Einladung zum

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Fractionally Charged Quasiparticles

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Fractionally charged quasiparticles were proposed by Laughlin to >explain the characteristics of the fractional quantum Hall effect (FQHE) - a Hall effect under extreme magnetic fields. The unexpected effect was discovered in 1982 and won the Nobel Prize in 1998. Laughlin's prediction had been confirmed experimentally in 1997 via shot noise measurements, with charges e/3 initially measured, followed later by measurements of e/5 and e/7. Due to the strong Lorentz force, the quasiparticles are expected to flow very near the edges of the sample, resembling one-dimensional like motion, hence, possessing properties of the so called Chiral Luttinger Liquid (CLL).

We study the characteristics of quasiparticles at different fractional filling factors (FF) of the FQHE, via conductance and shot noise measurements, with main findings:

(a) Quasiparticles charge was measured to be e/3, e/5, and e/7 at FF=1/3, 2/5 and 3/7, respectively, at temperatures above 50mK. As expected.
(b) Quasiparticles charge was measured to be e/3, 2e/5, and ~3e/7 at FF=1/3, 2/5 and 3/7, respectively, at temperatures below 20mK. Not expected and not understood.
(c) Diluting the beam of quasiparticles, making the beams very sparse, changes their behavior in an unexpected way. This behavior is not understood.

Future studies of quasiparticles will test their quantum statistics, which is predicted to be fractional - namely, not bosonic and not fermionic.

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