Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Path Entanglement of Continuous-Variable Quantum Microwaves

E. P. MENZEL, F. DEPPE, P. EDER, L. ZHONG, M. HAEBERLEIN, A. BAUST, E. HOFFMANN, A. MARX, R. GROSS, Walther-Meissner-Institut and TU Muenchen, Germany, R. DI CANDIA, E. SOLANO, Universidad del Pais Vasco UPV/EHU and Ikerbasque, Spain, D. BALLESTER, University College London, UK, M. IHMIG, TU Muenchen, Germany, K. INOMATA, RIKEN Advanced Science Institute, Japan, T. YAMAMOTO, NEC Smart Energy Research Laboratories and RIKEN, Japan, Y. NAKAMURA, The University of Tokyo and RIKEN, Japan —

Entanglement is a quantum mechanical phenomenon playing a key role in quantum communication and information processing protocols. Here, we report on frequency-degenerate entanglement between continuous-variable quantum microwaves propagating along two separated paths. In our experiment, we combine a squeezed and a vacuum state via a beam splitter. Overcoming the challenges imposed by the low photon energies in the microwave regime, we reconstruct the squeezed state and, independently from this, detect and quantify the produced entanglement via correlation measurements (E. P. Menzel *et al.*, arXiv:1210.4413). Our work paves the way towards quantum communication and teleportation with continuous variables in the microwave regime.

This work is supported by SFB 631, German Excellence Initiative via NIM, EU projects SOLID, CCQED and PROMISCE, MEXT Kakenhi "Quantum Cybernetics", JSPS FIRST Program, the NICT Commissioned Research, EPSRC EP/H050434/1, Basque Government IT472-10, and Spanish MICINN FIS2009-12773-C02-01.

E. P. Menzel
Walther-Meissner-Institut and TU Muenchen, Germany

Date submitted: 09 Nov 2012 Electronic form version 1.4