Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad – 500 046

Seminar

Quantum Hall Thermal Conductance of an Isolated Edge Channel

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The quantum Hall effect (QHE) states, one of the earliest known examples of topological insulators, are predicted to host exotic quasiparticles that make them one of the most sought after for application in topological quantum computations. A proposed host of such quasiparticles is the ν=5/2 QHE state. The gapless edge modes are ideal candidates for braiding experiments, which can reveal the state's robustness to decoherence. Since the ν=5/2 state hosts a variety of edge modes (integer, fractional, neutral), a robust technique is needed to isolate the exotic modes while assuring that their original character remains intact. In this talk, I will present our recent work, where we exploited a novel technique to gap-out the integer modes of the ν=5/2 state by interfacing it with the integer state ν=2 and ν=3[1], and measured the thermal conductance of the isolated ν=1/2 mode. Observing a thermal conductance of $0.5\kappa_0 T$ (with $\kappa_0=\pi^2 k_B^2/3h$, the quantum of thermal conductance), assures the non-abelian nature of the ν=1/2 mode and its topological order[2]. Our result opens a new avenue to manipulate and test other QHE states and braid via interference of the isolated exotic modes.

References:

1. Dutta, B., et al., *Distinguishing between non-abelian topological orders in a quantum Hall system.* Science, 2022. **375**(6577): p. 193-197.
2. Dutta, B., et al., *Isolated ballistic non-abelian interface channel.* Science, 2022. **377**(6611): p. 1198-1201.

Monday, Sep 19th 2022

4:00 PM (Tea/Coffee at 3:45 PM)

Auditorium, TIFR-H