Simon Hands (Swansea)

Title: Monte Carlo Approach to 2d Quantum Critical Phenomena using U(2N)-Invariant Fermions

Relativistic theories of fermions in 2+1 dimensions are widely believed to furnish examples of strongly-interacting UV-fixed points, which serve as starting points for the description of quantum critical points in graphene-like systems. In this talk I will review two examples, the Gross-Neveu and Thirring models, mainly using numerical lattice field theory. I argue that simulations to date using the staggered approach to lattice fermions do not capture the correct global symmetries, and set out a proposal for improved studies using domain wall fermions in a 2+1+1d approach. I demonstrate that the desired U(2N) symmetry is recovered in the limit that the domain wall separation grows large, present a numerical portrait of critical behaviour in the GN model, and then preliminary simulation results for the Thirring model suggesting that current estimates for the critical flavor number need to be revised downwards.