heterodyne receiver system. Because both the pump tone and the generated idler tones lie at higher frequency than the amplified region, the entire 4-12 GHz range will be useful for signal amplification without introduction of image tones.