

## **A lattice gauge theory model for graphene**

Abstract: We consider a model where electrons hopping on a honeycomb lattice interact via a quantized photon field; the physical motivation is to investigate the low energy physics of graphene. Using exact Renormalization Group techniques, we prove that, at all orders in renormalized perturbation theory, the quasi-particle weight vanishes at the Fermi surface and the effective Fermi velocity tends to the speed of light, both as power laws with interaction-dependent anomalous exponents.

An analysis of various response functions indicates a tendency of the system towards excitonic pairing; moreover, using a variational argument we find a non-BCS equation for the excitonic gap, admitting a non-trivial solution if its critical exponent exceeds a critical value. Talk based on a joint work with A. Giuliani and V. Mastropietro.