UNIVERSITY OF IOANNINA

DEPARTMENT OF MATHEMATICS

WORKSHOP, 28 MAY 2022

PROGRAMME OF TALKS

IOANNINA, MAY 2022

INFORMATION

The event will take place in Room 01 (Ground floor) of the Department of Mathematics, Univ. of Ioannina. Coffee will be served in Room 201 (Second floor) of the Department of Mathematics, Univ. of Ioannina.

PROGRAMME:

14:30 Coffee

15:00 – 15:45 Marius Vladoiu: Markov complexity versus complete intersection

16:00 – 16:45 Hara Charalambous: The relative canonical ideal

17:00 – 17:45 Anargyros Katsabekis: Minimal systems of binomial generators and the indispensable complex of a toric ideal

Coffee Break

18:30 – 19:15 Dimitra Kosta: On the strongly robustness property of toric ideals

19:30 – 20:15 Christos Tatakis: Quadratic robust and generalized robust toric ideals of graphs

ABSTRACTS OF TALKS

Hara Charalambous (Aristotle University of Thessaloniki)
The relative canonical ideal

The relative canonical ideal of a curve appears as a notion to connect the lifting from characteristic p to characteristic zero. In this talk we discuss the notion and examine combinatorial criteria for the generating sets of these ideals.

Anargyros Katsabekis (Bilkent University)
Minimal systems of binomial generators and the indispensable complex of a toric ideal

This talk is based on joint work with Hara Charalambous and Apostolos Thoma. Let $A = \{\mathbf{a}_1, \ldots, \mathbf{a}_m\} \subset \mathbb{Z}^n$ be a vector configuration and $I_A \subset K[x_1, \ldots, x_m]$ its corresponding toric ideal. We determine the number of different minimal systems of binomial generators of I_A. We associate to A a simplicial complex $\Delta_{\text{ind}(A)}$. We show that the vertices of $\Delta_{\text{ind}(A)}$ correspond to the indispensable monomials of the toric ideal I_A, while one dimensional facets of $\Delta_{\text{ind}(A)}$ with minimal binomial A-degree correspond to the indispensable binomials of I_A.

Dimitra Kosta (University of Edinburgh)
On the strongly robustness property of toric ideals

Co-authors: Dimitra Kosta, Apostolos Thoma, Marius Vladoiu

To every toric ideal one can associate an oriented matroid structure, consisting of a graph and another toric ideal, called bouquet ideal. The connected components of this graph are called bouquets. Bouquets are of three types; free, mixed and non mixed. We prove that the cardinality of the following sets - the set of indispensable elements, minimal Markov bases, the Universal Markov basis and the Universal Gröbner basis of a toric ideal - depend only on the type of the bouquets and the bouquet ideal. These results enable us to introduce the strongly robustness simplicial complex and show that it determines the strongly robustness property for toric ideals. For co-dimension 2 toric ideals, we study the strongly robustness simplicial complex and prove that robustness implies strongly robustness.

Christos Tatakis (University of Ioannina)

Quadratic robust and generalized robust toric ideals of graphs

(joint work with Ignacio Garcia-Marco)

A toric ideal is robust if its universal Gröbner basis (the union of all the reduced Gröbner bases) is a minimal set of generators, and is generalized robust if its universal Gröbner basis equals its universal Markov basis (the union of all its minimal sets of binomial generators). Robust and generalized robust toric ideals are both interesting from both a Commutative Algebra and an Algebraic Statistics perspective. However, only a few nontrivial examples of such ideals are known. In this talk we study these properties (and some related ones) for toric ideals of both graphs and numerical semigroups.

Marius Vladoiu (University of Bucharest)

Markov complexity versus complete intersection

We discuss the asymptotic behaviour of the Markov complexity of matrices and its few known values in the complete intersection case.