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Quantum charge fluctuations of a proximitized nanowire ROMAN LUTCHYN, Microsoft Station Q, Santa Barbara, KARSTEN FLENSBERG, University of Copenhagen, LEONID GLAZMAN, Yale University — Motivated by recent experiment by Albrecht et al., Nature (2016), we consider charging of a nanowire which is proximitized by a superconductor and connected to a normal-state lead by a single-channel junction. The charge Q of the nanowire is controlled by gate voltage eN_g/C. A finite conductance of the contact allows for quantum charge fluctuations, making the function $Q(N_g)$ continuous. It depends on the relation between the superconducting gap Δ and the effective charging energy E_C^*. The latter is determined by the junction conductance, in addition to the geometrical capacitance of the nanowire. We investigate $Q(N_g)$ at zero magnetic field B, and at fields exceeding the critical value B_c corresponding to the topological phase transition. Unlike the case of $\Delta = 0$, the function $Q(N_g)$ is analytic even in the limit of negligible level spacing in the nanowire. At $B = 0$ and $\Delta > E_C^*$, the maxima of dQ/dN_g are smeared by $2e$-fluctuations described by a single-channel "charge Kondo" physics, while the $B = 0$, $\Delta < E_C^*$ case is described by a crossover between the Kondo and mixed-valence regimes of the Anderson impurity model. In the topological phase, $Q(N_g)$ is analytic function of gate voltage with e-periodic steps.

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