
Transport Signatures of Fractional Quantum Hall Binding Transitions

Christian Spanslatt^{*1}, Ady Stern², and Alexander D. Mirlin³

¹Chalmers University of Technology – Sweden

²Weizmann Institute of Science – Israel

³Karlsruhe Institute of Technology – Germany

Abstract

Certain fractional quantum Hall edges have been predicted to undergo quantum phase transitions which reduce the number of edge channels and at the same time bind electrons together **(1)**. However, detailed studies of experimental signatures of such a "binding transition" remain lacking.

In this talk, I describe recent work **(2)** proposing quantum transport signatures of such a transition. Focus is on filling $9/5$: the simplest intrinsic edge predicted to undergo the binding transition.

I demonstrate that in the regime of non-equilibrated edge transport, the bound and unbound edge phases display distinct conductance and noise characteristics. I will also show that for a quantum point contact in the strong back-scattering regime, the bound phase produces a minimum Fano-factor $F=3$, corresponding to three-electron tunneling, whereas single electron tunneling is strongly suppressed at low energies. Together with recent experimental developments, these results provide the means to detect binding transitions in the fractional quantum Hall regime.

(1) H.-c. Kao, C.-H. Chang, X.-G. Wen: Phys. Rev. Lett. 83, 5563 (1999)

(2) C. Spånslätt, A. Stern, A. D. Mirlin: arXiv:2302.05781 (2023)

*Speaker