

Transport in very high Landau levels

When a two-dimensional electron system (2DES), most famous for quantum Hall effects, is subject to a weak perpendicular magnetic field and low temperature, the resistivity exhibits well-known Shubnikov-de Haas oscillations. If a high-mobility 2DES is further exposed to microwave radiation, dc electric field or elevated temperatures, other classes of magneto-oscillations emerge. These oscillations are known as microwave-, Hall field- and phonon-induced resistance oscillations, respectively. Under certain conditions oscillation minima can extend all the way to zero giving rise to zero-resistance and zero-differential resistance states. This talk will focus on recent experimental and some theoretical developments towards identifying the microscopic origin of these effects. In particular, it will discuss the effect of strong dc electric fields on microwave and acoustic phonon resonances and the roles of electron-electron interactions and short-range disorder in a high-mobility 2DES.