Abstract Submitted
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Influence of spin polarization on resistivity of a two-dimensional electron gas in Si MOSFET at metallic densities[1] I. SHLIMAK, A. BUTENKO, D.I. GOLOSOV, Dept. of Physics, Bar-Ilan University, Israel, K.-J. FRIEDLAND, Paul Drude Institute, Berlin, Germany, S.V. KRAVCHENKO, Physics Dept., Northeastern University, Boston, MA, U. S. A. — Positive magnetoresistance (PMR) of a silicon MOSFET in parallel magnetic fields B has been measured at high electron densities $n \gg n_c$ where n_c is the critical density of the metal-insulator transition (MIT). It turns out that the normalized PMR curves, $R(B)/R(0)$, merge together when the field is scaled according to $B/B_c(n)$ where B_c is the field in which electrons become fully spin polarized. The values of B_c have been calculated from the simple equality between the Zeeman splitting energy and the Fermi energy taking into account the experimentally measured dependence of the spin susceptibility on the electron density. This extends the range of validity of the scaling all the way to a deeply metallic regime far away from MIT. The subseqent analysis of PMR for low $n \gtrsim n_c$ demonstrated that the merging of the initial parts of curves can bee achieved only with taking into account the temperature dependence of B_c. It is shown that the shape of the PMR curves at strong magnetic fields is affected by a crossover from a purely two-dimensional (2D) electron transport to a regime where out-of-plane carrier motion becomes important (quasi-three-dimensional regime).

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