

# MICHELE GRAFFEO

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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

|   |                |
|---|----------------|
| <b>Postdoctoral Fellow</b> at SISSA - Trieste (Italy)<br>Project: “Geometry of Hilbert schemes”<br>Mentor: A. T. Ricolfi  | 1/2024-present |
| <b>Postdoctoral Fellow</b> at Politecnico di Milano - Milano (Italy)<br>Project: PRIN 2020 “Squarefree Gröbner degenerations, special varieties and related topics”<br>(MUR, project number 2020355B8Y)<br>Mentor: P. Lella | 2/2023-12/2023 |
| <b>Visiting Fellow</b> at SISSA - Trieste (Italy)<br>Project: “Nested Hilbert schemes and GIT stability conditions”<br>Mentor: U. Bruzzo  | 1/2023-12/2023 |

## EDUCATION

|   |                 |
|---|-----------------|
| <b>PhD in Geometry and Mathematical Physics (cum Laude)</b> at SISSA - Trieste (Italy)<br>Thesis: “ Zero-dimensional sheaves, group actions and blowups ”<br>Supervisors: U. Bruzzo & A. T. Ricolfi | 10/2018-11/2022 |
| <b>Master of Science in Mathematics (cum Laude)</b> at University of Pisa - Pisa (Italy)<br>Thesis: “ Koszul cohomology and Hilbert schemes of points ”<br>Supervisors: M. Franciosi                | 9/2015-9/2018   |
| <b>Bachelor in Mathematics</b> at University of Pisa - Pisa (Italy)<br>Thesis: “ Il teorema degli zeri in algebre analitiche reali e complesse ”<br>Supervisors: F. Acquistapace                    | 9/2010-5/2015   |
| <b>Scientific High School diploma</b> at Liceo Scientifico “Enrico Fermi” - Siacca (Italy)  | 9/2003-8/2008   |

## TO APPEAR AND PUBLISHED

- “A counterexample to the parity conjecture”,  
with F. Giovenzana, L. Giovenzana and P. Lella.  
Algebraic Geometry, 12 (2025), no. 2, 173–188 2025
- “Unexpected but recurrent phenomena for Quot and Hilbert schemes of points”,  
with F. Giovenzana, L. Giovenzana and P. Lella.  
Rendiconti del Seminario Matematico - Politecnico di Torino, 82 (2024), no. 1, 145–170. 2024
- “5d Conformal Matter”,  
with M. De Marco, M. Del Zotto, A. Sangiovanni.  
JHEP, Volume 2024, article number 306, (2024) 2024
- “The geometry of double nested Hilbert schemes of points on curves”,  
with P. Lella, S. Monavari, A. T. Ricolfi and A. Sammartano.  
To appear in TAMS 2024
- “Moduli spaces of  $\mathbb{Z}/k\mathbb{Z}$ -constellations over  $\mathbb{A}^2$ ”.  
Communications in Contemporary Mathematics 27 (2025), no. 03, 2450019 2024
- “Growth and integrability of some birational maps in dimension three”, with G. Gubbiotti.  
Annales Henri Poincaré, 13 July 2023 2023
- “On the Behrend function and the blowup of some fat points”, with A. T. Ricolfi.  
Advances in Mathematics, Volume 415, 15 February 2023, 108896 2023

## PREPRINTS

- “Invariants of nested Hilbert and Quot Schemes on surfaces”,  
with N. Fasola, D. Lewański and A. T. Ricolfi 2025

- “Enumeration of partitions via socle reduction”, with S. Monavari, R. Moschetti and A. T. Ricolfi 2025
- “The Painlevé equivalence problem for a constrained 3D system”, with G. Filipuk, G. Gubbiotti and A. Stokes 2024
- “The motive of the Hilbert scheme of points in all dimensions”, with S. Monavari, R. Moschetti and A. T. Ricolfi 2024

