Fractional Quantum Hall Effect in Confined Geometries

Klaus Ensslin

ETH Zurich

Time: 4:00pm, Oct. 28, 2015 (Wednesday)

2015 10 28 4:00

Venue: Room W563, Physics Building, Peking University

563

The fractional quantum Hall effect is usually investigated in macroscopic (i.e. larger than 100 micrometers) geometries. When studying backscattering between quantum Hall edge channels, one may obtain parameters such as interaction parameters or fractional charges of the involved quantum states. It turns out that investigating edge channel backscattering in the filling factor 5/2 state using a quantum point contact gives results which are not compatible with any of the theoretically proposed wave functions. Measurements of several groups around the world give similar results. We have thus extended such experiments to the filling factor 2/3 regime, where coupling to nuclear spins results in highly reproducible periodic resistance oscillations. The periodicity as well as the shape of the oscillations depend on current bias and current direction as well as on magnetic field. Finally, in the filling factor 1/3 regime, which is probably best understood theoretically, we investigate backscattering between edge channels and find non-linear I-V curves which are not even qualitatively in agreement with predictions based on Luttinger liquids.

Prof. Klaus Ensslin got his bachelor degree from University of Munich, Germany and Ph. D. in physics at Max-Planck Institute for solid state research. He has been a professor of Physics at ETH Zurich, Switzerland since 1995. He is a world known condensed matter physicist and his research focuses on the ultra-small semiconductor structures with the aim to investigate experimentally new, unusual and unexpected physical systems.

Host: xilin@pku.edu.cn