



IberoSing | International Workshop | 2026

Singularity Theory & Related Topics

June 29 - July 8 | ZARAGOZA (Spain) & ANDORRA

Book of Abstracts

Zaragoza Week

IberoSing International Workshop 2026

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Universidad de Zaragoza, Spain

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Zaragoza Abstracts

Explicit cones for surfaces from pencils at infinity

Elvira Pérez Callejo

Universidad de Valladolid (IMUVA)

Abstract

We study rational surfaces obtained by blowing up the projective plane at configurations $\mathcal{C} = \mathcal{B} \cup \mathcal{D}$, where \mathcal{B} is the set of proper and infinitely near base points of the pencil associated to a curve with one place at infinity, and \mathcal{D} is a finite set of free infinitely near points lying on strict transforms of curves of the pencil. On the resulting surface X , the cone of curves $\text{NE}(X)$ and the nef cone $\text{Nef}(X)$ are polyhedral, and we give an explicit description of them. Moreover, when the pencil arises from an AMS-type curve and \mathcal{D} contains at most two free points on each considered curve, the Cox ring $\text{Cox}(X)$ is finitely generated.

This is joint work with Carlos Galindo, Francisco Monserrat and Carlos-Jesús Moreno-Ávila.

Fixed point Floer homology: an introduction

Tomasz Pełka

Jagiellonian University

Abstract

The course will be a gentle introduction to fixed point Floer theory, aimed at non-experts, with special focus on possible applications to singularity theory.

First, I will explain Floer's original motivation: the Arnold conjecture, bounding the number of fixed points of a Hamiltonian diffeomorphism by the sum of Betti numbers. With this in mind, I will introduce the Floer complex, following the lectures of D. Salamon. Next, I will explain M. McLean's proposal to use Floer-theoretic invariants to study the geometry of isolated singularities. Following his ICM address, I will explain why smoothness of isolated threefold singularities is a symplectic invariant, even though it is not a topological one.

For isolated hypersurface singularities, I will state the arc-Floer conjecture, relating fixed point Floer homology of the monodromy with the compactly-supported cohomology of contact loci. This conjecture is motivated by the existence of spectral sequences which converge to each side and have the same first page. On the Floer side, it is a Morse--Bott type spectral sequence, due to McLean. I will explain how to construct it from the symplectic version of the A'Campo model (joint work by J. F. de Bobadilla). Finally, I will indicate some special cases when this spectral sequence degenerates. In particular, an observation of P. Seidel yields such degeneration for plane curves, which is one of the ingredients of the proof of arc-Floer conjectures in this case, due to J. de la Bodega and E. de Lorenzo Poza.

Derived categories

Guillermo Peñafort Sanchis

Universitat de València

Abstract

This minicourse will provide an introduction to derived categories and derived functors, with an emphasis on their applications to singularity theory. We will develop the basic formalism and use it to study a number of classical results and constructions, including criteria for Cohen-Macaulayness, depth computations, comparison theorems relating singular cohomology, sheaf cohomology and de Rham cohomology, Poincaré--Verdier duality and vanishing cohomology of deformations of singularities.

The Bruno ideal for logarithmic vector fields

María Martín Vega

Institut de Mathématiques de Jussieu--Paris

Abstract

Given a germ of analytic vector field ∂ , let $\partial = \partial_{\text{ss}} + \partial_{\text{nilp}}$ be its unique formal Jordan decomposition, where ∂_{ss} is semi-simple and ∂_{nilp} is nilpotent. When ∂ is logarithmic, we define the Bruno ideal $B(\partial)$ as the formal locus where the semi-simple and the nilpotent components are collinear, that is, the vanishing locus of $\partial_{\text{ss}} \wedge \partial_{\text{nilp}}$.

We prove the following result originally stated by A. D. Bruno: if the eigenvalues of ∂_{ss} satisfy an arithmetic condition, then $B(\partial)$ is analytic and the restriction of ∂ to its zero set V is analytically normalizable.

This talk is based on joint work with Daniel Panazzolo.

The Strong Monodromy Conjecture and certain homogeneous polynomials

Daniel Bath

KU Leuven

Abstract

The Strong Monodromy Conjecture promises a miraculous connection between the theory of algebraic differential operators and the theory of motivic integration, namely it claims the poles of the motivic zeta function are contained in the zeroes of the Bernstein--Sato polynomials. Alas, the miracle has few witnesses; even for homogeneous polynomials in three variables this conjecture is open. We prove it for homogeneous polynomials in three variables whose associated reduced projective divisor has, at worst, quasi-homogeneous singularities. In the analogous situation with more variables, we will ``solve'' the D-module part of the story.

This is joint work with Wim Veys; arXiv:2602.20922.

Isosingularity in algebraic varieties and arc schemes

Mario Morán Cañón

Universidad Autónoma de Madrid (UAM) / ICMAT

Abstract

Given a scheme, analytic isosingularity is, informally speaking, the property that the formal neighborhood of a point remains constant as the point varies. We will present several results, as well as a number of questions, concerning analytic isosingularity in algebraic varieties on the one hand, and in arc schemes, that is, the space of formal germs of curves on an algebraic variety, on the other. This is joint work with David Bourqui.

The Archimedean zeta function

Roger Gómez López

Universitat Politècnica de Catalunya (UPC)

Abstract

The Archimedean zeta function is a one-parameter family of distributions, for which the dependence on the parameter is analytic in the region of convergence. Two approaches have been used to obtain its meromorphic extension to the complex plane: resolution of singularities and the Bernstein--Sato polynomial. In the case of irreducible plane curves, we have obtained a full explicit description of the poles and the residues, and their consequences for the Bernstein--Sato polynomial.

