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Magnetotransport in HgTe double quantum well[1] A.V. SUSLOV, NHMFL, Tallahassee, FL 32310, USA, M.V. YAKUNIN, M.R. POPOV, Institute of Metal Physics, Ekaterinburg 620990, Russia, E.G. NOVIK, Physical Institute, D-97074 Wurzburg, Germany, S.A. DVORETSKY, N.N. MIKHAILOV, Institute of Semiconductor Physics, Novosibirsk 630090, Russia — We present a study of a double quantum well (DQW) made of two-dimensional layers with inverted energy band spectrum: HgTe. The magnetotransport reveals a considerably larger overlap of the conduction and valence subbands, than is known for HgTe single quantum wells (QW). Thus, the critical field B_c for opening the gap in the energy spectrum shifts towards much higher fields with respect to B_c in single QWs. The accompanying specific features in magnetotransport, such as multiple inversions in ρ_{xy}(B), zero-filling-factor state with a concomitant manifestation of its insulator character in ρ_{xx}(B), etc., also move towards higher fields, where the quantum Hall regime is well realized. The overlap can be regulated by a gate voltage V_g and the coexisting electrons and holes were found in the whole investigated range of positive and negative V_g. The electron density n remains almost constant in the whole range of investigated V_g, while the hole density p drops down passing through the charge-neutrality point. This difference between n and p stems from an order of magnitude larger density of states for holes than for electrons. We analyze our observations on the basis of a calculated picture of magnetic levels in a DQW.

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