

MICHELE GRAFFEO

Postdoc at SISSA, Geometry and Mathematical Physics ,

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RESEARCH INTERESTS

• Algebraic Geometry • Birational Geometry • Resolution of singularities • Hilbert schemes & Moduli spaces of sheaves • Representation theory • Toric Geometry • Enumerative Geometry • Minimal Model Program • Derived Category

ACADEMIC POSITIONS

Postdoctoral Fellow at SISSA - Trieste (Italy) 1/2024-present

Project: “Geometry of Hilbert schemes”

Mentor: A. T. Ricolfi

Postdoctoral Fellow at Politecnico di Milano - Milano (Italy) 2/2023-12/2023

Project: PRIN 2020 “Squarefree Gröbner degenerations, special varieties and related topics”

(MUR, project number 2020355B8Y)

Mentor: P. Lella

Visiting Fellow at SISSA - Trieste (Italy) 1/2023-12/2023

Project: “Nested Hilbert schemes and GIT stability conditions”

Mentor: U. Bruzzo

EDUCATION

PhD in Geometry and Mathematical Physics (cum Laude) at SISSA - Trieste (Italy) 10/2018-11/2022

Thesis: “Zero-dimensional sheaves, group actions and blowups”

Supervisors: U. Bruzzo & A. T. Ricolfi

Master of Science in Mathematics (cum Laude) at University of Pisa - Pisa (Italy) 9/2015-9/2018

Thesis: “Koszul cohomology and Hilbert schemes of points”

Supervisors: M. Franciosi

Bachelor in Mathematics at University of Pisa - Pisa (Italy) 9/2010-5/2015

Thesis: “Il teorema degli zeri in algebre analitiche reali e complesse”

Supervisors: F. Acquistapace

Scientific High School diploma at Liceo Scientifico “Enrico Fermi” - Siacca (Italy) 9/2003-8/2008

TO APPEAR AND PUBLISHED

- “Moduli spaces of $\mathbb{Z}/k\mathbb{Z}$ -constellations over \mathbb{A}^2 ”. 2024
To appear in *Communications in Contemporary Mathematics*
- “A counterexample to the parity conjecture”, with F. Giovenzana, L. Giovenzana and P. Lella. 2024
To appear in *Algebraic Geometry*
- “Growth and integrability of some birational maps in dimension three”, with G. Gubbiotti. 2023
Annales Henri Poincaré, 13 July 2023
- “On the Behrend function and the blowup of some fat points”, with A. T. Ricolfi. 2023
Advances in Mathematics, Volume 415, 15 February 2023, 108896

PREPRINTS

- “Unexpected but recurrent phenomena for Quot and Hilbert schemes of points”, 2024
with F. Giovenzana, L. Giovenzana and P. Lella.
- “5d Conformal Matter”, with M. De Marco, M. Del Zotto, A. Sangiovanni. 2023
- “The geometry of double nested Hilbert schemes of points on curves”, 2023
with P. Lella, S. Monavari, A. T. Ricolfi and A. Sammartano.

TEACHING

T.A. for Mathematical Analysis at University of Trieste, School of Engineering - Trieste (Italy) 9/2023-2/2024

T.A. for Mathematical Analysis at University of Trieste, School of Engineering - Trieste (Italy) 9/2022-2/2023

T.A. for Mathematical Analysis at University of Trieste, School of Engineering - Trieste (Italy) 9/2021-2/2022

T.A. for Mathematical Analysis at University of Trieste, School of Engineering - Trieste (Italy) 9/2020-2/2021

T.A. for Mathematical Analysis at University of Trieste, School of Engineering - Trieste (Italy) 9/2019-2/2020

T.A. for Mathematical Analysis at University of Pisa, School of Engineering - Pisa (Italy) 9/2017-2/2018

HELD SEMINARS, POSTER SESSIONS & WRITTEN ESSAYS

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| • “Integrable systems and the Cremona-cubes group” | University of Trieste |
| • “Nested variants of the Hilbert scheme of points” | University of Milan |
| • “Nested variants of the Hilbert scheme of points on smooth curves” | SISSA |
| • “Double nested Hilbert schemes & reverse plane partitions” | Politecnico di Milano |
| • “Double nested Hilbert scheme of points on curves” | MIMUW |
| • “The geometry of double nested Hilbert schemes” | ETH Zürich |
| • “Some open problems and recent progress on the Hilbert schemes of points on smooth threefolds” | MPI MiS |
| • “The algebraic entropy and the Reye configuration” | TU Chemnitz |
| • “On the number twelve in algebraic geometry” | SISSA |
| • “On the dynamics of some birational maps of \mathbb{P}^3 ” | Politecnico di Milano |
| • “Behrend number and blowups of planar fat points” | Politecnico di Milano |
| • “Dynamics of some birational maps of the projective 3-space” | University of Genova |
| • “Dynamics of some birational maps of \mathbb{P}^3 ” | SISSA |
| • “GIT stability conditions on the space of G-Constellations” | University of Milan |
| • “Minimal resolutions of A_k singularities as moduli spaces of $\mathbb{Z}/(k+1)\mathbb{Z}$ -constellations” | Federal University of Paraíba |
| • Poster session at the Workshop “Integrable Probability, Classical and Quantum Integrability” | SISSA |
| • “Moduli spaces of $\mathbb{Z}/k\mathbb{Z}$ -constellations over the affine plane” | University of Utrecht |
| • “On the Behrend function and the blowup of some fat points” | University of Bologna |
| • “How to get your hands dirty with canonical singularities” | SISSA |
| • “Crepan resolutions of symplectic quotient singularities as moduli spaces of constellations” | SISSA |
| • “Introduction to K3 surfaces” | SISSA |
| • “Moduli of representation of quivers and first examples of scattering diagrams” | SISSA/ICTP |
| • “Intersection theory and tautological ring of moduli space of curves” | SISSA |
| • “Blowups: some properties and funny examples” | SISSA |
| • “Towards the Kodaira vanishing theorem” | SISSA |
| • “Playing with quotient singularities” | SISSA |
| • “The real nullstellensatz” | University of Pisa |
| • “Normalization of complex spaces” | University of Pisa |
| • Fifty-pages extended essay on “Markov’s Theorem” based on in-class lectures and individual research | |

