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Carbon nanotube field effect transistors under high magnetic fields GEORGY FEDOROV, DMITRY SMIRNOV, Natl. High Magnetic Field Lab, Florida State Univ., ALEXANDER TSELEV, YANFEI YANG, Dept. of Physics, Georgetown Univ., NIKOLAY KALUGIN, Dept. of Physics, Texas A&M Univ. — Magnetic field, when applied parallel to the CNT axis, alters the energy gap in the CNT electron spectrum with a period corresponding to one quantum of magnetic flux through the cross-section of the CNT. With available magnetic fields (10^1T by the order of magnitude), gap oscillations can be observed only in multi-wall CNTs with diameters larger than approx 5 nm, where effects of band structure variation are smeared out by defects and by quantum interference effects. As follows from [1], it is possible to separate effects of disorder from those of the band structure modification by studying magnetotransport in small diameter CNTs while controllably changing the position of the Fermi level of the CNT by electrostatic doping, i.e. by applying a gate voltage in the field effect transistor configuration. We have studied several samples of individual CTNs contacted by palladium electrodes placed on an oxidized heavily doped silicon substrate that served as a back-gate. We find that magnetoresistance of a CNT strongly depends on the Fermi level position with respect to the nanotube's charge neutrality point (CNP). Details and the analysis of our experimental data will be presented. [1] S. Roche, R. Saito, Phys. Rev. Lett. 87, 246803 (2001)

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