ICTS Statistical Physics and Condensed Matter Seminar

Title : Ordering transition of the three-dimensional four-state random-field Potts model

Speaker : Manoj Kumar (National Institute of Science Education and Research, Bhubaneswar)

Date : Wednesday, 16 April 2025

Time : 11:30 AM (IST)

Abstract : Spin systems subjected to random magnetic fields serve as key models for exploring the effects of quenched disorder in condensed matter. While most studies have focused on Ising or continuous symmetries, the Potts model, with its fundamental relevance to realistic systems, has received comparatively little attention. In this work, we investigate the four-state random-field Potts model using a recently developed quasi-exact ground-state method. Building on approaches used for the three-state model, we perform extensive finite-size scaling analyses of observables such as magnetization, Binder parameter, energy cumulant, specific heat, and both connected and disconnected susceptibilities. Our results reveal compelling evidence for a continuous magnetic ordering transition in the presence of disorder, in contrast to the first-order transition in the pure system. We precisely estimate the critical point and critical exponents, which differ significantly from those of the three-state Potts model and the random-field Ising model, highlighting a unique behavior of the four-state case.

Reference: (arXiv:2504.03854) https://arxiv.org/pdf/2504.03854

Venue : Emmy Noether Seminar Room
Zoom Link: https://icts-res-in.zoom.us/j/96139069066?pwd=FbjzI9FS4UMD9gL2oOqvBys1uIklLP.1
Meeting ID: 961 3906 9066
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