

Disordered fermions in two dimensions: is Anderson insulating phase the only possibility?

Luca Dell'Anna

Department of Physics and Astronomy "Galileo Galilei", University of Padova, Italy

We study complete sets of one-loop renormalization group equations of several interacting non-linear σ -models, the effective field theories describing the diffusive quantum fluctuations in correlated disordered systems. We consider different cases according to the presence of certain symmetries in the original random Hamiltonians, and we show that, for interacting systems, the Cartan's classification of symmetry classes is not enough to uniquely determine their scaling behaviors. Moreover, we show that, in many cases Anderson insulating phase can be completely avoided or preceded by other phases, in particular, disorder can even promote superconductivity or antiferromagnetic order.

- [1] L. Dell'Anna, *Enhancement of critical temperatures in disordered bipartite lattices*, Phys. Rev. B 88, 195139 (2013)
- [2] L. Dell'Anna, *Beta-functions of non-linear σ -models for disordered and interacting electron systems*, Annalen der Physik 529, 1600317 (2017)