The Abdus Salam International Centre for Theoretical Physics

School in Computational Condensed Matter Physics:
From Atomistic Simulations to Universal Model Hamiltonians

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Trieste, Italy

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TITLES OF TALKS and SUBTOPICS:

1. Introduction to Monte Carlo algorithms
   Subtopics: exponential convergence, detailed and global balance, transfer matrices, faster-than-the-clock, error estimates,

2. Hard disks: From Classical Mechanics to Statistical Mechanics
   Subtopics: Molecular dynamics, direct sampling, Markov chain sampling Metropolis, Event chains. One-dimensional hard spheres.

3. Sampling and integration: From Gaussians to Maxwell and Boltzmann
   Subtopics: Sampling and inference, Discrete and one-dimensional distributions, uniform samples on the sphere, sampling in high dimensions. Simulated annealing.

4. Classical lattice spin models: Ising model, XY model
   Subtopics: Metropolis, Heat-bath, Wolff cluster algorithm, Event-chains. Coupling of Markov chains. Perfect sampling.