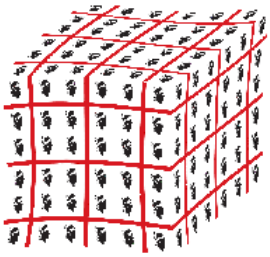

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Chiral symmetry of graphene and strong coupling lattice gauge theory

Thursday, 17 June 2010 15:50 (20 minutes)

Electrons on suspended graphene (monoatomic layer of carbon atoms) can be described as (2+1)-dimensional massless Dirac fermions strongly interacting with (3+1)-dimensional compact or non-compact U(1) gauge field. By employing the techniques of square lattice regularization and strong coupling expansion, we find that the electrons obtain a finite spectral gap in the strong coupling regime do to spontaneous breaking of global chiral symmetry. The magnitude of the gap is analytically calculated up to the next-to-leading order in the strong coupling expansion. We have also derived a mass formula for the pseudo Nambu–Goldstone boson excitation associated to the symmetry breaking, which is analogous to the Gell-Mann–Oakes–Renner relation for pions in QCD.

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talk

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