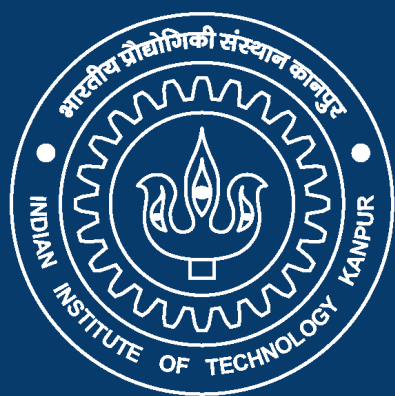




DEPARTMENT OF PHYSICS INDIAN INSTITUTE OF TECHNOLOGY KANPUR

PROF. AMIT DUTTA MEMORIAL DISTINGUISHED LECTURE SERIES 2025

INTRODUCTION TO SPIN GLASSES AND NEURAL NETWORKS

ALL ARE
CORDIALLY
INVITED

ABSTRACT

Spin glasses are disordered magnetic systems with pairs of spins having randomly distributed ferromagnetic and antiferromagnetic interactions. At low temperatures, these systems exhibit a spin-glass phase in which the spins are frozen in random directions. Unusual equilibrium and dynamic properties in the spin-glass phase arise from the presence of a large number of low-lying local minima of the energy or the free energy. An introduction to the theoretical description of spin glasses will be provided in the first half of the lectures.

Concepts and techniques developed in studies of spin glasses have been very useful in understanding a variety of random and complex systems in physics, as well as in very different areas, such as mathematics, biology, neuroscience and computer science. The second half of the lectures will provide an introduction to a class of such systems - neural networks. The Hopfield model of associative memory and the use of statistical physics to understand its properties will be discussed. Other applications of "spin-glass-like" theories will be discussed if time permits.

ABOUT THE SPEAKER



PROF. CHANDAN DASGUPTA
IISC AND ICTS, BANGALORE

Prof. Chandan Dasgupta earned his BSc degree in 1971 from Presidency College, University of Calcutta and MSc degree from Delhi University in 1973. He did his doctoral research at the University of Pennsylvania, USA under the supervision of Professor AB Harris and obtained PhD degree in Physics in 1978. Subsequently, he did post-doctoral research at the University of California, San Diego and Harvard University, and worked as a faculty member in the School of Physics and Astronomy of the University of Minnesota for a few years. Dasgupta's area of specialization is theoretical condensed matter physics with emphasis on statistical mechanics. He joined the Indian Institute of Science in 1987, where he is an honorary Professor. He is also the Simon's Professor at ICTS, Bangalore. Professor Dasgupta is the recipient of several awards and honours that include: the Warner Teutsch Memorial Prize (1974), the Fellowship of the Alfred P Sloan Foundation (1984-87), DAE-Raja Ramanna Prize (1999), Fellow of the Indian Academy of Sciences, Bangalore (1992), Fellow of the National Academy of Sciences (India), Allahabad (2000), Fellow of the Academy of Sciences for the Developing World (TWAS) (2007) and JC Bose National Fellowship (2006-10).

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AND TIME :**

LH - 17 ON 03/11/2025 (MONDAY) FROM 03:30 PM TO 05:00 PM,
LH - 19 ON 04/11/2025 (TUESDAY) FROM 03:30 PM TO 05:00 PM,
LH - 17 ON 06/11/2025 (THURSDAY) FROM 03:30 PM TO 05:00 PM,