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**Compressibility Instability of Interacting Electrons in Bilayer Graphene** XIN-ZHONG YAN, Institute of Physics, CAS, C.S. TING, Texas Center for Superconductivity/UH — Using the self-consistent Hartree-Fock approximation, we study the compressibility instability of the interacting electrons in bilayer grapheme at finite temperature. The chemical potential and the compressibility of the electrons can be significantly altered by an energy gap (tunable by external gate voltages) between the valence and conduction bands. For zero gap case, we show that the homogeneous system is stable. When the gap is finite, the compressibility of the electron system becomes negative at low carrier doping concentrations and low temperature. We also present the phase diagram distinguishing the stable and unstable regions of a typically gapped system in terms of temperature and doping.

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