

Abstract Submitted
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Photo-assisted Shot Noise as universal photon detectors¹ CHRISTIAN GLATTLI, YODCHAY JOMPOL, IVANA PETKOVIC, FABIEN PORTIER, PATRICE ROCHE, CEA Saclay — Photon assisted shot noise (PASN) is a universal phenomenon occurring in all mesoscopic conductors. It has been observed in diffusive metallic thin films [1] and in Quantum Point Contacts (QPCs) realized in 2D electron gas [2] at temperature < 1 K for frequencies up to 20GHz. We propose to exploit PASN to realize radiation detectors working at temperature > 4 K and frequencies up to tens of THz. PASN originates from the creation of electron-hole pairs of energy $h\nu$ when an ac voltage V_{ac} at frequency ν is applied on a contact of a mesoscopic conductor. The electron-hole pairs are then dissociated by random scattering in the conductor. This generates a low frequency current shot noise $S_I = 4h\nu J_1(eV_{ac}/h\nu)^2 G F$, with F the ordinary shot noise Fano factor, G the conductance and J_1 a Bessel function. This relation being independent of material or geometrical details and free from unknown parameters, PASN radiation detectors are expected robust and universal for radiation metrology. Possible conductors are tunnel junctions, Graphene, doped semi-conductors, QPCs, etc., for a wide range of temperatures < 1 K to ~ 100 K and frequencies GHz to 10 THz. [1] Kozhevnikov et al. PRL **84**,3398(2000). [2] Reydellet et al. PRL **90**,176803(2003).

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