Interaction effects in Quantum Hall edge channels at ν=2

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The evolution of the peak height of energy-resolved electronic wave-packets ballistically propagate along integer quantum Hall edge channels at filling factor equal to two is related to the elastic scattering amplitude for the fermionic excitations evaluated at different injection energies. We investigate this quantity assuming a short-range capacitive coupling between edge channels [1]. Moreover, we also phenomenologically take into account the possibility of energy dissipation towards additional degrees of freedom—both linear and quadratic—in the injection energy. Through a comparison with recent experimental data [2], we rule out the non-dissipative case as well as a quadratic dependence of the dissipation, indicating a linear energy loss rate as the best candidate for describing the behavior of the quasi-particle peak at short enough propagation lengths. Moreover, the unavoidable effects of interactions, in realistic experimental situations, can be taken into account in a quantum point contact geometry to investigate the squeezing of the emitted microwave radiation through the study of the current fluctuations at finite frequency [3].

[1] G. Rebora et al., Entropy 138 (2021)

[2] R. H. Rodriguez et al., Nat. Comm. 2426 (2020)

[3] G. Rebora et al., New J. Phys 23, 063018 (2021)