ATTENDED SCHOOLS, WORKSHOPS & ADVANCED COURSES

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| • “Genova-Torino-Milano Seminar” University of Milan | Winter 2024 |
| • “Enumerative geometry of the Hilbert scheme of points” SRS Research Station (Les Diablerets) | Winter 2024 |
| • “A day on Hilbert scheme of points” Humboldt University (Berlin) | Fall 2023 |
| • “Geometry In Bicocca” Università di Milano-Bicocca | Summer 2023 |
| • “A workshop on Geometry and Commutative algebra” Politecnico di Milano | Summer 2023 |
| • “Genova-Torino-Milano Seminar” Università degli studi di Genova | Spring 2023 |
| • “Hilbert schemes, moduli spaces, and symplectic varieties” Université de Nantes | Spring 2023 |
| • “Commutative Algebra TOwards Applications” (Torino) | Spring 2023 |
| • “Mini-school: Real and complex birational geometry” at University of Milan (Milano) | Spring 2023 |
| • “Refined invariants in Moduli Theory” (Trieste) | Spring 2023 |
| • “5th Christmas Workshop on Moduli Spaces and Integrable Systems” (Genova) | Winter 2022 |
| • “AGATES-Deformation theory workshop” at IMPAN (Warsaw) | Winter 2022 |
| • “Young Researchers Meeting in Algebra and Geometry 2022” conference at SISSA (Trieste) | Fall 2022 |
| • “Recent Advances in Classical Algebraic Geometry” conference at Jagiellonian University (Krakow) | Summer 2022 |
| • “Mini-workshop on Quiver Varieties and Related Topics” workshop at University of Oxford | Summer 2022 |
| • “New Perspectives on Hyperkähler Manifolds” workshop at Levico Terme | Spring 2022 |
| • “Moduli Spaces and Stability Conditions” school & workshop at Levico Terme | Spring 2022 |
| • “Derived Functors” PhD course by U. Bruzzo | Fall 2020 |
| • “Hilbert schemes, Mckay correspondence and singularities” winter school at Univ. Paris Diderot (Paris) | Winter 2019 |
| • “Localisation in Enumerative Geometry” PhD course by A. T. Ricolfi | Fall 2019 |
| • “Differentiable Orbifolds” PhD course by B. Fantechi | Fall 2019 |
| • “Foliations in algebraic geometry” summer school at Istitut Fourier (Grenoble) | Summer 2019 |
| • “Gauge Theory” PhD course by A. Tikhomirov | Spring 2019 |
| • “Advanced topics in algebraic geometry” PhD course by E. Arbarello | Fall 2018 |

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| • “Algebraic surfaces: the cubic surface, the Cayley cubic, lines on smooth surfaces” PhD course by F. Catanese | Fall 2018 |
| • “Cones of divisors and positivity” PhD course by L. Lombardi | Fall 2018 |
| • “Integrable systems from moduli spaces of stable curves” PhD course by P. Rossi | Fall 2018 |

PRIZES

- Lutman Prize for the best PhD thesis in Mathematics, 2023.

LANGUAGES & IT SKILLS

- Italian: native; English: fluent; French: basic.
- Macaulay2, GAP, Latex, Unity, Windows OS, Android OS (Developer), Microsoft application, Office suite (ECDL) (Advanced), Ubuntu, C programming language, html.

REFEREES

| | |
|-------------------|-----------------------------|
| Ugo Bruzzo | Andrea Tobia Ricolfi |
| SISSA | SISSA |
| bruzzo@sissa.it | aricolfi@sissa.it |

ORGANISATION OF EVENTS

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| • Co-organiser with U. Bruzzo, B. G. Otero, D. H. Serrano, D. S. Gómez of the conference "WAGP24P" | Trieste (Italy) June 24 |
| • Co-organiser with P. Lella, S. Monavari, A. Ricolfi, A. Sammartano of the conference "GHiSP" | Levico Terme (Italy) May 24 |
| • Co-organiser of the Algebraic Geometry seminar in SISSA | 2021-22 |
| • Co-organiser of the Algebraic Geometry seminar in SISSA/IGAP | 2020-21 |
| • Co-organiser of the Algebraic Geometry seminar joint between SISSA and ICTP | 2019-20 |
| • Co-organiser of the Algebraic Geometry seminar in SISSA | 2018-19 |

OTHER TASKS

- Museum guide of a Mathematics exhibition named “*Mathematics in ancient Greece*” Pisa (Italy) 2018
- Developed strong analytical, problem-solving and time management skills, throughout my PhD studies at SISSA.
- Proven excellent communication, coaching and leadership skills, when working as a teaching assistant.
- Learnt how to be a team-player and how to get the best from joint outcome when working in a group.
- Learnt how to work and deliver results in high-pressure situations, such as studying and working at the same time.
- Volunteer work with both the needy and the elderly.
- Interests and hobbies: music, politics and chess.