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Disorder-tuned selection of ordered state in bilayer graphene[1]
JUNHUA ZHANG, Department of Physics, College of William and Mary, RAHUL NANDKISHORE, Department of physics, MIT, Princeton Center for Theoretical Science, Princeton University, ENRICO ROSSI, Department of Physics, College of William and Mary — The nature of the symmetry-broken state driven by interaction in bilayer graphene (BLG) has attracted a lot of interest. Theoretical studies predict various possible ordered phases as the candidate for the ground state of BLG. To identify what instability is the most favorable in BLG, a number of experiments have been performed by several groups. However, there is no consensus: some experiments show evidence for a fully gapped state while others seem more consistent with a nematic state. By exploring the influence of disorder on a variety of competing ordered states, we find that the pair breaking effect due to disorder varies among the candidate phases, giving rise to different amount of suppression on the mean-field transition temperatures. This suggests a simple and natural scenario to resolve the discrepancy between experimental observations.

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