Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Development of on-chip passive microwave components towards a continuous variables implementation of Quantum Information Processing HSIANG-SHENG KU, MANUEL CASTELLANOS-BELTRAN, FRANCOIS MALLET, KENT IRWIN, LEILA VALE, KONRAD LEHNERT — Quantum information processing aims to exploit entanglement, the unique feature of quantum mechanics, to enhance our abilities for communication and computation. In the strategy of continuous-variables quantum information processing, an entangled state of the electromagnetic field, similar to the famous EPR state, can be generated by combining two squeezed states on a beam splitter. Our group has already demonstrated the ability to generate these highly non classical squeezed states at microwave frequencies using a Josephson Parametric Amplifier. However, generating EPR states is more demanding. Passive elements, like directional couplers and 90-degree-hybrid couplers (the microwave analogue of beam splitters), have to be developed such that they can be integrated on the same chip as the JPA. In addition, they must be low-loss to preserve the entanglement. In this talk we will present the design and test of an on-chip 20dB directional coupler and a 90-degree-hybrid coupler. Their performance will be carefully analyzed by the use of the Through-Reflect-Line calibration method.

Hsiang-Sheng Ku

Date submitted: 24 Nov 2009 Electronic form version 1.4