

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Determination Hanbury-Brown Twiss correlations with electrons and photons EVA ZAKKA-BAJJANI, SPEC/IRAMIS/DSM/CEA, J. DUFOULEUR, P. ROCHE, D.C. GLATTLI, F. PORTIER, NANO-ELECTRONICS TEAM — What is the statistics of the photons emitted by a quantum conductor? We present the first experiment addressing this question, where the electronic shot noise power of a 500Ω tunnel junction is measured in the 4-8 GHz frequency range in an Hanbury-Brown Twiss geometry (E. Zakka-Bajjani *et al.* Phys. Rev. Lett. **99**, 236803 (2007)). The emitted noise is analyzed in two different manners. The fluctuations of the transmitted and reflected electronic currents are shown to be anti-correlated. The auto-correlated power fluctuations reveal that the junction emits power into the detection in the form of photons, and the emitted powers show positive cross-correlation, proportional to the squared emitted power. The photons emitted by a biased low impedance (i.e. $R_{tunnel} \ll e^2/h$) tunnel junction are thus shown to obey the same statistics as thermal photons, also in the quantum regime, $eV \approx h\nu$, in agreement with a recent prediction of Beenakker and Schomerus (Phys. Rev. Lett. **93**, 096801 (2004)).

Eva Zakka-Bajjani
SPEC/IRAMIS/DSM/CEA

Date submitted: 15 Dec 2008

Electronic form version 1.4