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

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"* - Sciacca (Italy)   9/2003-8/2008

TO APPEAR AND PUBLISHED

- *"A counterexample to the parity conjecture"*,   2025
  with F. Giovenzana, L. Giovenzana and P. Lella.
  Algebraic Geometry, 12 (2025), no. 2, 173–188
- *"Unexpected but recurrent phenomena for Quot and Hilbert schemes of points"*,   2024
  with F. Giovenzana, L. Giovenzana and P. Lella.
  Rendiconti del Seminario Matematico - Politecnico di Torino, 82 (2024), no. 1, 145–170.
- *"5d Conformal Matter"*,   2024
  with M. De Marco, M. Del Zotto, A. Sangiovanni.
  JHEP, Volume 2024, article number 306, (2024)
- *"The geometry of double nested Hilbert schemes of points on curves"*,   2024
  with P. Lella, S. Monavari, A. T. Ricolfi and A. Sammartano.
  To appear in *TAMS*
- *"Moduli spaces of $\mathbb{Z}/k\mathbb{Z}$-constellations over $\mathbb{A}^2$"*.   2024
  Communications in Contemporary Mathematics 27 (2025), no. 03, 2450019
- *"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

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

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

TEACHING
Lecturer
(PhD course) ***Computations in Algebraic Geometry*** at *IMECC/UNICAMP* - Campinas (SP, Brazil)   2025
Teaching Assistant
(PhD course) ***Topics in advanced algebra*** at *SISSA* - Trieste (Italy)   2024-2025
(PhD course) ***Algebraic Geometry*** at *SISSA* - Trieste (Italy)   2024-2025
(PhD course) ***Topics in advanced algebra*** at *SISSA* - Trieste (Italy)   2022-2023
(PhD course) ***Algebraic Geometry*** at *SISSA* - Trieste (Italy)   2023-2024
Mathematical Analysis at *University of Trieste, School of Engineering* - Trieste (Italy)   9/2023-2/2024
(PhD course) ***Algebraic Geometry*** at *SISSA* - Trieste (Italy)   2022-2023
Mathematical Analysis at *University of Trieste, School of Engineering* - Trieste (Italy)   9/2022-2/2023
Mathematical Analysis at *University of Trieste, School of Engineering* - Trieste (Italy)   9/2021-2/2022
Mathematical Analysis at *University of Trieste, School of Engineering* - Trieste (Italy)   9/2020-2/2021
Mathematical Analysis at *University of Trieste, School of Engineering* - Trieste (Italy)   9/2019-2/2020
Mathematical Analysis at *University of Pisa, School of Engineering* - Pisa (Italy)   9/2017-2/2018
Linear Algebra at *University of Pisa, School of Engineering* - Pisa (Italy)   9/2017-2/2018
Linear Algebra at *University of Pisa, School of Engineering* - Pisa (Italy)   9/2016-2/2017

HELD SEMINARS, POSTER SESSIONS & WRITTEN ESSAYS

- *"Irreducibility of the Hilbert scheme of points and the class of 2-step algebras"*   *IME-USP São Paulo (Brazil)*
- *"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* $\mathrm{Hilb}^{78}(\mathbb{A}^3)$*"*   *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*
- *"Crepant 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

- *"GC Legacy - A meeting in Algebraic Geometry"* Politecico di Torino — Winter 2025
- (Poster session) *"Syzygies and Hilbert Schemes"* Jagiellonian University (Krakow) — Fall 2024
- (Invited speaker) *"Algebro-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 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
- *"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 — Winter 2025
- Committee member for PhD degree at Federal University of Paraíba, Brazil — 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	**Paolo Lella**	**Andrea Tobia Ricolfi**
SISSA	Politecnico di Milano	SISSA
bruzzo@sissa.it	paolo.lella@polimi.it	aricolfi@sissa.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.