Ferromagnetic-paramagnetic transition in p-Si/SiGe due to Landau levels overlapping

ALEXEY SUSLOV, NHMFL-FSU, Tallahassee, Florida 32310, USA, I.L. DRICHKO, I.YU. SMIRNOV, A.F. Ioffe PI of RAS, St.-Petersburg 194021, Russia, O.A. MIRONOV, Warwick SEMINANO R&D Centre, University of Warwick SP, Coventry CV4 7EZ, UK, D.R. LEADLEY, Department of Physics, University of Warwick, Coventry CV4 7AL, UK — The magnetoresistance $\rho_{xx}$ and $\rho_{xy}$ as well as attenuation and velocity change of surface acoustic waves were measured in a p-Si/SiGe sample with $p=2\times10^{11}$ cm$^{-2}$. The research was performed in the temperature range of 0.3-2 K and in the magnetic fields of up to 18 T tilted with respect to the two-dimensional (2D) channel plane. The dependence of the g-factor $g^*(\Theta)/g^*(0^\circ)$ on the tilt angle was determined. The measurements of $\rho_{xx}$ and $\rho_{xy}$ in the tilted magnetic field showed that the anomaly in $\rho_{xx}$ observed at filling factor $\nu=3/2$ is insignificant in the conductivity $\sigma_{xx}$. The anomaly in $\sigma_{xx}$ at $\nu=2$ might be explained by overlapping of the levels with different spins $0\uparrow$ and $1\downarrow$ when the tilt angle of the applied magnetic field is changed. The overlapping occurs at $\Theta$ of about $60^\circ$ and causes a ferromagnetic-paramagnetic transition.

Supervised by RFBR 08-02-00852; the RAS Presidium, RAS Program “Spintronika”, NSF DMR-0084173, the State of Florida, and the DOE.