CICLO DE CONFERENCIAS

DEPARTAMENTO DE FÍSICA- INSTITUTO DE FÍSICA DEL SUR

" Density of states of the Ising model in the field "

Disertante:

Dr. Borko Stosic

Departamento de Estadística e Informática
Universidad Federal Rural de Pernambuco- Brasil

Fecha: Viernes 14 de Noviembre de 2014
Horario: 15hs
Lugar: Sala de Conferencias del Departamento de Física (Av. Alem 1253- subsuelo - cuerpo B)

Resumen

Density of States (DOS) surfaces, as function of scaled energy and magnetization, are sufficient for complete description of thermodynamic behavior of magnetic systems in external magnetic field. Exact DOS surfaces for the Ising model have been reported in the literature up to sizes 12x12, and have only recently been determined up to sizes 15x15 (unpublished results), using the novel CUDA GPGPU technology. On the other hand, the scaled DOS surfaces are shown to converge rapidly towards the thermodynamic limit, and the Wang-Landau algorithm has been employed to generate high quality DOS surface approximations up to sizes 36x36. It is shown here how Wang-Landau algorithm can be substantially improved for systems in the field, so that systems up to sizes 256x256 (and possibly larger) can be addressed computationally. This improvement is accomplished by restricting magnetization of individual spin configurations, when the Hamiltonian contains both spin interaction and an external field term, and therefore the energy-magnetization plane is used for characterizing the density of states. Within this framework Wang-Landau random walk is performed on mutually independent lines of constant magnetization, and can thus be parallelized on a geographically distributed computer grid. This approach should benefit studies of a broad range of phenomena where field dependent behavior may be of practical interest, such as nano-structured metamagnets.