Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Coherent Two Photon Production in Superconductor-Semiconductor Heterostructures[1] PAUL BAIREUTHER, Karlsruhe Institute of Technology, Karlsruhe, Germany, ILYA VEKHTER, Louisiana State University, Baton Rouge, LA, USA, JÖRG SCHMALIAN, Karlsruhe Institute of Technology, Karlsruhe, Germany
— Connecting a thin (direct band gap) p-n junction to a superconductor allows Cooper pairs to tunnel into the junction. This leads to an enhancement of the luminescence at the junction via Cooper pair based radiative recombination[1,2], an effect that has recently been observed experimentally[3]. Due to the proximity-induced Cooper pairs in the junction, anomalous photon production related to coherent two photon processes becomes allowed. Using a simple model for direct band gap luminescence we study a superconductor-p-n-superconductor heterostructure where the two photon state depends on the relative phase between the two superconductors. We investigate to what extend the production rate of entangled photons is controlled by the phase difference between the attached superconductors.

[1] E. Hanamura, Phys. Stat. Sol. (b) 234, 166 (2002).
[2] Y. Asano, I. Suemune, H. Takayanagi, and E. Hanamura, Phys. Rev. Lett. 103, 187001 (2009).
[3] I. Suemune, T. Akazaki, K. Tanaka, M. Jo, K. Uesugi, M. Endo1, H. Kumano, E. Hanamura, H. Takayanagi, M. Yamanishi and H. Kan, Jpn. Journ. of Appl. Phys. 45, 9264 (2006).

Paul Baireuther
Karlsruhe Institute of Technology, Karlsruhe, Germany

[1]Supported by the DFG-Center for Functional Nanostructures, Karlsruhe Institute of Technology

Date submitted: 11 Nov 2011 Electronic form version 1.4