Abstracts

Mahan M.J.

Title: **A splitting theorem for good complexifications**

We produce restrictions on fundamental groups of manifolds admitting good complexifications in the sense of Totaro by proving the following Cheeger-Gromoll type splitting theorem.

Let M be a closed manifold admitting a good complexification. Then M admits a finite-sheeted regular covering M_1 such that M_1 admits a fiber bundle structure with base $(S^1)^k$ and fiber N, where N admits a good complexification and has zero virtual first Betti number.

We give several applications to manifolds of dimension at most 5.

This is joint work with I. Biswas and A. J. Parameswaran.

Kaushal Verma

Title: Constructing quadrature domains in C^n

The goal will be to present a method of constructing two families of quadrature domains in C^n.

V. Balaji

Title: Principal bundles on nodal curves, a new perspective.

In this talk, I will take a closer look at principal bundles on an irreducible nodal curve. A long standing question is to be able to give an intrinsic definition of semistability of bundles on nodal curves. I will examine this issue and present a possible solution.

Sarbeswar Pal

Title: Irreducibility of the moduli space of vector bundles over a smooth sextic surface.

Let S be a very general smooth hypersurface of degree 6 in $\mathbb{P}3$. In my lecture i will give an effective bound for c_2 for which the moduli space of rank 2 stable vector bundles with $c_1 = \mathcal{O}_S(1)$ is irreducible.

J. Hurtubise

Title: Instantons on a Taub-Nut manifold

There are various hyperkahler geometries which have the asymptotics of R^3 x S^1, the simples being R^3 x S^1 itself. The next one on the list is the Taub-NUT manifold. We will discuss the descriptions of the moduli spaces engendered in both these cases. (joint with Sergey Cherkis).

Archana S. Morye

Title: Real Vector Bundles

In this talk we will discusse real holomorphic vector bundles on real abelian varieties. The main result in the talk gives several conditions that are necessary and sufficient for the existence of a holomorphic connection on a real holomorphic vector bundle over a real abelian variety. Also will give an analogue, for real abelian varieties, of a result of Simpson, which gives a criterion for a holomorphic vector bundle to arise by successive extensions of stable vector bundles with vanishing Chern classes.

M. Logares

Title: Hodge polynomials of the SL(2,C) – character variety of an elliptic curve with two marked points

We compute Hodge polynomials for the moduli space of representations of an elliptic curve with two marked points into SL(2**,**C). When we fix the conjugacy classes of the representations around the marked points to be diagonal and such that the eigenvalues are of module one, the character variety is diffeomorphic to the moduli space of parabolic Higgs bundles for which the Betti numbers are known. In that case we can recover some of the Hodge numbers of the character variety. Moreover, as a byproduct, we get some of the Hodge numbers of the moduli space diffeomorphic to the moduli space of doubly periodic instantons. This is joint work with Vicente Muñoz.

Ritwik Mukherjee

Title: Enumerative geometry of singular curves in a general linear system

Enumerative geometry of singular plane curves (i.e. curves in CP^2) is a classical subject dating back to nineteenth century. A more general class of question is to consider a linear system L--->X over a compact complex manifold and enumerate singular curves in this linear system.

In this talk we will describe a topologcial method to approach questions of this nature. The basic idea is to express these enumerative numbers as the Euler class of some appropriate bundle. If time permits, we will give a brief idea about how to compute degenerate contributions to the Euler class using topological methods.

Manish Kumar

Title: Etale fundamental groups and family of Galois covers of curves

For a smooth affine curve C over an algebraically closed field of positive characteristic, we discuss how the existence of certain family of Galois covers of curves could help us solve various embedding problems for

the etale fundamental group and its subgroups. This help in understanding the etale fundamental group better.

Ana Peon

Title: The Structure of the Hitchin Fibration

Given a real reductive Lie group G, and the moduli space of G-Higgs bundles Higgs(G), the Hitchin map defines a fibration over a vector space (the Hitchin base). I will discuss the structure of the fibration, both global, and in terms of the description of a section and the fibers. The talk will be concerned about the global structure and the description of the fibers, in particular regarding abelianization. I will explain why the fibers are subvarieties of the Picard variety of the cameral cover only when G is quasi split, and present some examples.

Tathagata Sengupta

Title: Elliptic Fibrations on Supersingular K3 Surface with Artin invariant 1 in characteristic 3

We describe elliptic models with section on the Shioda super singular K3 surface X of Artin invariant 1 over an algebraically closed field of characteristic 3. We compute elliptic parameters and Weierstrass equations for the fifty two different fibrations, and analyze some of the reducible fibers and Mordell-Weil lattices.

Pabitra Barik

(to be announced)

J. Huisman

Title: The fundamental class of a real algebraic variety

We construct a fundamental class of a real algebraic variety as a Borel-Moore homology class on its set of closed points with coefficients in a certain complex of sheaves of abelian groups. It is a kind of unification of the integral fundamental class of the set of complex points, and the mod-2 fundamental class of the set of real points of the real algebraic variety. We discuss some applications.

V. Heu

Isomonodromic deformations in genus 2

We study the isomonodromic foliation in the moduli space of flat rank 2 vector bundles over genus 2 curves. We proof by explicit calculations that it is topologically transverse to the locus of the trivial bundle as well as to the unstable bundles.

Arjit Dey

Title: Equivariant principal bundle over toric varieties

We classify holomorphic torus equivariant principal G-bundle on a nonsingular toric variety, where G is a complex algebraic group. As an application we show some splitting results for certain class of groups. Further when the structure group is reductive we give an if and only if condition for existence of equivariant structure on a principal G-bundle. This is a joint work with Indranil Biswas and Mainak Poddar.

Y. Pandey

Title: Brauer group of moduli stack and space of parahoric G-torsors on a curve

We compute the Brauer group of the moduli stack and the space of regularly stable parahoric G-torsors on a smooth projective curve X of genus g ≥ 3.

L. Alvarez-Concul

Title: Moduli of quiver sheaves

I will explain a construction of the moduli of semistable quiver sheaves over a projective scheme, extending previous joint work with Alastair King for coherent sheaves. By quiver sheaf here, I mean a representation of a quiver in coherent sheaves. The main differences with related previous work by Alexander Schmitt come from the choice of a different semistability condition. Embedding this moduli space in a moduli space for representations of a different quiver in vector spaces, I can use the invariant theory for quiver representations to obtain affine and homogeneous coordinates on the moduli of quiver sheaves, that are similar in this context to the generalized theta functions for vector bundles.

Shane D’Mello

Title: Chord Diagrams and Generic Real Rational Planar Curves of Degree 4

We will show that the rigid isotopy classification of generic real rational curves of degree 4 in the plane can be reduced to the combinatorial classification of certain chord diagrams.

Anilatmaja Aryasomayajula

Title: Heat kernel and automorphic forms

In this talk, we discuss the applications of the heat kernel approach to line bundles of automorphic forms defined on a Hilbert modular variety. We link the heat kernel acting on the line bundle of Maass forms of weight k with the Bergman kernel associated to the vector space of 2k cusp forms. Using the relation, we derive sup norm bounds for average of cusp forms of any weight. Furthermore, we discuss the applicability of this approach to hyperbolic 3 manifolds.

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