

## Kondo Effect and Local Moment Formation in Defective Graphene

Miguel A. Cazalilla, A. Iucci, F. Guinea, A. H. Castro Neto

Graphene Research Centre, National University of Singapore, Singapore, Centro de Física de Materiales (CFM) Centro Mixto CSIC UPV, and Donostia International Physics Center (DIPC), San Sebastian, Spain  
miguel.cazalilla@gmail.com

### Abstract

We study the local moment formation and the Kondo effect at single-atom vacancies in Graphene. We develop a model accounting for the vacancy reconstruction as well as non-planarity effects induced by strain and/or temperature. Thus, we find that the dangling  $\sigma$  orbital localized at the vacancy is allowed to strongly hybridize with the  $\pi$ -band since the scattering with the vacancy turns the hybridization into singular function of the energy ( $\sim |\epsilon| \ln^2 \epsilon/D$ ),  $D \sim$  the bandwidth). This leads to several new types of impurity phases, which control the magnitude of the vacancy magnetic moment and the possibility of Kondo effect depending on the strength of the local Coulomb interactions, the doping level, and the degree of particle-symmetry breaking.

### References

[1] M. A. Cazalilla et al. arxiv:1207.3135