June 4 (Wed.) 13:30 – 14:30

Zero-energy states of Dirac fermions in two dimensions and orders in graphene

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The Dirac equation in two dimensions in a magnetic or a pseudo-magnetic field admits a certain number of special solutions with exact zero energy. I will present a pedagogical discussion of the role this zero-energy manifold plays in the formation of possible order parameters in presence of interactions. This "magnetic catalysis" may be responsible for the observed quantization of Hall conductivity in graphene at filling factors zero and one. Special roles played by the particle-hole and the time-reversal symmetry of the Dirac equation will be emphasized, and some simple examples worked out.