Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Photon statistics of shot noise measured using a Josephson parametric amplifier JEAN OLIVIER SIMONEAU, STÉPHANE VIRALLY, CHRISTIAN LUPIEN, BERTRAND REULET, Université de Sherbrooke — Quantum measurements are very sensitive to external noise sources. Such measurements require careful amplification chain design so as not to overwhelm the signal with extraneous noise. A quantum-limited amplifier, like the Josephson parametric amplifier (paramp), is thus an ideal candidate for this purpose. We used a paramp to investigate the quantum noise of a tunnel junction. This measurement scheme allowed us to improve upon previous observations of shot noise by an order of magnitude in terms of noise temperature. With this setup, we have measured the second and fourth cumulants of current fluctuations generated by the tunnel junction within a 40 MHz bandwidth around 6 GHz. From theses measurements, we deduce the variance of the photon number fluctuations for various bias schemes of the junction. In particular, we investigate the regime where the junction emits pairs of photons.

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Date submitted: 14 Nov 2014 Electronic form version 1.4