



Contribution ID: 80

Type: not specified

Luttinger Liquids at the Edge of Quantum Hall Systems

Friday, 29 July 2022 11:30 (30 minutes)

We consider the edge transport properties of a generic class of interacting quantum Hall systems on a cylinder, in the infinite volume and zero temperature limit. We prove that the large-scale behavior of the edge correlation functions is effectively described by the multi-channel Luttinger model. In particular, we prove that the edge conductance is universal, and equal to the sum of the chiralities of the non-interacting edge modes. The proof is based on rigorous renormalization group methods, that allow to fully take into account the effect of backscattering at the edge. Universality arises as a consequence of the vanishing of the beta function for the emergent multi-channel Luttinger liquid, combined with lattice Ward identities for the microscopic 2d theory and with the non-renormalization of the chiral anomaly for the emergent QFT. Joint work with Vieri Mastropietro.

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