

# BUNDLES 2023

MARCH 27-31, 2023

## TITLES AND ABSTRACTS

### Monday, 27 March 2023

**Sorin Dumitrescu** *Holomorphic foliations and transverse Cartan geometry* (11:30-12:30pm)

This talk will present the foliated aspect of Cartan's geometries (connections) which are geometrical structures infinitesimally modeled on homogeneous spaces. After an introduction of the classical framework providing motivations, we will show classification results for holomorphic foliations with transversal Cartan geometries on rationally connected varieties and on Calabi-Yau manifolds. This is based on a joint work with Indranil Biswas (TIFR, Mumbai).

### Tuesday, 28 March 2023

**Krishna Hanumanthu** *Bounded negativity conjecture and line arrangements.* (11:30-12:30pm)

Let  $X$  be a nonsingular projective surface. Bounded negativity conjecture predicts that there is an integer  $b(X)$ , depending only on  $X$ , such that the self-intersection  $C^2$  is at least  $b(X)$  for every reduced curve  $C$  on  $X$ . This conjecture is open, in general, in characteristic zero (it is known to be false in positive characteristic), even in some seemingly simple cases like blow ups of the projective plane. Line arrangements in the plane reveal interesting features of this conjecture. We will discuss this circle of ideas and talk about some recent results on line arrangements. This talk is partly based on joint work with Brian Harbourne.

**Carolina Tamborini** *A topological construction of families of Galois covers of the line* (16:00-17:00pm)

We describe a new construction of families of Galois coverings of the line using basic properties of configuration spaces, covering theory, and the Grauert-Remmert Extension Theorem.

**Wednesday, 15 March 2023**

FREE

**Thursday, 16 March 2023****Swarnava Mukhopadhyay** *Graph potentials associated moduli of rank two bundles on curves* (11:30-12:30pm)

Graph potentials are Laurent polynomials associated with (colored) trivalent graphs that were introduced in a joint work with Belmans and Galkin. They naturally appear as Newton polynomials of natural toric degenerations of the moduli space of rank two bundles. In this talk we will first discuss how graph potentials compute quantum periods of the moduli space  $M$  of rank two bundles with fixed odd degree determinant and hence can be regarded as a partial mirror to  $M$ . From the viewpoint of mirror symmetry, we will show how the critical value decomposition of graph potentials provides evidence for the conjectural semiorthogonal decomposition of  $DbCoh(M)$ . If time permits we will also discuss a formula to efficiently compute the periods of graph potential via a *TQFT*. This is joint work with Pieter Belmans and Sergey Galkin.

**Friday, 17 March 2023****Arijit Dey** *Chen–Ruan cohomology and orbifold Euler characteristic of moduli spaces of parabolic bundles* (11:30-12:30pm)

We consider the moduli space of stable parabolic Higgs bundles of rank  $r$  and fixed determinant, and having full flag quasi-parabolic structures over an arbitrary parabolic divisor on a smooth complex projective curve  $X$  of genus  $g$ , with  $g \geq 2$ . The group  $\Gamma$  of  $r$ -torsion points of the Jacobian of  $X$  acts on this moduli space. We describe the connected components of the various fixed point loci of this moduli under non-trivial elements from  $\Gamma$ . When the Higgs field is zero, or in other words when we restrict ourselves to the moduli of stable parabolic bundles, we also compute the orbifold Euler characteristic of the corresponding global quotient orbifold. We also describe the Chen–Ruan cohomology groups of this orbifold under certain conditions on the rank and degree, and describe the Chen–Ruan product structure in special cases. This is a joint work with Indranil Biswas and Sujoy Chakraborty.