

**Annual Discussion Meeting on
Vector Bundles**

28 March - 01 April, 2022

Abstracts of Talks

**School of Mathematics
Tata Institute of Fundamental Research**

Title of Talks

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| Arijit Dey | <i>Toric principal bundles</i> |
| Umesh Dubey | <i>Functorial moduli construction of Consul and King</i> |
| Krishna Hanumanthu | <i>Some results on Seshadri constants</i> |
| Manish Kumar | <i>Genuinely ramified maps of orbifolds and stability of parabolic bundles</i> |
| Sarbeswar Pal | <i>Non-free Minimal rational curves and Wobbly type locus on Fano manifolds of Picard number one</i> |
| Pranav Pandit | <i>Sheaves of categories in geometry</i> |

Abstracts

Monday, 28 March 2022 (14:30-15:30)

Speaker : Pranav Pandit
Title : Sheaves of categories in geometry

The study of vector bundles on Fano manifolds is related to the symplectic geometry of Lefschetz fibrations by homological mirror symmetry. I will talk about how the study of sheaves of categories sheds light on common phenomena that arise in both these contexts. This talk is based on joint work with L. Katzarkov and T. Spaide.

Tuesday, 29 March 2022 (11:00-12:00)

Speaker : Krishna Hanumanthu
Title : Some results on Seshadri constants

Seshadri constants for line bundles have been defined by Demailly in 1990 and since then they have been studied extensively. The original definition has been generalized in various directions, including to the case of vector bundles of arbitrary rank. We will give an overview of these developments and talk about some important questions and recent results.

Wednesday, 30 March 2022 (14:30-15:30)

Speaker : Sarbeswar Pal
Title : Non-free Minimal rational curves and Wobbly type locus on Fano manifolds of Picard number one

Let X be a Fano manifold of Picard number one. In this talk, I will introduce a notion of wobbly type points in X and show that locus of wobbly type points forms a divisor under certain hypothesis. In fact we will show that wobbly type locus is completely invariant for any surjective endomorphism of X . For the case of moduli space of stable vector bundles on curves, we will show that the wobbly type locus and the usual wobbly locus coincide which gives a proof of Drinfeld's conjecture which claims that wobbly locus is pure of co-dimension one. Finally we will show that any endomorphism of the moduli space of stable vector bundles is étale outside the wobbly locus which gives an alternative proof of Hwang-Ramanan theorem on endomorphisms of the moduli Space.

Thursday, 31 March 2022 (11:00-12:00)

Speaker : Manish Kumar

Title : Genuinely ramified maps of orbifolds and stability of parabolic bundles

A morphism between smooth projective curves is called genuinely ramified if the induced map on the fundamental group of curves is surjective. There are a couple bundle theoretic characterizations of these maps. In particular, stable bundles pull back to stable bundles under these maps. In this talk, we will discuss the analog of these statements for morphisms of (formal) orbifolds with bundles replaced by parabolic or orbifold bundles. It is based on a joint work with Indranil Biswas and A. J. Parameswaran.

Thursday, 31 March 2022 (14:30-15:30)

Speaker : Umesh Dubey

Title : Functorial moduli construction of Consul and King

The moduli construction of Mumford and Seshadri for vector bundle over smooth projective curves was extended to moduli of torsion-free sheaves over higher dimensional varieties by Gieseker and Maruyama. Simpson later generalized it to the moduli of pure sheaves on higher dimension projective schemes and Langer extended it to mixed characteristics.

Consul and King used embedding of the category of regular sheaves to the category of Kronecker representations to get the functorial moduli construction of pure sheaves.

In this talk, we will briefly describe the construction of the Consul and King. We will also mention the related results obtained jointly with Sanjay Amrutiya for parabolic sheaves using the moduli of filtered Kronecker Representations.

Friday, 01 April 2022 (14:30-15:30)

Speaker : Arijit Dey

Title : Toric principal bundles

Let X be a complex toric variety equipped with the action of an algebraic torus T , G be a connected reductive complex algebraic group and E be an equivariant principal G -bundle on X . In this talk we will discuss following problems:

- (a) Classification of T -equivariant principal G -bundles on X .
- (b) Equivariant automorphism group $\text{Aut}_T(E)$.
- (c) Equivariant splitting of E .
- (d) Stability and equivariant stability.

This is a joint work with Jyoti Dasgupta, Bivas Khan, Indranil Biswas and Mainak Poddar.