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Response to comment on "Photon-assisted electron transport through a quantum point contact in a microwave field" (Pis'ma v ZhETF 102(6), 417 (2015))

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It is argued in [1] that a high-frequency (HF) potential induced by microwaves (≈ 150 GHz) in the quantum point contact (QPC) in a two-dimensional electron gas (2DEG) must be an odd function of x ($V(x)$ in Fig. 1a). This corresponds to the HF voltage applied

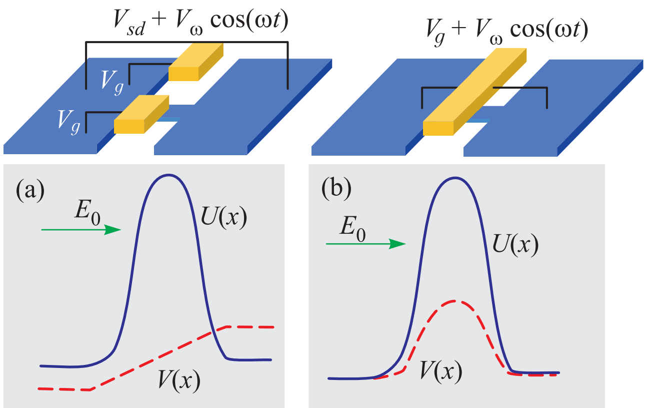

Fig. 1. (Color online) Split gate (a) or narrow continuous gate (b) above the constriction in the 2DEG; $U(x)$ is static 1D barrier, $V(x)\cos(\omega t)$ is the HF potential, E_0 is energy of electron incident on the barrier

between the source and drain 2DEG reservoirs of the system and opposed to the case of the HF barrier $V(x)$ shown in Fig. 1b and corresponding to the HF voltage applied between the gate and the 2DEG. In [2] we compared to experiment [3] only case b. Then the authors of comment [1] conclude that the work is not related to experiment [3]. Meanwhile HF additions to *both* V_{sd} *and* V_g static voltages were previously registered in the THz-photoconductance of QPC [4].

Actually, we considered two cases in [2], and the results were not qualitatively different. Here we show that fitting to experiment [3] is equally good for both cases (Fig. 2). The main difference is maximum HF field in

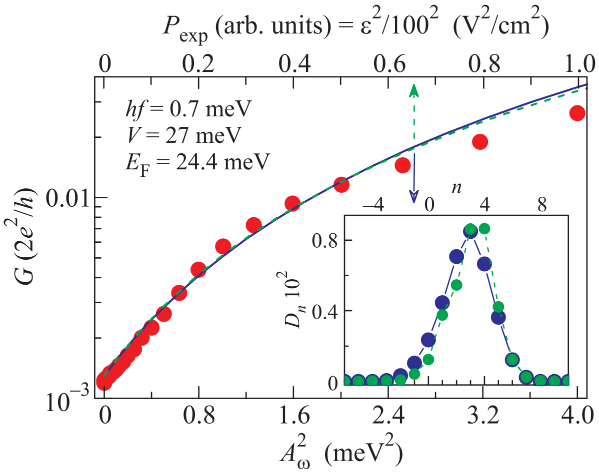

Fig. 2. (Color online) Experimental [3] (dots) and calculated conductance. Case from Fig. 1a – dashed line, top axis, G vs HF field power P_{exp}. Case from Fig. 1b – solid line, bottom axis, G vs square of amplitude of the HF barrier A_ω^2. Inset shows contributions of channels $E_n = E_F + n\hbar\omega$ to transmission coefficient ($D = 0.034$) for respective cases of HF potential

the QPC: 100 vs 150 V/cm. These values are 2 orders of magnitude larger than the power of 2 mm microwaves emitted from waveguide on the sample. We argue that this amplification is due to all metal leads in the sample acting as antenna.

Simple formulas given in [1] ignore non-uniformity of potentials $U(x)$, $V(x)$ on the scale 100 nm, but it is these irregularities that HF field makes use of influencing the electron transmission coefficient. In our model continuous $U(x)$, $V(x)$ are approximated by piecewise constant functions with a small step in x. The wave-

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function matching technique, which is used in [2], defines the multi-channel wave function at each interval as a series over Bessel functions of arguments depending on x. Surprisingly, the calculation for two different distributions of electric field yield similar results (Fig. 2). Explanation of this fact and calculation of the HF field enhancement near the QPC are interesting problems for theory.

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