Abstract Submitted
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Quantum critical scaling in magnetic field near the Dirac point in graphene BITAN ROY, IGOR HERBUT, Simon Fraser University — Graphene, a monolayer of graphite, exhibits some peculiar electronic properties which are consequences of the pseudo relativistic Dirac like excitations. The anomalous integer quantum Hall effect, i. e. platoues in Hall conductivity σ_{xy} at filling factors $f = \pm(4n + 2)$, which can be understood within the framework of non-interacting Dirac like quasiparticles is one of such. On the other hand, the appearance of additional Hall states at filling factors $f = 0$ and $f = \pm 1$ at higher magnetic fields calls for electron-electron interactions to be taken into account. Motivated by the recent measurement of the activation energy at the quantum Hall state at the filling factor $f = 1$ in graphene, I will discuss the scaling of the interaction-induced gaps in the vicinity of the Dirac point with the magnetic field. The gap at $f = 1$ is shown to be bounded from above by $E(1)/C$, where $E(n) = v_F\sqrt{2nB}$ is the Landau-level energy and $C = 5.985 + O1/N$ is a universal number. The universal scaling functions computed exactly for a large number of Dirac fermions N will also be presented. The sublinear dependence of the gap at the laboratory fields of $10T < B < 50T$ for realistic values of short-range repulsion between electrons, in quantitative agreement with observation will also be presented.

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