Experimental Studies of the Fractional Quantum Hall Effect: High field-low temperature studies

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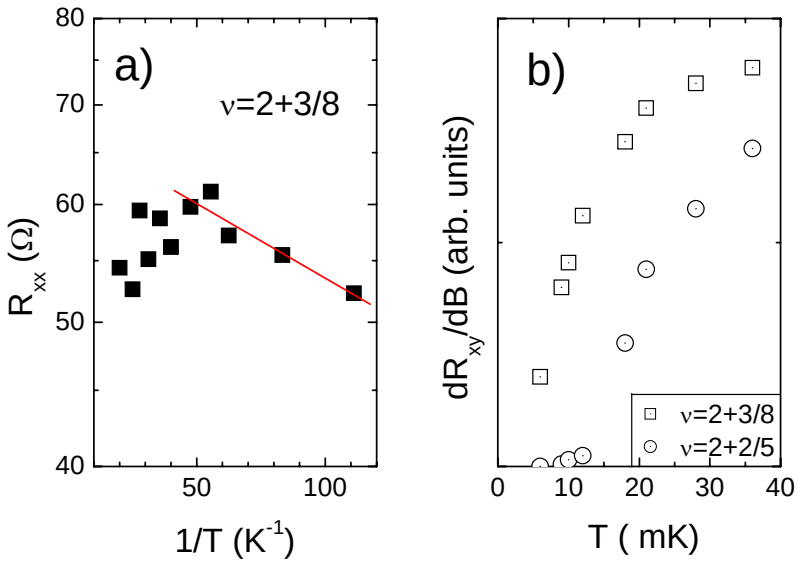
Measurements at very low electron temperatures of the fractional quantum Hall effect in high mobility samples indicate an energy gap of $\Delta_{5/2}$ well below the theoretical values and implying that this state is quite different to other states, and possibly a so-called "anti-Pfaffian" state.

The ν=19/8 state occurs only in very high quality and requires extremely low temperatures for its study as the corresponding energy scale is ~ 5mK.

The most surprising result of the studies of the high quality sample is the apparent absence of the =13/5 state, while its particle-hole conjugate at ν = 12/5 has been shown to be a fully developed state at low temperatures. This breaking of particle-hole symmetry is contrary to previous trends and may be associated with a transition from an unpolarized state at small B to a spin-polarized state at higher B.

W.P. was supported by the DOE, H.L.S. by the DOE and W.M. Keck Foundation , D.C.T. by the AFOSR, the DOE and the NSF. The work was carried out at the NHMFL High B/T Facility supported by the NSF and the State of Florida.



Temperature dependence of :

(a) the R_{xx} minimum at ν=19/8, and (b) the derivative of the Hall resistance R_{xy} at ν=19/8 and 12/5,
--- *see also J.S. Xia et al., Phys. Rev. 93,176809 (04).*

Phys. Rev. B 77, 075307 (2008).