Quantum-coherent Transport in Quantum Hall Devices

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(a) Quantum antidot of area S can be populated either by electrons or by Laughlin quasiparticles. The particles are attracted by the electric field proportional to the voltage applied to the back gate, which forms a parallel plate capacitor with the 2D electrons. The change in the number of particles is monitored by tunneling between the two front gates via the antidot: change by one particle is seen as a peak in tunneling conductance.
(b) It takes the same electric field to attract one electron as three Laughlin quasiparticles; thus the charge of each quasiparticle is $e^* = e/3$. The experiment is conducted in very strong magnetic fields and at a very low temperature, so that 2D electrons condense into new states of matter: integer ($i = 1$) or fractional ($f = 1/3$) quantum Hall liquids. The quantum numbers i or f label the quantum Hall states.