

INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE

2A & 2B, Raja S.C. Mullick Road, Jadavpur, Kolkata-700032, India

IACS Colloquium from School of Physical Sciences

Professor Vedika Khemani, Stanford University will deliver the Institute Colloquium lecture organized by School of Physical Sciences as per following schedule :

Speaker : Professor Vedika Khemani, Stanford University

Title : Surprises from Time Crystals

Date & Time : 18th December, 2019 at 3.00PM

Venue : C.V. Raman Hall

Abstract: Recent years have witnessed a remarkable confluence of diverse areas of physics coming together to inform fundamental questions about many-body quantum matter. A unifying theme in this enterprise has been the study of many-body quantum dynamics in systems ranging from electrons in solids to cold atomic gases to black holes. One of the foundational pillars in the study of many-body systems is the theory of equilibrium statistical mechanics characterized by two fundamental ideas: thermalization (that interacting systems generically approach thermal equilibrium at late times) and phase structure (that equilibrium states of matter can display various forms of order separated by sharp phase transitions).

Recent progress, particularly in the field of many-body localization, has led to generalizations of these fundamental ideas to the out-of-equilibrium setting. I will describe this progress, particularly as applied to periodically driven or Floquet systems. I will show that not only can non-equilibrium systems exhibit a sharp notion of phase structure, but that some of these phases are completely novel and unique to the out-of-equilibrium setting. For example, certain phases of matter that are forbidden in equilibrium, such as quantum time crystals, have found new life in the out-of-equilibrium setting. I will review the state of this rapidly evolving field, focusing in particular on some of the remarkable properties of the time crystal phase, and the surprises coming out of its study. I will provide a detailed overview of existing experiments, with a view towards identifying the ingredients needed for an unambiguous observation of this phase in the future.

Reference: Khemani, Moessner, Sondhi, "A Brief History of Time Crystals", arXiv:1910.10745

All are cordially invited