

Spin configurations and activation gaps of the quantum Hall states in graphene

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We report on our accurate evaluation of spin polarizations of the ground state and particle-hole gaps for the partially filled lowest Landau level, observed in recent experiments on graphene subjected to ultra-high magnetic fields. We find that the inter-electron interactions are important at these filling factors, characterized by the non-degenerate ground states and large particle-hole gaps at infinitely large wave vectors. The gaps are the largest for the quantum Hall states in the second Landau level. The weak appearance of quantum Hall plateaus in the experiments for certain filling factors in the second Landau level however indicates that at these filling factors, the system has a soft mode at a finite wave vector due presumably to the presence of disorder.