

Abstract Submitted
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On-chip photon-assisted shot noise detection to probe the near THz fundamental quantum noise of QPC Y. JOMPOL, F. PORTIER, P. ROCHE, D.C. GLATTLI, SPEC, CEA Saclay, France — The physics of quantum shot noise becomes particularly interesting when the voltage energy is close to the frequency operation. However, high-frequency noise is usually limited to few GHz due to the large mismatch between the high impedance of the quantum conductor and the low impedance of the external circuit. To circumvent this problem, on-chip detection schemes have been recently implemented using Quantum Dots or SIS junctions. The proximity (few tens of microns) between the emitter and the detector prevents capacitive shunting and very high frequency noise (up to THz) can be measured. We propose a new type of universal high frequency noise detector based on Photo-Assisted Shot Noise (PASN) using universal effect of quantum noise from two quantum point contacts (QPCs), one as an emitter of high frequency shot noise and the other as a PASN detector, each of them placed on separate mesa Hall bars of a two-dimensional electron gas. Two extra QPCs are used as tuning impedance for cut-off frequency. At high frequency the detector and the noise source emitter are coupled via an interdigitated capacitor. By separately varying the noise Fano factor with the transmission of the QPCs, it is possible to check the detection is actually based on PASN mechanism and that the emitter actually generates quantum shot noise. We will present detailed studies of this new universal on-chip detection.

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