ABSTRACTS

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CONDUCTANCE FLUCTUATIONS IN MESOSCOPIC CONDUCTOR WITH ANTIDOTS.

G.M. Gusev, P. Basmajji, M. H. Degani
Instituto de Física e Química de São Carlos,
Universidade de São Paulo, SP, Brasil

P.W.H. Pinkse, J.C. Portal
Service National des Champs Intenses, Centre National
de Recherche Scientifique, F-38042, Grenoble,
and INSA-Toulouse, 31077, France

Z.D. Kvon, L.V. Litvin, Yu.V. Nastaushev, A.I. Toropov
Institute of Semiconductor Physics, Russian Academy of Sciences,
Siberian Branch, Novosibirsk, Russia

Recently, new microstructures based on a high mobility two-dimensional (2D) electron gas in GaAs/AlGaAs heterostructures have been fabricated, in which electron transport is ballistic: electron collide with the sidewall of microstructures, but not with the impurities. One version of this electron billiard is a 2D electron gas in a lattice of antidot: holes with submicron diameter etched in heterostructures GaAs/AlGaAs. In this system electrons are scattered by the antidot strong repulsive potential. In this work we measured magnetoresistance in mesoscopic samples with artificially created scatterers (antidots) arranged in a disordered configurations. Samples had a size $4 \times 4 \, \mu m^2$, the averaged period of the disordered antidot lattice was $0.7 \, \mu m$, diameter of antidot $0.1$-$0.15 \, \mu m$. Magnetoresistance fluctuations of this mesoscopic conductor due to the interference of the ballistic electron trajectories have been found. From calculation of the correlation function and Fourier spectrum of these fluctuations we determined correlation magnetic field. We suggested, that our billiard consists of a series of elementary billiard with 3-4 antidots. Amplitude of the conductivity fluctuations $0.1 \, e^2/h$ has been found. Change in the pattern of conductivity fluctuations as a function of magnetic field after irradiation by the light has been observed. We believe, that this change was due to variation in the width of the depletion region around antidots. Since our system is a chaotic billiard, the close electron trajectories are diverged after several collisions. Therefore interference of these trajectories has a high sensitivity to radius variation of the depletion zone around antidots.