Coincidence of the Landau levels in wide HgTe quantum well

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The magnetoresistance components ρ_{xx} and ρ_{xy} were measured in tilted magnetic fields of up to 18 T at temperatures down to 20 mK in a symmetrically doped n-$Cd_xHg_{1-x}Te$/$HgTe$/$Cd_xHg_{1-x}Te$ heterostructure with the quantum well thickness of 20 nm (and the inverted band structure) grown on a (013) GaAs wafer. The electron density n = 1.6×10^{11} cm^{-2}, and mobility $\mu = 28$ m^2/Vs were calculated from the results acquired in the perpendicular magnetic field. Coincidences of the quantum levels at small filling factors $2 \leq \nu \leq 8$ were observed on ρ_{xx} and ρ_{xy} at the tilt angle values of about 67, 78, and 83^0. We compared our data with the Landau level spectrum in the tilted magnetic field, calculated using a 4-band model for the HgTe quantum well.[1] We obtained good quantitative agreement for the Landau level crossing points, which allowed us to extract the band structure parameters, such as the Dirac velocity, band gap, effective masses and anisotropic g-factors, used as fitting variables.

[1]M. König, H. Buhmann, L.W. Molenkamp, T.L. Hughes, C.-X. Liu, X.-L. Qi, S.-C. Zhang, J. Phys. Soc. Japan **77**, 031007 (2008).