Special Session 5: Topology of Singularities and Complex Spaces

Organizers: Javier Fernández de Bobadilla (BCAM, Bilbao, Spain) and Ann Lemahieu (Université Nice Sophia Antipolis, Nice, France).

Multiplier Ideals and Jumping Numbers in Higher dimensions

Ferran Dachs-Cadefau

Universität Halle, Germany

Tuesday 23, 09:25-10:00

Multiplier ideals and jumping numbers are invariants that encode relevant information about the structure of the ideal to which they are associated. The aim of this talk is to present an algorithm to compute jumping numbers on varieties of dimension at least 3. We will present a way to find a small subset of the 'classical' candidate jumping numbers of an ideal, containing all the jumping numbers. Moreover, many of these numbers are automatically jumping numbers, and in many other cases, it can be easily checked.
The presented results are part of a joint work with Hans Baumers.

The Euler-Chow series and Cox rings

Javier Elizondo

UNAM, Mexico

Monday 22, 08:45-09:20

In this talk I will explain briefly the definition of the series and give a short summary of what is known about it, in particular I will mention the motivic version of it. Finally, the relation of the series and Cox rings will be shown and some examples are presented to show this relation. At first, the series had the propose to compute the Euler characteristic of Chow varieties, but after a while the series started having some properties that resembles other very

important series, as the Hilbert or the Weil zeta series. This gives a glimp of the importance the series can be.

Blowing up of monomial ideals and the Semple-Nash modification on toric varieties

Pedro Daniel González Pérez

Universidad Complutense de Madrid, Spain

Tuesday 23, 10:10-10:45

The blowing up of a monomial ideal in the affine space is non necessarily normal. It is covered by affine charts determined by certain semigroup algebras. We explain how one can generalize this example to define toric varieties without the normality assumption. Gonzalez-Sprinberg proved that the Semple-Nash modification on a toric variety is described by the blowing up of certain monomial ideal. We study some properties of this modification in terms of monomial valuations. This is a joint work with B. Teissier.

Explicit description of the multiplier ideals associated to plane curve singularities

Manuel González Villa

CIMAT, Mexico

Tuesday 23, 08:45-09:20

Multiplier ideals and their jumping numbers are a powerful tool to study the singularities of an ideal on complex algebraic variety with mild singularities. Jumping numbers of (analytically) irreducible plane curve singularities have been independently computed and studied by Jarvilehto, Naie and Tucker. We will report on an explicit description of the multiplier ideals associated to irreducible plane curve singularities, developed in collaboration with Xavier Gómez-Mont and Carlos Rodrigo Guzmán (CIMAT). Alternative approaches have been recently pursued by Alberich Carramiñana, Blanco, Dachs-Cadefau and Álvarez-Montaner, and González-Pérez and Robredo-Bruces.

Invariants of singularities via arcs and the Nash Multiplicity Sequence

Beatriz Pascual Escudero

Universidad Autónoma de Madrid, Spain

Tuesday 23, 10:50-11:25

Arc spaces are useful in the study of singularities, since they detect properties of algebraic varieties, including smoothness. They also let us define numerous invariants. In particular, the Nash multiplicity sequence is a non-increasing

sequence of positive integers attached to an arc in the variety which stratifies the arc space. This sequence gives rise to a series of invariants of singularities which turn out to be strongly related to those that we use for constructive resolution of singularities for varieties defined over fields of characteristic zero. Moreover, these invariants defined by means of arc spaces do not rely on the peculiarities of the characteristic zero case, so they pose interesting questions for the case of varieties defined over perfect fields, regardless of their characteristic.

Tête-à-tête graphs and quasi-periodic diffeomorphisms

María Pe Pereira

Universidad Complutense de Madrid, Spain

Monday 22, 10:10-10:45

I will report about a joint work with J. Fernández de Bobadilla and P. Portilla. Norbert A'Campo defined tête-à-tête graphs and showed that if the monodromy of a plane branch is periodic then it is a generalized Dehn twist along a tête-à-tête graph.
We have characterized periodic orientable diffeomorphisms of surfaces with non-empty boundary as those induced by a generalized Dehn twist along a tête-à-tête graph. In this sense we generalize a result by Christian Graf.
We also propose a generalization of tête-à-tête graphs that allow to codify many quasi-periodic diffeomorphisms of surfaces with boundary.

Acknowledgements: The author is supported by Caja Madrid.

Some results about mixed singularities

Agustín Romano

Universidad del País Vasco, Spain

Monday 22, 09:25-10:00

A mixed function is a complex valued function $f\colon \mathbb{C}^n \to \mathbb{C}$ expanded in a convergent power serie of variables z_i and $\bar{z}_i$ for $i \in \{1, \ldots, n\}$,

$$f(z_1, \ldots, z_n) = \sum_{\mu,\nu} c_{\mu,\nu} \mathbf{z}^{\mu} \bar{\mathbf{z}}^{\nu}.$$

In this talk we present some results about mixed functions with an isolated singularity. In particular:

- We present a classification of polar weighted homogeneous polynomials with isolated critical point. These are real analytic maps which generalize complex weighted homogeneous polynomials, they are polynomials weighted homogeneous with respect to an $\mathbb{R}^+$-action and also with respect to a $\mathbb{S}^1$-action. Our classification it is a generalization of the families of complex weighted homogeneous polynomials given by Orlik and Wegreich.

- We introduce the "'embedding method"' to study mixed polynomials. The idea relays on a geometric method which allows us to prove new results and to generalize some properties from the complex case as an example of this method we define a GSV-index for mixed polynomials.

Joint work with José Luis Cisneros-Molina.

Tangent cones of Lipschitz normally embedded sets are Lipschitz normally embedded

Edson Sampaio

Universidade Federal do Ceará, Brazil

Monday 22, 10:50-11:25

We prove that tangent cones of Lipschitz normally embedded sets are Lipschitz normally embedded. We also extend to real subanalytic sets the notion of reduced tangent cone and we show that subanalytic Lipschitz normally embedded sets have reduced tangent cones. In particular, we get that Lipschitz normally embedded complex analytic sets have reduced tangent cones. This is a work joint with Alexandre Fernandes.