# Приложение 3

Higher School of Economics
Condensed-matter physics laboratory

Winter school on Quantum condensed-matter physics
Chernogolovka, Landau Institute, December 13-17, 2017

## Poster session

P1. A.A. Dobretsova – **Berry phase and extraordinary Landau levels shift**

P2. P. Volkov – **Charge and current orders in spin-fermion model with overlapping hot spots**

P3. M. L. Savchenko – **Density of States of Dirac Fermions in HgTe Quantum Well**

P4. S. V. Postolova – **Dimensional crossover as the origin of reentrant resistive behavior in superconducting films**

P5. S. S. Seidov – **Dipolar quantum phase transition in the Dicke model with infinitely coordinated frustrating interaction**

P6. M. V. Burdastykh – **Disorder-tuned superconductor-insulator transition in thin NbTiN films**

P7. V. V. Enaldiev – **Edge states and spin-valley edge photocurrent in transition metal dichalcogenide monolayers**

P8. E. S. Azarova – **Electronic properties and the persistent current of one-dimensional mesoscopic rings with inhomogeneities**

P9. Nikolay Stepanov – **Fluctuation superconductivity: from the dirty to the clean case**

P10. Vladislav Kurilovich and Pavel Kurilovich – **Helical edge transport in the presence of a magnetic impurity: influence of a local anisotropy**

P11. V. Sakhin – **Intrinsic Magnetic Moments in the Topological Insulators**

P12. A. A. Kopasov – **Inverse proximity effect in Majorana nanowires**

P13. O.V. Skryabina – **Josephson coupling across a long single-crystalline Cu nanowire**

P14. V. L. Vadimov – **Laser pulse probe of the chirality of Cooper pairs**

P15. Petr Karpov – **Modeling of networks and globules of charged domain walls observed in pump and pulse induced states**

P16. S. K. Gotovko – **Multiferroicity of $CuCrO_2$ tested by ESR**

P17. E. Baeva – **Quantitative determination of the the heat conductance for niobium-nitride single photon detectors**

P18. O. V. Ivakhnenko – **Simulating quantum dynamical phenomena using classical oscillators**

P19. Sergei Aksenov – **Spin-polarized-current switching mediated by Majorana bound states**

P20. G. Penzyakov – **About possible observation of $0-\pi$ transitions in hybrid planar Josephson junction**

P13

## Josephson coupling across a long single-crystalline Cu nanowire

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We report on a fabrication method and the electron-transport measurements for submicron Josephson junctions formed by Cu nanowires coupling superconducting planar Nb electrodes for 2-probe and 4-probe measurements. Copper nanowires were prepared by metal electrodeposition inside the cylindrical channels of porous template aluminum oxide. Transmission electron microscopy image and selected area electron diffraction pattern image reveal that copper nanowires have single crystal structure. By taking advantage of Nb as a superconducting electrode and a singlecrystalline Cu nanowire as a barrier, we demonstrate measurable Josephson supercurrent up to relatively high temperature of 3.5 K. The resistivity of Copper nanowires $\rho_{Cu} \simeq 1$ $\mu\Omega$ cm is comparable to the values of $\rho$ experimentally achieved earlier for Cu nanowire systems at the liquid helium temperature [1]. The measurements of $I_c$ as a function of magnetic field show that the Josephson supercurrent can be detectable up to a field of 800 Oe. The observed monotonic decrease in $I_c$ with magnetic field and temperature is quantitatively explained on the framework of the quasiclassial theory of superconductivity. As a model for the junctions investigated using 2-probe geometry, we consider an SINIS type structure where I is the interface barrier between the Nb electrode and the Cu nanowire described by the parameter $\gamma_B = R_B/\rho\xi_N$.

[1] A. Bid, A. Bora, A. K. Raychaudhuri, Phys. Rev. B **74**, 3, 035426 (2006).