Abstract Submitted
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Fractional quantum Hall effect in graphene: multicomponent states and tunable interactions[1] ZLATKO PAPIC, Department of Electrical Engineering, Princeton University, DMITRY ABANIN, Princeton Center for Theoretical Science, Princeton University, NICOLAS REGNAULT, Laboratoire Pierre Aigrain, Ecole Normale Superieure, CNRS, MARK GOERBIG, Laboratoire de Physique des Solides, CNRS, Universite Paris-Sud, Orsay — We study the fractional quantum Hall (FQH) states in graphene using exact diagonalization and taking into account the multicomponent degrees of freedom and the possibility of tuning the interaction potential. The recently observed graphene FQH state at a filling factor $\nu_G = 1/3$ is found to be adiabatically connected to the 1/3 Laughlin state in the upper spin branch, with SU(2) valley-isospin ferromagnetic ordering and a completely filled lower spin branch. At the experimentally relevant values of the Zeeman field, however, the state possesses characteristic low-energy spin-flip excitations (different from the magneto-roton expected at large Zeeman fields) that may be unveiled in inelastic light-scattering experiments. We also discuss the possibility of realizing other Abelian and non-Abelian FQH states in graphene by modifying the effective interaction potential using a combination of insulating substrates.

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