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【644】Electronic Phase Transitions in Suspended Graphene Multilayers

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Suspended Bernal-stacked graphene multilayers exhibit a broken-symmetry ground state whose origin remains to be understood. Based on electrical transport measurements, we observe a second-order phase transition, whose critical temperature (T_C) increases a function of the thickness of the system, starting from 12K in bilayer up to 100K in heptalayer devices. Furthermore, by means of a phenomenological model, we attribute this transition to the incursion of a self-consistent valley- and spin-dependent staggered potential $\Delta(T)$ that changes sign from one layer to the next.
Our experimental observation of such finite-temperature phase transition imposes additional constraints to the any microscopic theory which attempts to describe electronic correlations on these multilayer graphene systems.

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