INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE

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

Seminar Notice

Org. by

School of Physical Sciences

Title:	**Thermodynamic formalism of percolation**
Speaker:	**Md. Kamrul Hassan, University of Dhaka, Bangladesh**
Date:	**November 28, 2019 (Thursday)**
Time:	**15:00 Hours**
Venue:	**Physics Seminar Room (C-406), 3rd Floor, Centenary Building, IACS**
Abstract:	Percolation is one of the simplest paradigmatic model for phase transition. In general, phase transitions are classified broadly into two classes based on how entropy and order parameter behaves across the critical point. Despite the history of more than 60 years of extensive studies, a proper definition of entropy remained elusive until we proposed one in 2017. In this article, we have used the idea of entropy and order parameter extensively to gain deep insight into the explosive percolation (EP), random percolation (RP) and inverted explosive percolation (IEP) on Erdös-Rényi (ER) network. Their comparison suggests that RP on ER network is not like RP on lattice. Firstly, the decrease of entropy and increase of order parameter above tc = 0.5 for RP and IEP on ER are too slow compared to those of RP on lattice. Secondly, when we draw them on the same plot we find that the two curves meet at far from tc for RP and even farther for IEP while in all other known cases they meet exactly at tc in the thermodynamic limit. These findings sheds doubt whether RP and IEP on network really describes continuous phase transition or not. Furthermore, the nature of entropy and order parameter suggest that RP on lattice and EP on network describes order-disorder transition while it is not the case for RP and IEP on network. Besides, we used the thermodynamic definition of specific heat and susceptibility to obtain their equivalent counterpart in percolation and hence obtain the corresponding critical exponents α and γ. We show that they obey the Rushbrooke inequality like in its thermal counterpart which can be regarded as the litmus test of their numerical values.

All are cordially invited to attend the seminar