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

- *"Classical Algebraic Geometry and Discrete Integrable Systems"*, 2025
  with G. Alecci and A. Stokes.
  To appear in *Symmetry and Integrability of Difference Equations* - Lecture notes of ASIDE15
- *"The geometry of double nested Hilbert schemes of points on curves"*, 2025
  with P. Lella, S. Monavari, A. T. Ricolfi and A. Sammartano.
  Transactions of the American Mathematical Society 378, 6013-6047 (2025)
- *"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 and A. Sangiovanni.
  JHEP, Volume 2024, article number 306, (2024)
- *"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

- *"New components of Hilbert schemes of points and 2-step ideals"*, 2025
  with F. Giovenzana, L. Giovenzana and P. Lella.
- *"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 *UFMG* - Belo Horizonte (MG, Brazil) 2025
(Advanced mini-course) ***Classical Algebraic Geometry and Integrable Systems*** at *ASIDE* - Milan (Italy) 2025
(PhD course) ***Complex algebraic surfaces*** at *SISSA* - Trieste (Italy) 2025
(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) 2023-2024
(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

- *"The irreducible components of the Hilbert Scheme of points"* *ULB Brusselles (Belgium)*
- *"A combinatorial approach to double nested Hilbert schemes of points"* *University of Pisa*
- *"The Hilbert scheme of points and its motive"* *João Pessoa (PB, Brazil)*
- *"New components of Hilbert schemes of points and 2-step ideals"* *UFF Niterói (RJ, Brazil)*
- *"Double nested Hilbert schemes of points on smooth curves"* *IMPA Rio de Janeiro (Brazil)*
- *"The geometry of the Hilbert scheme of points, and its nested variants"* *Razlog (Bulgaria)*
- *"La geometria dello schema di Hilbert di punti, e sue varianti"* *Isola delle Femmine (Palermo)*
- *"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

- *"TULSF X - A one-day algebraic geometry meeting" (Ferrara)* — Fall 2025
- **(Invited speaker)** *"WAGP - Moduli Spaces in (Super)Geometry and Mathematical Physics" (João Pessoa)* — Fall 2025
- **(Invited speaker)** *"Geometry in Algebra, Algebra in Geometry" IMPA (Rio de Janeiro)* — Fall 2025
- *"Geometry In Bicocca" Università di Milano-Bicocca* — Summer 2025
- **(Invited speaker)** *"WAGP - Geometry And Physics of Higgs Moduli" (Razlog)* — Summer 2025
- *"Jordan Types of Artinian Algebras and Geometry of Punctual Hilbert Schemes" Université Côte d'Azur* — Summer 2025
- *"Modules & Rings: Recent Developments in Commutative Algebra" University of Genova* — Spring 2025
- **(Invited speaker)** *"Abecedarian of SIDE (ASIDE)" University of Milan* — Spring 2025
- **(Invited speaker)** *"Giornate di Geometria Algebrica e Argomenti Correlati XVII" Isola delle Femmine (Palermo)* — Spring 2025
- *"GC Legacy - A meeting in Algebraic Geometry" Politecico di Torino* — Winter 2025
- *"TULSF IX - A one-day algebraic geometry meeting" SISSA (Trieste)* — Fall 2024
- **(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. Graña Otero, D. H. Serrano, D. S. Gómez of the conference "WAGP24" 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.