INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE
2A & 2B, Raja S.C. Mullick Road, Jadavpur, Kolkata-700032, India

Seminar Notice

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School of Physical Sciences

Title:	**Classification of magnetic frustration and metamaterials from topology**
Speaker:	**Krishanu Roychowdhury, Stockholm University, Sweden**
Date:	**May 23, 2019 (Thursday)**
Time:	**4:00 p.m.**
Venue:	**Physics Seminar Room (C-406), 3rd Floor, Centenary Building, IACS**
Abstract:	We study the relationship between the physics of topology and zero modes in frustrated systems and metamaterials. Zero modes that exist in topological matters are distinct from the ones arising from symmetry breaking. Incidentally, a prominent aspect of frustrated systems and metamaterials also is to harbor such kind of zero modes in the form of an accidental degeneracy. Taking cues from these two apparently different phenomena, we ask a simple question: are the robust features of frustration topologically protected and if so can we classify different types of frustration using topology? In answering these questions we invoke the tools of topological mechanics to identify the key agent at play, namely the rigidity matrix, which is a non-Hermitian matrix and decides the topology of spin-wave zero modes in a frustrated magnet or phonon modes in metamaterials. Further developments of the theory rely on combining the recent developments in our understanding of Maxwell constraint counting and generalizing the ten-fold way classification of Hermitian matrices to non-Hermitian matrices. The result is a three-fold way classification for each Maxwell counting index. We illustrate the classification by demonstrating the existence of a new vortex-like invariant for real rigidity matrices using random matrices and through example frustrated spin models. So by classifying all the rigidity matrices, we answer the question of the origin of frustration (i.e. zero modes in the form of accidental degeneracy) in a wide class of frustrated magnets and metamaterials by linking it to topological invariants.

All are cordially invited to attend the seminar