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**Spontaneous Gap Formation in an Uniaxially Strained Graphene**

ANAND SHARMA, VALERI N. KOTOV, University of Vermont, ANTONIO H. CASTRO NETO, National University of Singapore — We study the condition of spontaneous gap generation due to Coulomb interaction between anisotropic Dirac fermions in an uniaxially strained graphene. The gap equation is realized as a self-consistent solution for the self- energy i.e., Dyson- Schwinger equation, within static Random Phase Approximation. The mass gap not only depends on the momentum due to long- range nature of the interaction but also on the anisotropy due to uniaxial strain. Using standard numerical analysis we solve the integral equation on a finite grid. We evaluate the mass gap as a function of dimensionless coupling constant for different values of anisotropy parameter and obtain the critical coupling at which the gap becomes non-zero. Our study indicates that with an increase in uniaxial strain in graphene, the critical coupling decreases which is in agreement with our perturbative renormalization group analysis.

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