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"* - 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

- *"Motivic and cohomological stabilisation of the Quot scheme of points"*, 2026
  with S. Monavari, R. Moschetti and A. T. Ricolfi
- *"Components of the nested Hilbert scheme of few points"*, 2026
  with P. Lella.
- *"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 *SISSA* - Trieste (Italy)	2026
(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

"Super Geometry, a classical viewpoint"	*IGAP*
"The geometric approach to Integrable Systems: Spaces of initial conditions for Painlevé equations"	*SISSA*
"The geometric approach to Integrable Systems: Algebraic Entropy"	*SISSA*
"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 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

- **(Invited speaker)** *"Mini-workshop on flag supermanifolds, related supergeometries and applications"* IGAP (Trieste) Winter 2026
- **(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"* 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
- 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.
- 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 of "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 *"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.