Abstract Submitted
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Quantum multicriticality in bilayer graphene with a tunable energy gap[1] ROBERT THROCKMORTON, University of Maryland — We extend previous renormalization group (RG) analyses of electron-electron interactions in gapless bilayer graphene at finite temperature to include the effect of an electric field applied perpendicular to the sample. We determine the possible outcomes of the resulting RG equations, represented by "fixed rays" along which ratios of the coupling constants remain constant and map out the leading instabilities of the system for an interaction of the form of a Coulomb interaction that is screened by two parallel conducting plates placed equidistant from the electron. We then construct maps of the leading instability (or instabilities) of the system for the screened Coulomb-like interaction as a function of the overall interaction strength and interaction range for four values of the applied electric field. We find that the pattern of leading instabilities is the same as that found in the zero-field case, namely that the system is unstable to a layer antiferromagnetic state for short-ranged interactions, to a nematic state for long-ranged interactions, and to both for intermediate-ranged interactions. However, if the interaction becomes too long-ranged or too weak, then the system will exhibit no instabilities.

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