SYMPOSIUM 2025

DEPARTMENT OF MATHEMATICS

INDIAN INSTITUTE OF TECHNOLOGY PALAKKAD

JANUARY 31 | FEBRUARY 1

IIT PALAKKAD

A01-007, Saraswathi Block

JAN 31

10:15 → 11:15

Sobolev type Inequalities and related problems.

Sobolev inequalities are integral inequalities estimating the norms of function in terms of the norms of their derivatives. These inequalities are connected with various problems in PDE and geometry. We will discuss these inequalities, some of the related problems and the role of these inequalities.

Prof. K. Sandeep, TIFR-CAM

11:30 → 12:00

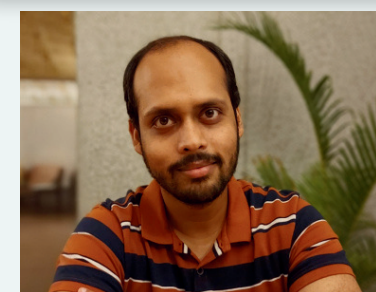**Geometric vs Topological perspective in Heegaard Floer homology**

We will begin with a brief overview of the topological perspective on the geometry of knot exteriors. Subsequently, we will explore how a topological tool known as Heegaard Floer homology can be employed to leverage this perspective in order to derive significant results in low-dimensional topology.

Dr. Subhankar Dey, IITPKD

12:00 → 01:00

Values of quadratic forms at integer points

I will explain how ergodic theory, the study of chaotic systems, can be used to study problems in number theory. The specific example will involve the study of quadratic forms.

Prof. Anish Gosh, TIFR

02:00 → 03:00

The Newton-- Kantorovich Theorem

The Newton–Kantorovich theorem is a fundamental result in both Numerical Analysis (for providing an iterative method for computing the roots of polynomials or of systems of nonlinear equations) and in Nonlinear Functional Analysis (for establishing that a nonlinear equation in an infinite-dimensional function space has a solution). This expository talk discusses a proof for this classical theorem.

Prof. Neela Nataraj, IITB

FEB 01

09:30 → 10:30

Circles and Reflections

This will be an expository talk on classical topics in inversive geometry and conformal maps.

Prof. Kaushal Verma, IISc

10:30 → 11:00

Unitary parts of Toeplitz operators

In 1972, Robert Goor proved the following surprising result: a contractive Toeplitz operator with an almost everywhere non-constant symbol is always completely non-unitary. In this talk, we will look at characterizing Toeplitz operators with operator-valued symbols which admit unitary parts.

Dr. Srijan Sarkar, IITPKD

11:30 → 12:00

Lifting criteria for closed curves to finite covers

We will discuss some necessary and sufficient conditions under which a closed curve on a surface can be lifted to a class of finite sheeted normal covering. We will also discuss some applications of these results to finite index normal subgroups of free groups. In particular, we prove that, for any prime number p, a free group with n >= 2 generators can be written as the union of subgroups of index p.

Deblina Das, IITPKD

12:00 → 12:30

A Cramér-Rao Type Bound Using Information Geometry.

Information–geometry is the study of statistical models from a Riemannian geometric point of view. A Riemannian metric is obtained from a divergence function using Eguchi's theory; the famous Fisher-Rao metric is obtained from the Kullback-Leibler (KL) divergence. The geometric derivation of the classical Cramér-Rao Lower Bound (CRLB) by Amari and Nagaoka is based on this metric. This talk studies a Riemannian metric obtained from the Basu et al. divergence and derives a Cramér-Rao type bound.

Satyajit Dhadumia, IITPKD