

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 <i>SISSA</i> - Trieste (Italy)	1/2024-present
Project: "Geometry of Hilbert schemes"	
Mentor: A. T. Ricolfi	
Postdoctoral Fellow at <i>Politecnico di Milano</i> - 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 <i>SISSA</i> - 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 <i>SISSA</i> - 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 <i>University of Pisa</i> - Pisa (Italy)	9/2015-9/2018
Thesis: "Koszul cohomology and Hilbert schemes of points"	
Supervisors: M. Franciosi	
Bachelor in Mathematics at <i>University of Pisa</i> - 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 <i>Liceo Scientifico "Enrico Fermi"</i> - Sciacca (Italy)	9/2003-8/2008

TO APPEAR AND PUBLISHED

- "Classical Algebraic Geometry and Discrete Integrable Systems",
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",
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",
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",
with F. Giovenzana, L. Giovenzana and P. Lella.
Rendiconti del Seminario Matematico - Politecnico di Torino, 82 (2024), no. 1, 145–170.
- "5d Conformal Matter",
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 ".
Communications in Contemporary Mathematics 27 (2025), no. 03, 2450019
- "Growth and integrability of some birational maps in dimension three", with G. Gubbiotti.
Annales Henri Poincaré, 13 July 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

PREPRINTS

- “*New components of Hilbert schemes of points and 2-step ideals*”, with F. Giovenzana, L. Giovenzana and P. Lella. 2025
- “*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

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

- “Elementary components of the nested Hilbert schemes of points & their schematic structure” UNICAMP Campinas (SP, Brazil)
- “A geometria do esquema de Hilbert aninhado” UFF Niterói (RJ, Brazil)
- “Crepant resolutions of canonical quotient singularities and moduli spaces of G -constellations” Belo Horizonte (MG, Brazil)
- “The Hilbert schemes of points: how to understand its geometry” Belo Horizonte (MG, Brazil)
- “The geometry of Hilbert schemes of points and 2-step ideals” Olinda (PE, Brazil)
- “The irreducible components of the Hilbert Scheme of points” ULB Bruxelles (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 $\text{Hilb}^{78}(A^3)$ ” 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

- **(Invited speaker)** “Bandoleros 2025” IMECC/UNICAMP (Campinas) Fall 2025
- **(Invited speaker)** “LEGALzinho” UFF (Niterói) Fall 2025
- **(Invited speaker)** “First Brazilian Northeastern Meeting on Commutative Algebra and Algebraic Geometry” (Olinda) Fall 2025
- “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” Politecnico 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) “ <i>Integrable Probability, Classical and Quantum Integrability</i> ” workshop at SISSA	Spring 2022
• “ <i>New Perspectives on Hyperkähler Manifolds</i> ” workshop at Levico Terme	Spring 2022
• “ <i>Moduli Spaces and Stability Conditions</i> ” school & workshop at Levico Terme	Spring 2022
• “ <i>Derived Functors</i> ” PhD course by U. Bruzzo	Fall 2020
• “ <i>Hilbert schemes, McKay correspondence and singularities</i> ” winter school at Univ. Paris Diderot (Paris)	Winter 2019
• “ <i>Localisation in Enumerative Geometry</i> ” PhD course by A. T. Ricolfi	Fall 2019
• “ <i>Differentiable Orbifolds</i> ” PhD course by B. Fantechi	Fall 2019
• “ <i>Foliations in algebraic geometry</i> ” summer school at Institut Fourier (Grenoble)	Summer 2019
• “ <i>Gauge Theory</i> ” PhD course by A. Tikhomirov	Spring 2019
• “ <i>Advanced topics in algebraic geometry</i> ” PhD course by E. Arbarello	Fall 2018
• “ <i>Algebraic surfaces: the cubic surface, the Cayley cubic, lines on smooth surfaces</i> ” PhD course by F. Catanese	Fall 2018
• “ <i>Cones of divisors and positivity</i> ” PhD course by L. Lombardi	Fall 2018
• “ <i>Integrable systems from moduli spaces of stable curves</i> ” 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
• INFN, Italy	Fall 2025-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; Portuguese: basic; French: basic.	Winter 2025
• Macaulay2, Sagemath, GAP, Latex, Unity, Windows OS, Android OS (Developer), Microsoft application, Office suite (ECDL) (Advanced), Ubuntu, C programming language, html.	Winter 2025

REFEREES

Ugo Bruzzo	Paolo Lella	Andrea Tobia Ricolfi
SISSA bruzzo@sissa.it	Politecnico di Milano paolo.lella@polimi.it	SISSA aricolfi@sissa.it

ORGANISATION OF EVENTS

• Co-organiser with U. Bruzzo of the “Mini-workshop on flag supermanifolds, and supergeometries”	Trieste (Italy) Feb 26
• Co-organiser with U. Bruzzo, E. Pavia of the conference “TULSF - IX”	Trieste (Italy) Nov 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 “ <i>Mathematics in ancient Greece</i> ”	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.	