S. N. Bose National Centre for Basic Sciences

Azadi Ka Amrit Mahotsav

26th S. N. BOSE MEMORIAL LECTURE

Date: 11th May 2023
Time: 4:00 PM
Venue: Silver Jubilee Hall

https://meet.google.com/xzy-avwa-zgq

SNBoseNationalCentreforBasicSciences

TITLE

Phase transition in hard rigid rods on a d-dimensional lattice

ABSTRACT

A system of hard rigid rods of length k on hypercubic lattices in d dimensions (d > 1) is known to undergo two phase transitions when chemical potential is increased: from a low density isotropic phase to an intermediate density nematic phase, and on further increase to a high-density phase with no orientational order. I will discuss the phase transitions when k>>1. I will argue that second phase transition is a first order transition with a discontinuity in density. We can obtain asymptotically exact results for the large-k limit for the chemical potential at the transition, and the two coexisting phase densities at the second transition. Interestingly, this large-k asymptotic behavior is independent of dimension. (This work is done with A. Shah and R. Rajesh.)

SPEAKER

Professor Deepak Dhar
Distinguished Professor Emeritus and NASI-Senior Scientist
Indian Institute of Science Education and Research, Pune

Professor Deepak Dhar is a renowned theoretical physicist, who has worked in the broad area of statistical physics. He is particularly well-known for his work on critical phenomena on fractals, branched polymers, disordered magnets, self-organized criticality, proportionate growth in biology, and models of super-cooled liquids and glasses, among other things.

Prof. Dhar earned his bachelor's degree in science from the University of Allahabad in 1970 and his master's degree in physics from the Indian Institute of Technology, Kanpur in 1972. Then he went to the California Institute of Technology for his PhD and, after that, joined the Tata Institute of Fundamental Research (TIFR), Mumbai, where he retired in 2016. Since then, he has been at the Indian Institute of Science Education and Research, Pune.

In 2022, he became the first ever Indian scientist selected for the Boltzmann Medal, the highest recognition in statistical physics, for outstanding contributions to the field. Prof. Dhar was awarded the Padma Bhushan in 2023, the Shanti Swarup Bhatnagar Prize (one of the India's highest scientific honours) in 1991, and is a TWAS Award winner in 2002. He is a fellow of The World Academy of Sciences as well as the three major Indian science academies: the Indian Academy of Sciences, the Indian National Science Academy, and the National Academy of Sciences.