Renormalization group for interacting electrons on the honeycomb lattice

A. Giuliani
Universita' di Roma Tre

In this talk I will review recent advances on the understanding of the ground state properties of interacting electrons on the honeycomb lattice. In the case of weak short range interactions, renormalization group methods allowed us to give a complete construction of the ground state of the half-filled system and to prove analyticity in the coupling constant of the thermodynamic functions and of the equilibrium correlations. In the case that the electrons interact with a three-dimensional quantum electromagnetic field, the ground state can be constructed order by order in renormalized perturbation theory, with the n-th order admitting n!-bounds. Ward Identities are needed in order to control the flow of the effective charges. Lorentz invariance is dynamically restored, thanks to lattice gauge invariance. This talk is based on joint work with V. Mastropietro and M. Porta.