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Title: Universality of Edge Physics in the Fractional Quantum Hall Regime: Contrasting Graphene with Gallium Arsenide

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Despite the prediction of universal chiral Luttinger liquid behavior at the edge of two-dimensional electron gas subjected to a high perpendicular magnetic field (so as to be in the fractional quantum Hall regime), this universality (e.g. in exponents characterizing electron tunneling) has not been observed so far experimentally in two-dimensional electrons in semiconductor heterostructures, such as GaAs. It is believed that this lack of universality is due to reconstruction of the edge in these systems which induces additional non-chiral edge modes. Edge reconstruction occurs generically in semiconductor heterostructures because of the competition between the repulsive Coulomb interaction between electrons and the confinement potential provided by the positive charge in the dopant layer. In (two-dimensional) graphene, however, the electrons come from metallic gates and interact with their image charge, and the confinement potential is provided by the presence of graphene boundaries. In this work, we study the combined effect of the Dirac nature of electrons and the dipole nature of the effective electron-electron interaction. We show that as a result of the rather different confinement mechanism in graphene, there is an experimentally accessible parameter window in which edge reconstruction can be avoided. This should allow observation of the predicted universal chiral Luttinger liquid behavior in graphene based two-dimensional electrons in high magnetic field.