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In-plane magnetoresistivity of high-mobility two-dimensional electrons in an undoped Si/SiGe quantum well at 20 mK T. M. LU, Princeton University, W. PAN, Sandia National Laboratories, D. C. TSUI, Princeton University, C.-H. LEE, C. W. LIU, National Taiwan University — Two-dimensional electron gas (2DEG) in a Si quantum well with mobility over 1×10^6 cm^2/Vs has been realized using an undoped Si/SiGe heterostructure. In this high quality 2DEG, the 2D metal-insulator transition occurs at a characteristic density n_c=1.35×10^{10}/cm^2, the lowest reported in the Si systems. We have further measured the in-plane magnetoresistivity at 20mK. It is observed that, in sharp contrast to modulation-doped heterostructures with lower electron mobility where the ratio of the saturation resistance in high in-plane magnetic field to the zero-magnetic-field resistance is strongly enhanced near n_c, no such enhancement is observed in this high-mobility undoped field-effect transistor. The characteristic magnetic field, B_S, at which the in-plane magnetoresistivity saturates, follows the linear electron density dependence previously observed in modulation-doped structures at high densities. However, B_S deviates considerably from this linear dependence at low densities and does not extrapolates to a finite density at B_S =0.

T. M. Lu
Princeton University

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