Hilbert schemes of points and the lattice cohomology of finite maps

Alex Hof

Alfréd Rényi Institute of Mathematics

Abstract

The analytic lattice cohomology of a reduced curve germ categorifies its delta invariant and captures information about other invariants, including its Cohen--Macaulay type and, in the planar case, its Heegaard Floer link homology. We show that these cohomology groups can be computed from filtrations on an appropriate collection of nested punctual Hilbert schemes; this allows us to define a theory of lattice cohomology for finite maps between arbitrary-dimensional complex-analytic multigerms such that the lattice cohomology of a curve germ is retrieved as the cohomology of its normalization map. As an application, we construct specialization maps in lattice cohomology arising from deformations of curve germs. Based on joint work with András Némethi.

Denef--Loeser zeta functions of suspensions and Lê--Yomdin singularities

Manuel González Villa

Universidad de Zaragoza

Abstract

In this talk, we provide formulas for the motivic and topological zeta functions for a broad family of hypersurfaces. This family includes suspensions of hypersurfaces by an arbitrary number of points and extends beyond the classical Thom--Sebastiani type. Furthermore, we present applications to the monodromy and holomorphy conjectures for suspensions and Lê--Yomdin singularities. This is joint work with Enrique Artal Bartolo, Pedro D. González Pérez, and Edwin León Cardenal (arXiv:2604.24523v1).

Cyclic quotient surface singularities and proportionally modular numerical semigroups

Zsolt Baja

Babeş-Bolyai University

Abstract

Let (X, o) be a weighted homogeneous surface singularity whose link is a rational homology sphere. By the Pinkham--Dolgachev--Demazure formula, the dimensions of the graded components of its coordinate ring

$$R_{(X,o)} = \bigoplus_{\ell \geq 0} R_{(X,o),\ell}$$

are determined by the topology of the singularity. Therefore one can associate with (X, o) the numerical semigroup

$$\mathcal{S} = \{\ell \in \mathbb{Z}_{\geq 0} \mid \dim R_{(X,o),\ell} \neq 0\}.$$

Numerical semigroups obtained in this way are called *representable numerical semigroups*. This construction makes it possible to apply tools from singularity theory to the study of numerical semigroups.

In 2020, László and Némethi derived a formula for the Frobenius number of a representable numerical semigroup and established the representability of a class of numerical semigroups. Subsequent works provided a characterization of representable semigroups and established a formula for their genus.

In this talk, we focus on the case in which (X, o) is a cyclic quotient singularity. The associated semigroups form the class of *proportionally modular numerical semigroups* introduced by Rosales et al. We describe this correspondence and illustrate how to determine a system of generators, as well as how to construct a resolution graph representing a given semigroup. Finally, we present a solution to a previously open problem posed by Rosales and García-Sánchez in their 2009 monograph regarding modular numerical semigroups.

This is joint work with T. László and A. Némethi.

On the Hodge index theorem for singular spaces and characteristic classes

Irma Pallarés Torres

Universidad de Cantabria

Abstract

The classical Hodge index theorem identifies the signature of a compact complex manifold with the value at $y = 1$ of its Hirzebruch χ_y -genus. Recently, this result has been extended to singular spaces. Moreover, Brasselet, Schürmann, and Yokura conjectured a characteristic class version of this theorem. In this talk, we will discuss progress on this conjecture. This presentation is based on joint work with Fernández de Bobadilla and Saito.

Geometry of contact loci via semihomogeneous singularities

Eduardo de Lorenzo Poza

BCAM (Basque Center for Applied Mathematics)

Abstract

Given a scheme X , a regular function f and an integer m , the m -contact locus $\mathcal{X}_m(f)$ is the subspace of the m -jet space $J_m(X)$ consisting of those arcs that meet the hypersurface $f^{-1}(0)$ with order precisely m . Even though the additive invariants of $\mathcal{X}_m(f)$ are relatively well understood thanks to the tools of motivic integration, other geometric invariants such as the number of connected or irreducible components, codimension, cohomology, etc. seem more challenging to comprehend. In this talk we will explain how these geometric invariants are related to other areas such as birational geometry and Floer theory, and we will use the example of semihomogeneous singularities to showcase some unexpected properties of contact loci.

Posters and Lightning Talks

Tuesday, June 30

- *Zariski site as a precohesive topos* --- Lidia Angélica Ávila Déciga.
- *Real algebraic realization of divide links* --- Arthur Garcia Tonus.
- *Holomorphic mappings and their frontalisations* --- Christian Muñoz Cabello.
- *Jets of good real images* --- Ignacio Brea Ribes.
- *The Singular Derived Category of a Hypersurface* --- Jesús Javier Vidales Pérez.
- *Essential divisors and the higher Nash modification for RDP singularities* --- José Alejandro Tenorio Vázquez.

Thursday, July 2

- *Higher-order connections for modules* --- Jesús Daniel Aparicio Barrera.
- *Cubical hyperresolutions for stable corank ≤ 1 maps* --- José Galindo Jiménez.
- *Line arrangements on Cubic Surfaces* --- Juan Carlos Castro Rivera.
- *The Link of Polar Weighted Homogeneous Polynomials* --- Jessica Torres Flores.
- *On the isotropic points of holomorphic curves* --- Amanda Dias Falqueto.