ICTS Skype Seminar

Title : Entropy driven phase transitions in hard core lattice gases

Speaker : Dipanjan Mandal, The Institute of Mathematical Sciences, Chennai

Date : Tuesday, January 8, 2019

Time : 10:45 AM

Venue : Amal Raychaudhuri Meeting Room, ICTS Campus, Bangalore

Abstract : Entropy driven phase transitions are often observed in nature e.g., freezing transition in hard sphere, disordered-nematic transition in suspension of tobacco mosaic virus. Hard core lattice gas models are minimal models to study entropy-driven phase transitions where particles interact only through excluded volume interactions. The phases and phase transitions depends only on the shape and density of the particles. Despite a long history, it is not understood what the precise dependence between the shapes of the particles and the emergent phases is.

We have studied the model of differently shaped particles both in two and three dimensions, which include, (a) 2 × 2 squares, (b) mixture of 2 × 1 dimers and 2 × 2 squares in square lattice, (c) Y - shaped particles in triangular lattice, (d) 2 ×2×1 plates, (e) 2×2×2 cubes in cubic lattice. We have performed both analytical calculations and large-scale Monte Carlo simulations to study the phase diagram of the models. Details of various non-trivial high density phases will be given in talk.