Photon-assisted shot noise in graphene in the Terahertz range

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When subjected to electromagnetic radiation, the fluctuation of the electronic current across a quantum conductor increases. This additional noise, called photon-assisted shot noise, arises from the generation and subsequent partition of electron-hole pairs in the conductor. The physics of photon-assisted shot noise has been thoroughly investigated at microwave frequencies up to 20 GHz, and its robustness suggests that it could be extended to the Terahertz (THz) range. Here, we present measurements of the quantum shot noise generated in a graphene nanoribbon subjected to a THz radiation. Our results show signatures of photon-assisted shot noise, further demonstrating that hallmark time-dependant quantum transport phenomena can be transposed to the THz range.

References

[1] F.D. Parmentier *et al.*, Phys. Rev. Lett. 116, (2016) p.227401

Figures

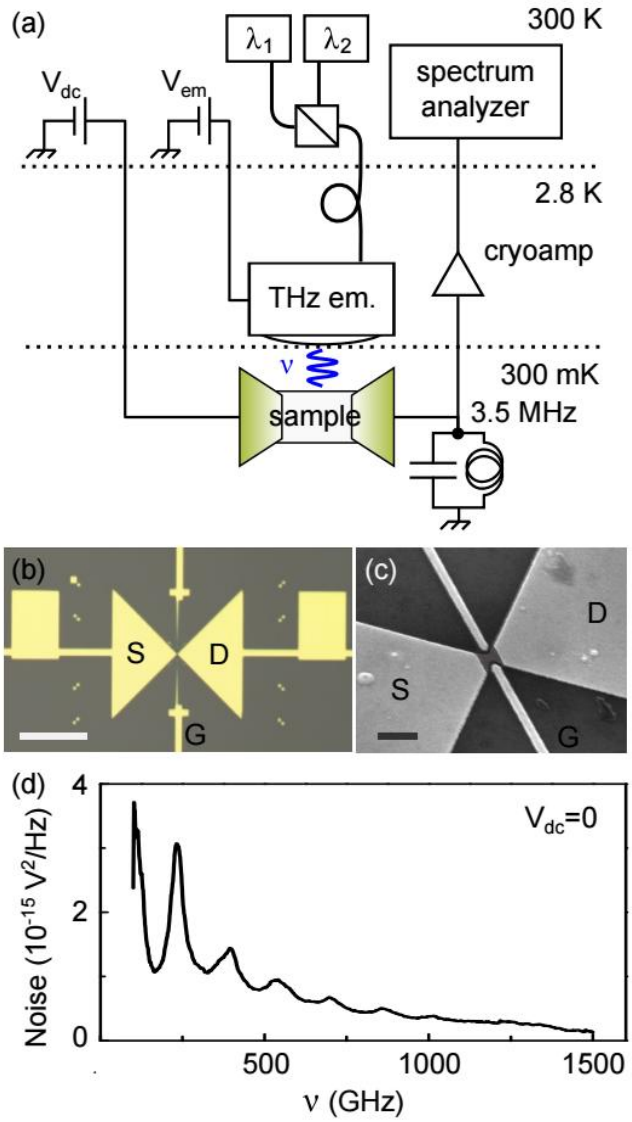

Figure 1: (a), Schematic description of the experimental setup, combining tunable THz emission and high-sensitivity shot noise measurements at 0.3 K. (b) and (c), Optical and scanning electron micrographs of a typical sample made of a CVD-grown graphene nanoribbon contacted by bow-tie antenna-shaped electrodes. (d), Integrated excess noise power measured at the output of the setup as a function of the frequency of the THz radiation.