Detection of fractional quantum Hall states by entropic sensitive measurements

Fereshte Ghahari
Associate Professor, Department of Physics and Astronomy
George Mason University, Fairfax, USA
fghahari@gmu.edu

Abstract

Thermopower of a clean two-dimensional electron system is directly proportional to the transport entropy. This makes thermopower a powerful tool to probe topological properties of fractional quantum Hall (FQH) states as the entropy carried by non-Abelian quasiparticles is predicted to be anomalously larger than that of Abelian quasiparticles. In this talk, I will present magneto-thermopower measurements of high-quality mono and Bernal-stacked bilayer graphene where FQH states including even denominator states appear at relatively low magnetic fields. Our data demonstrate that magneto-thermopower detection of FQH states is more sensitive than resistivity measurements.

References

[1] N. Sultana, R. Rienstra, K. Watanabe, T. Taniguchi, J. A. Stroscio, N. B. Zhitenev, D. E. Feldman and **F. Ghahari**, "Detection of even denominator fractional quantum Hall states by entropy-sensitive measurements", Nature Physics, 21, 724–731 (2025).

[2] N. Sultana, R. Rienstra, K. Watanabe, T. Taniguchi, J. A. Stroscio, D. E. Feldman and **F. Ghahari**, "Thermopower probe of fractional quantum Hall states in monolayer graphene", Phys. Rev. Lett., 136, 046502 (2026) (Editors' Suggestion, on the cover).