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Particle-hole symmetry and Luttinger liquids in a quantum Hall circuit[1]

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I shall present recent experimental results on edge-state transport through quantum point contacts in the quantum Hall (QH) regime. Finite-bias backscattering measurements between edge channels at filling factor $\nu = 1$ will be presented at different temperatures. Transport through the constriction displays a non-linear Luttinger-like behavior even in the integer QH regime in contrast with the linear tunneling predicted for integer edge states [1,2]. Both zero-bias enhancement and suppression of the inter-edge tunneling will be shown in a controllable way as a function of gate bias [2,3,4]. The observed evolution is connected to the local charge depletion in the constriction region and offers new insight into the link between QH charge-conjugation and Luttinger liquid description of edge channels [2]. I shall discuss the relevance of these experimental results in the context of the dynamics of the highly-correlated edge channels in the fractional QH regime [5]. Finally I shall demonstrate how charge-conjugation can be exploited in the design of new QH circuits where the transport properties of the hole component of a partially filled Landau level can be directly addressed.

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