

Experimental Studies of the Fractional Quantum Hall Effect: High Field-Low Temperature Studies

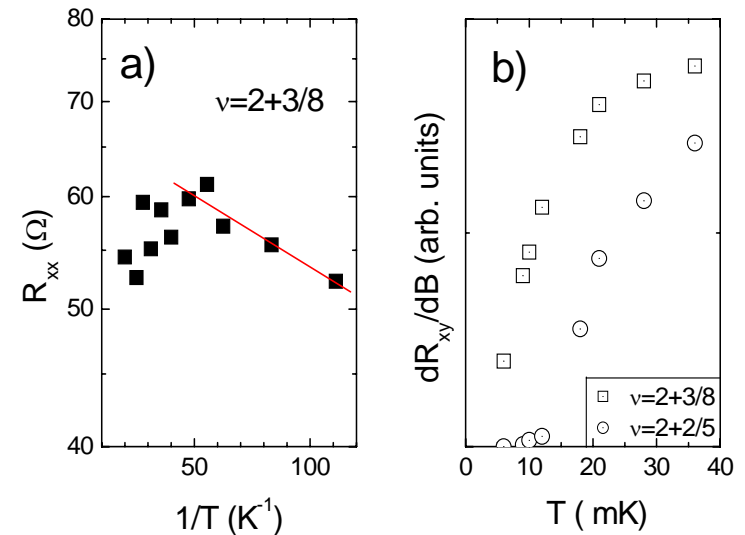
National High Magnetic Field Laboratory

High B/T Facility User Program, Microkelvin Laboratory, University of Florida

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, implying that this state is quite different to other states, and possibly a so-called “anti-Pfaffian” state.

The $\nu=19/8$ state occurs only in very high quality samples and requires extremely low temperatures (<10 mK) for its study.

The most surprising result is the apparent absence of the $\nu=13/5$ state, while its particle-hole conjugate at $\nu = 12/5$ 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.



Temperature dependence of :
(a) the R_{xx} minimum at $\nu=19/8$, and
(b) the derivative of the Hall resistance R_{xy} at $\nu=19/8$ and $12/5$.

Pan, W.; Xia, J.S.; Stormer, H.L.; Tsui, D.C.; Vicente, C.; Adams, E.D.; Sullivan, N.S.; Pfeiffer, L.N.; Baldwin, K.W. and West, K.W., *Phys. Rev. B*, **77**, 075307 (2008).

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Science Quest students visit in Summer 2007. The program immerses students in science disciplines to stimulate interest in and appreciation for the range of college and career opportunities available in science. The selected students are rising 10th graders.

The High B/T facility at the University of Florida Microkelvin Laboratory hosts summer interns, including undergraduate students, teachers and trainees for several programs, including the Research Experiences for Undergraduate programs of the NHMFL and the UF physics department.

On the state-wide level, the laboratory hosts visits from high school students in Florida's Science Quest program (see left). Faculty members also give talks and demonstrations at elementary and middle schools in the area.