<u>*"I WANNA KNOW VORTICES"*</u>

A One-day Discussion Meeting On Vortices And Flux Lattices

Venue : Institute Lecture Hall

Date : 08. 05. 2002

<u>*ABSTRACTS*</u>

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Speaker : Prof. S. N. Behera

Title : Vortices and vortex lattices : an introduction

An elementary and qualitative discussion of the phenomenon of vortex formation will be presented. Starting from vortices seen in rotating fluids, the subject of vortices in superfluid Helium, manifestation of vortex and flux lattices in type-II superconductors, in 2D-electron gas of fractional quantum Hall systems and in alkali atom Bose condesates will be touched upon.

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Speaker : Prof. S. G. Mishra

Title: Wave function of an electron in a magnetic field.

One of the solutions of Schroedinger equation for an electron in a constant magnetic field has relevance for flux lattice in a type II superconductor. We present here a brief pedagogical description of a search for a suitable wave function for an electron in a magnetic field.

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Spaeker : Prof. A. M. Srivastav

Title : Topology of vortices: a general introduction

This talk will provide a general introduction to the topology of vortices in various physical systems, with some discussion of specific systems such as helium-4, superconductor, liquid crystals etc. It will be explained how non-trivial topological structures are associated with vortices in these systems. Brief account of non-abelian vortices (as in biaxial nematic liquid crystals) will be given and their non-trivial interactions will be described.

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Speaker : Prof. S. M. Bhattacharjee

Title: Phases of vortices

Interacting topological defects like vortices in superconductors are strongly influenced by thermal and disorder-induced fluctuations. As a result, new phases (not just crystalline) are possible in various parts of the magnetic field-temperature phase diagram. Many of these phases and phase transitions can be undertood at a classical level by treating the topological defects as the primary degrees of freedom. We plan to discuss these issues in this lecture.

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Speaker : Prof. A. Khare

Title: Chern-Simons Vortices

It is well known that the Abrikosov vortices have quantized flux but are electrically neutral. I discuss Abelian Higgs model (which is a relativistic generalization of the Ginzburg-Landau model of superconductivity) with Chern-Simons term and show that in this case the vortices not only have quantized flux but also quantized electric charge. As a prelude to this discussion I first discuss the various properties of the CS term. In particular its role as a gauge field mass term is emphasized. I discuss the various properties of these vortices. I show that these charged vortices are nothing but charged anyons. It may be pointed out here the quasi-particles which appear in fractional quantum Hall effect are in fact believed to be charged vortices i.e. charged anyons.

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⋆ email: kundu@iopb.res.in