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Current noise and AC conductivity as probes of non-abelian quasi-particles

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We consider two scenarios for probing signatures of non-abelian quasi-particles through transport and noise measurements in the $\nu = 5/2$ fractional quantum Hall effect. In the first scenario we study bulk transport in the presence of a Wigner crystal of quasi-particles, which would form at filling factors close to $\nu = 5/2$. For immobile quasi-particles, we find a mechanism for dissipative transport at frequencies below the gap, which is manifested in a nonzero conductivity in response to an electric field with finite wave vector $\mathbf{q}$ and frequency ω, and reflects the exponential degeneracy of the ground state. The second scenario deals with noise measurements in a Hall bar geometry where two quantum point contacts (QPCs) introduce two interfering amplitudes for back-scattering. Thermal fluctuations of the number of quasi-particles enclosed between the two point contacts induce current noise of the telegraph type. The non-abelian $\nu = 5/2$ state is characterized by a unique switching pattern of current, originating from the suppression and revival of the interference term as the parity of the number of quasi-particles between the two QPCs fluctuates. This work was done in collaboration with Ady Stern and Steve Simon.