INVITADO: Gemma de las Cuevas (Max Plank Institute, Garching)

TITULO: Quantum algorithms for classical lattice models

LUGAR: FACULTAD DE CIENCIAS FÍSICAS UCM
DÍA: 21 Febrero, 2012 (Martes)
HORA: 14:30 horas
AULA: Seminario Depto. Física Teórica I, Planta 3ª

ABSTRACT

I will talk about our recent work [G. De las Cuevas, W. Dür, M. Van den Nest, M.A. Martin-Delgado, NJP 13, 093021 (2011)] where we give efficient quantum algorithms to estimate the partition function of (i) the six-vertex model on a two-dimensional (2D) square lattice, (ii) the Ising model with magnetic fields on a planar graph, (iii) the Potts model on a quasi-2D square lattice and (iv) the Z2 lattice gauge theory on a 3D square lattice. Moreover, we prove that these problems are BQP-complete, that is, that estimating these partition functions is as hard as simulating arbitrary quantum computation. The results are proven for a complex parameter regime of the models. The proofs are based on a mapping relating partition functions to quantum circuits introduced by Van den Nest et al (2009 Phys. Rev. A 80052334) and extended here.