Abstract Submitted
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Electron-electron interactions in graphene bilayers[1] FAN ZHANG, HONGKI MIN, MARCO POLINI, ALLAN MACDONALD, DEPARTMENT OF PHYSICS, UNIVERSITY OF TEXAS AT AUSTIN COLLABORATION, NEST-CNR-INFM AND SCUOLA NORMALE SUPERIORE COLLABORATION — Electrons in condensed matter normally form Fermi-liquid states in which e-e interactions play an inessential role. A well known exception is the case of 1D electron systems in which the Fermi-surface consists of two points and divergences associated with low-energy particle-hole excitations abound when e-e interactions are described perturbatively. Corresponding divergences normally occur in systems with higher space dimensions when Fermi lines or surfaces satisfy idealized nesting conditions. Here we discuss the role of e-e interactions in 2D graphene bilayers which behave in many ways as if they were 1D because they have point-like Fermi surfaces which satisfy the nesting condition and have two-layer chirality and because their particle-hole energies have a quadratic dispersion which compensates for the difference between 1D and 2D phase spaces. We conclude, on the basis of a perturbative RG calculation, that interaction in neutral graphene bilayers drive the system into a spontaneously broken symmetry state with layer-pseudospin ferromagnetism.

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