Noise measurements in HgTe quantum wells

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Physical properties of HgTe/HgCdTe quantum wells (QW) are investigated extensively during the last years, especially for potential applications for THz detectors.

We report on our magnetotransport and resistance noise measurements in 7.5 nm-wide HgTe QW embedded in HgCdTe barriers. Inverted band ordering in such a QW makes it a topological insulator [1] and references within.

Our experiment has been performed at liquid helium temperatures and magnetic field values up to 12 T. The Hall bridge structure with isolated gate has been fabricated lithographically. The gate electrode allows to control the Fermi level and electrons to holes concentration ratio within the sample.

Changing the gate voltage and magnetic field in standard magnetoresistance measurements we have observed the fan chart of the Landau levels with Shubnikov-de Haas oscillations and increased resistance close to the charge neutrality point (CNP). Preliminary resistance noise measurements made at the same gate voltages and magnetic fields revealed the same Landau levels fan chart structure nad increased noise close to the CNP. However, resistance noise shows much more details than time-averaged measurements. Using magnetic field/hydrostatic pressure we can induce the topological phase transition between topological insulator and band insulator states.

We will discuss the magnetotransport and noise properties in this system.

[1] I. Yahniuk *et al.,* arXiv:1810.07449v1 [cond-mat.mes-hall]; S. S. Krishtopenko, *et.al*., *Phys. Rev.* B **94**, 245402 (2016).