

FOUNDATION DAY LECTURE

States of matter

Solids, liquids, gases, and in-betweens

Professor Deepak Dhar

Distinguished Emeritus Professor, IISER, Pune

Friday, June 30, 2023 at 2:30 pm

Venue - Homi Bhabha Auditorium

The phase transitions from solid to liquid to gaseous phases of matter are familiar to us from everyday life. Scientific study of phase transitions may be said to have started with the experiments of Cagniard de la Tour in 1822. Now, after 200 years, there is a fairly good theoretical understanding of continuous phase transitions. For changes of states, which are generically first order, the situation is less satisfactory. In particular, given a material, there is no general theory to predict what are the possible phases, and their relative positions in the pressure-temperature phase diagram.

Prof. Dhar will also discuss some of their recent work that models the orientationally disordered crystalline mesophases of matter (phases in between solids and liquids) as rigid rotators pivoted to lattice sites, interacting with their neighbouring rotators only by hard-core interactions, and otherwise free to take up any orientation.



Deepak Dhar was born on October 30, 1951 at Pratapgarh, Uttar Pradesh. After finishing his Ph.D. at Caltech in 1978, he returned to India, and joined TIFR, Mumbai as a regular faculty member. He was a Distinguished Professor at the time of his superannuation in September 2016. He is currently a Distinguished Emeritus Professor at IISER Pune. Prof. Dhar is known for his work on the abelian sandpile model of self-organised criticality, fractals, slow relaxation in magnets, percolation and animal problems, and growth models.

Prof. Dhar is a Fellow of all the three major Indian Science Academies. He is the recipient of the Young Scientist Award (1983), Shanti Swarup Bhatnagar Prize in Physics (1991), the J.R. Schrieffer Prize of the I.C.T.P. (1993), the S.N. Bose Medal of the Indian National Science Academy (2001), the T.W.A.S. Award in Physics (2003), the **Boltzmann Medal** (2022), and the **Padma Bhushan** (2023).