## TEACHING

|   |               |
|---|---------------|
| <b>T.A. for Topics in advanced algebra</b> at SISSA - Trieste (Italy)                                   | 2024-2025     |
| <b>T.A. for Algebraic Geometry</b> at SISSA - Trieste (Italy)   | 2024-2025     |
| <b>T.A. for Topics in advanced algebra</b> at SISSA - Trieste (Italy)                                   | 2022-2023     |
| <b>T.A. for Algebraic Geometry</b> at SISSA - Trieste (Italy)   | 2023-2024     |
| <b>T.A. for Mathematical Analysis</b> at University of Trieste, School of Engineering - Trieste (Italy) | 9/2023-2/2024 |
| <b>T.A. for Algebraic Geometry</b> at SISSA - Trieste (Italy)   | 2022-2023     |
| <b>T.A. for Mathematical Analysis</b> at University of Trieste, School of Engineering - Trieste (Italy) | 9/2022-2/2023 |
| <b>T.A. for Mathematical Analysis</b> at University of Trieste, School of Engineering - Trieste (Italy) | 9/2021-2/2022 |
| <b>T.A. for Mathematical Analysis</b> at University of Trieste, School of Engineering - Trieste (Italy) | 9/2020-2/2021 |
| <b>T.A. for Mathematical Analysis</b> at University of Trieste, School of Engineering - Trieste (Italy) | 9/2019-2/2020 |
| <b>T.A. for Mathematical Analysis</b> at University of Pisa, School of Engineering - Pisa (Italy)       | 9/2017-2/2018 |
| <b>T.A. for Linear Algebra</b> at University of Pisa, School of Engineering - Pisa (Italy)              | 9/2017-2/2018 |
| <b>T.A. for Linear Algebra</b> at University of Pisa, School of Engineering - Pisa (Italy)              | 9/2016-2/2017 |

## HELD SEMINARS, POSTER SESSIONS & WRITTEN ESSAYS

|   |                                  |
|---|----------------------------------|
| • “Motives of the Hilbert schemes of points in all dimensions”  | ETH Zürich                       |
| • “Algebraic curves and one-dimensional complex manifolds”  | SISSA                            |
| • “The geometry of the Hilbert scheme of points and its variants”   | EPFL                             |
| • “Toric singularities”   | SISSA                            |
| • “The motive of the Hilbert scheme of points in all dimensions”  | University of Pisa               |
| • Poster “Syzygies, Iarrobino’s example on 78 points and new components of Hilbert schemes”                     | Jagiellonian University (Krakow) |
| • “Double nested Hilbert schemes of points”   | SISSA/IGAP                       |
| • “On the motives of the Hilbert schemes of points”   | University of Milan              |
| • “Reducibility of $\text{Hilb}^{78}(\mathbb{A}^3)$ ”   | SISSA                            |
| • “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 “Moduli spaces of $\mathbb{Z}/k\mathbb{Z}$ -constellations over $\mathbb{A}^2$ ”                       | 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”
- “Normalization of complex spaces”
- Fifty-pages extended essay on “Markov’s Theorem” based on in-class lectures and individual research

University of Pisa  
University of Pisa

## ATTENDED SCHOOLS, WORKSHOPS & ADVANCED COURSES

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|---|-------------|
| • “GC Legacy - A meeting in Algebraic Geometry” Politecnico di Torino   | Winter 2025 |
| • (Poster session) “Syzygies and Hilbert Schemes” Jagiellonian University (Krakow)                              | Fall 2024   |
| • (Invited speaker) “Algebraic-geometric techniques for physics: bundles, stacks and supergeometry” SISSA/IGAP  | Spring 2024 |
| • “The Geometry of Hilbert Schemes of Points” CIRM - Levico Terme   | Spring 2024 |
| • (Invited speaker) “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 |
| • (Invited speaker) “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 |
| • (Poster session) “Integrable Probability, Classical and Quantum Integrability” workshop at SISSA              | Spring 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 Institut 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   |
| • “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 SISSA in Mathematics, 2023.

## MEMBERSHIPS

- GNSAGA-INdAM, Italy
- Fall 2024-present

## COMMITTEE MEMBER

- Committee member for master degree at EPFL, Switzerland
  - Committee member for PhD degree at Federal University of Paraíba, Brazil
- Winter 2025  
Winter 2025

## LANGUAGES & IT SKILLS

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

## REFEREES

**Ugo Bruzzo**  
SISSA  
bruzzo@sisssa.it

**Paolo Lella**  
Politecnico di Milano  
paolo.lella@polimi.it

**Andrea Tobia Ricolfi**  
SISSA  
aricolfi@sisssa.it

## ORGANISATION OF EVENTS

- Co-organiser with U. Bruzzo, E. Pavia of the conference "TULSF - IX" Trieste (Italy) November 24
- 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.