

# 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)	1/2024-present
Project: “Geometry of Hilbert schemes”	
Mentor: A. T. Ricolfi	
<b>Postdoctoral Fellow</b> 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	
<b>Visiting Fellow</b> at SISSA - Trieste (Italy)	1/2023-12/2023
Project: “Nested Hilbert schemes and GIT stability conditions”	
Mentor: U. Bruzzo	

## EDUCATION

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

- (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

- “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  $\text{Hilb}^{78}(\mathbb{A}^3)$ ” 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

- “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
- (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**  
SISSA  
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**Paolo Lella**  
Politecnico di Milano  
paolo.lella@polimi.it

**Andrea Tobia Ricolfi**  
SISSA  
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.