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Chiral superconductivity from repulsive interactions in doped graphene RAHUL NANDKISHORE, LEONID LEVITOV, Massachusetts Institute of Technology, ANDREY CHUBUKOV, University of Wisconsin-Madison — We present a model wherein repulsive interactions unambiguously lead to superconductivity with enhanced Tc. The superconducting state is the chiral d + id superconducting state, which has no known experimental realizations. Intriguingly, our model has a natural realization in graphene that is doped to the M point of the Brilliouin zone. At this doping level, the Fermi surface nesting and the divergent density of states can produce interaction driven instabilities to exotic phases with high energy scales. Analyzing the competition between various ordering tendencies within a renormalisation group framework, we find that the leading instability is to d-wave superconductivity, for any choice of weak repulsive interactions. The instability develops simultaneously in two distinct d-wave channels, which are degenerate by lattice symmetries. Analysis of the pairing below Tc reveals that both orders co-exist to produce d + id superconductivity, with the phase of the order parameter winding by 4π as we go around the Fermi surface.

[X] Prefer Oral Session
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