THE WORK OF ALEXANDRU DIMCA

IN

ALGEBRA, GEOMETRY, AND TOPOLOGY

Alexandru Suciu

Northeastern University

Conference in Algebraic Geometry for
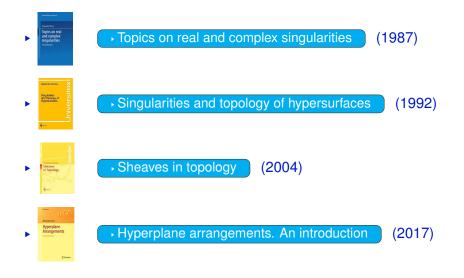Alexandru Dimca's retirement

Ischia, Italy

October 11, 2021

Eforie, 2013

OVERVIEW

▶ The work of Alex Dimca spans almost half a century (1976–2021).

▶ His research covers many areas of mathematics, including
  • Algebraic Geometry
  • Algebraic Topology
  • Commutative Algebra
  • Hyperplane Arrangements
  • Several Complex Variables
  • Singularity Theory

▶ He has published about 160 articles, with some 45 collaborators. Many of those articles have appeared in top journals, including the *Annals of Mathematics*.

▶ His work has been very influential, and is highly cited.

Alex has also published 4 highly acclaimed books.

▸ ‣ Topics on real and complex singularities (1987)

▸ ‣ Singularities and topology of hypersurfaces (1992)

▸ ‣ Sheaves in topology (2004)

▸ ‣ Hyperplane arrangements. An introduction (2017)

SINGULARITY THEORY

- *Contact unimodular germs from the plane to the plane*
  (with C.G. Gibson, 1983)

- *Are the isolated singularities of complete intersections determined by their singular subspaces?* (1984)

- *Classification of equidimensional contact unimodular map germs*
  (with C.G. Gibson, 1985)

- *Singularities and coverings of weighted complete intersections* (1986)

- *Koszul complexes and hypersurface singularities*
  (with A.D.R. Choudary, 1994)

- *Real singularities and dihedral representations*
  (with L. Păunescu, 1997)

- *Sur la topologie des polynômes complexes*
  (with E. Artal-Bartolo & P. Cassou-Noguès, 1998)

- *On the connectivity of complex affine hypersurfaces.* II
  (with L. Păunescu, 2000)

- *On the monodromy of complex polynomials*
  (with A. Némethi, 2001)

- *Monodromy at infinity and the weights of cohomology*
  (with M. Saito, 2003)

- *Hypersurface complements, Alexander modules and monodromy* (with A. Némethi, 2004)

- *Regular functions transversal at infinity*
  (with A. Libgober, 2006)

- *Multivariable Alexander invariants of hypersurface complements* (with L. Maxim, 2007)

- *On 1-forms on isolated complete intersection curve singularities* (with G.-M. Greuel, 2018)

- *The Hessian polynomial and the Jacobian ideal of a reduced hypersurface in $\mathbb{P}^n$* (with L. Busé, H. Schenck & G. Sticlaru, 2021)

ALGEBRAIC GEOMETRY

- *Filtrations de Hodge et par l'ordre du pôle pour les hypersurfaces singulières* (with P. Deligne, 1990)

- *Betti numbers of hypersurfaces and defects of linear systems* (1990)

- *Purity and equivariant weight polynomials* (with G. Lehrer, 1997)

- *Dwork cohomology and algebraic $\mathcal{D}$-modules* (with M. Fayçal, C. Sabbah, M. Saito, 2000)

- *Algebraic Gauss-Manin systems and Brieskorn modules* (with M. Saito, 2001)

- *A generalization of Griffiths's theorem on rational integrals* (with M. Saito, 2006)

- *Multiplier ideals, V-filtrations and transversal sections* (with Ph. Maisonobe, M. Saito & T. Torrelli, 2006)

- *Non-finiteness properties of fundamental groups of smooth projective varieties* (with A. Suciu & S. Papadima, 2009)

- *The Milnor fibre of the Pfaffian and the Hilbert scheme of four points on* $\mathbb{C}^3$ (with B. Szendroi, 2009)

- *Syzygies and logarithmic vector fields along plane curves* (with E. Sernesi, 2014)

- *On the fundamental groups of normal varieties* (with D. Arapura & R. Hain, 2014)

- *Koszul complexes and pole order filtrations* (with G. Sticlaru, 2015)

- *Free divisors and rational cuspidal plane curves* (with G. Sticlaru, 2017)

- *Splitting types of bundles of logarithmic vector fields along plane curves* (with T. Abe, 2018)

- *Higher order Jacobians, Hessians and Milnor algebras* (with R. Gondim & G. Ilardi, 2020)

Nizza, 2009

ALGEBRAIC TOPOLOGY

- *Characteristic varieties and constructible sheaves* (2007)

- *Quasi-Kähler Bestvina-Brady groups*
  (with A. Suciu & S. Papadima, 2007)

- *Alexander polynomials: essential variables and multiplicities*
  (with A. Suciu & S. Papadima, 2008)

- *Topology and geometry of cohomology jump loci*
  (with A. Suciu & S. Papadima, 2009)

- *Which 3-manifold groups are Kähler groups?*
  (with A. Suciu, 2009)

- *Quasi-Kähler groups, 3-manifold groups, and formality*
  (with A. Suciu & S. Papadima, 2011)

- *Characteristic varieties and logarithmic differential 1-forms* (2010)

- *Arithmetic group symmetry and finiteness properties of Torelli groups* (with S. Papadima, 2013)

- *Non-abelian cohomology jump loci from an analytic viewpoint* (with S. Papadima, 2014)

- *The abelianization of the Johnson kernel* (with R. Hain & S. Papadima, 2014)

- *Algebraic models, Alexander-type invariants, and Green–Lazarsfeld sets* (with A. Suciu & S. Papadima, 2015)

HYPERPLANE ARRANGEMENTS

- *Nonresonance conditions for arrangements*
  (with D.C. Cohen & P. Orlik, 2003)

- *Hypersurface complements, Milnor fibers and higher homotopy groups of arrangements* (with S. Papadima, 2003)

- *First Milnor cohomology of hyperplane arrangements*
  (with N. Budur & M. Saito, 2011)

- *On the Milnor monodromy of the exceptional reflection arrangement of type G_{31}* (with G. Sticlaru, 2018)

- *On the Milnor monodromy of the irreducible complex reflection arrangements*, 2019

- *Numerical invariants and moduli spaces for line arrangements*
  (with D. Ibadula, D.A. Măcinic, 2020)

- *On complex supersolvable line arrangements* (with T. Abe, 2020)

Venezia, 2006

Revel in retirement, Alex!