

凝縮系物理学ゼミナール

Condensed Matter Seminar

Location: Room 413, School of Science Bldg. 5 (理学 5 号館 413 号室)

Date: 13:30-15:00, Wednesday, 6 February 2013

“Playing with fluctuations: killing and resuscitating long range order in low dimensional superconductors”

Speaker: **Dr. Antonio M. García-García**

(Cavendish Laboratory, University of Cambridge and CFIF, Instituto Superior Técnico, Universidade Técnica de Lisboa)

Abstract:

In the first part of the talk we describe recent results on the role of fluctuations that weaken and eventually destroy long range order in zero dimensional superconducting nanograins and in disordered quantum wires at zero temperature.

In the second part of the talk we put forward a mechanism which can restore phase coherence even in 1d: power-law hopping. We study a 1D attractive- U Hubbard model with power-law hopping by Abelian bosonization and density-matrix renormalization group (DMRG) techniques. We show analytically that at zero temperature, sufficiently slow power-law hopping suppresses fluctuations and induces phase coherence, namely, long-range superconducting order. These results are also of direct relevance to quantum magnetism as our model can be mapped onto a spin-chain with power-law decaying couplings, which can be studied experimentally by cold ion-trap techniques.