MAR12-2011-004937

Abstract for an Invited Paper
for the MAR12 Meeting of
the American Physical Society

Interaction-Driven Spectrum Reconstruction in Bilayer Graphene

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The nematic phase transition in various two-dimensional electronic systems is a fascinating subject of an ongoing investigation. Driven by electron-electron interactions it represents a new class of strongly correlated electronic ground states. Thus it is extremely important and interesting to expand the list of materials where such transitions are observed to those with particularly unusual electronic dispersion. Here we show indications that bilayer graphene – a truly two-dimensional material with complex chiral electronic spectrum – undergoes such transition. This is especially surprising as no interaction effects have been observed so far in either mono- or bilayer graphene without a help of magnetic field. Gaining access to low-energy physics in bilayer graphene devices (by suspending our samples and achieving quasiparticle mobilities larger than 10^6 cm^2/V·s) allowed us to observe strong spectrum reconstructions and electron topological transitions which we attribute being due to such nematic transition.