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Universality and Hall transitions in interacting fermionic systems Abstract: In this talk I will discuss the charge transport properties of weakly interacting fermionic

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In this talk I will discuss the charge transport properties of weakly interacting fermionic systems, in the zero temperature and infinite volume limit. In the first part of the talk I will consider general interacting, gapped fermionic systems on periodic two-dimensional lattices. Our theorem states that the Kubo conductivity matrix is independent of many-body interactions, provided the interaction strength is small enough. In particular, the result proves the stability of the integer quantum Hall effect against weak many-body interactions. In the second part of the talk, I will focus on the transitions between different topological Hall phases in the interacting Haldane model. The Haldane model is a graphene-like model that, in
the absence of interactions, displays a non-trivial topological phase diagram. We consider the model in the presence of weak many-body interactions, and we give a rigorous construction of the renormalized transition line. Despite the nontrivial renormalization of the wave function and of the Fermi velocity, the conductivity is universal: at the renormalized critical line, both the discontinuity of the transverse conductivity and the longitudinal conductivity do not depend on the interaction. The proofs are based on a combination of cluster expansion techniques, rigorous renormalization group and Ward identities. Joint work with A. Giuliani, I. Jauslin and V. Mastropietro.

Presenter: Prof. PORTA, Marcello