

# 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” - Siacca (Italy) 9/2003-8/2008

## TO APPEAR AND PUBLISHED

- “Unexpected but recurrent phenomena for Quot and Hilbert schemes of points”, 2024  
with F. Giovenzana, L. Giovenzana and P. Lella.  
To appear in *Rendiconti del Seminario Matematico - Politecnico di Torino*
- “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*
- “A counterexample to the parity conjecture”, 2024  
with F. Giovenzana, L. Giovenzana and P. Lella.  
To appear in *Algebraic Geometry*
- “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

- “The motive of the Hilbert scheme of points in all dimensions”, 2024  
with S. Monavari, R. Moschetti A. T. Ricolfi

## TEACHING

<b>T.A. for <i>Topics in advanced algebra</i></b> at SISSA - Trieste (Italy)	2022-2023
<b>T.A. for <i>Algebraic Geometry</i></b> at SISSA - Trieste (Italy)	2023-2024
<b>T.A. for <i>Mathematical Analysis</i></b> at University of Trieste, School of Engineering - Trieste (Italy)	9/2023-2/2024
<b>T.A. for <i>Algebraic Geometry</i></b> at SISSA - Trieste (Italy)	2022-2023
<b>T.A. for <i>Mathematical Analysis</i></b> at University of Trieste, School of Engineering - Trieste (Italy)	9/2022-2/2023
<b>T.A. for <i>Mathematical Analysis</i></b> at University of Trieste, School of Engineering - Trieste (Italy)	9/2021-2/2022
<b>T.A. for <i>Mathematical Analysis</i></b> at University of Trieste, School of Engineering - Trieste (Italy)	9/2020-2/2021
<b>T.A. for <i>Mathematical Analysis</i></b> at University of Trieste, School of Engineering - Trieste (Italy)	9/2019-2/2020
<b>T.A. for <i>Mathematical Analysis</i></b> at University of Pisa, School of Engineering - Pisa (Italy)	9/2017-2/2018
<b>T.A. for <i>Linear Algebra</i></b> at University of Pisa, School of Engineering - Pisa (Italy)	9/2017-2/2018
<b>T.A. for <i>Linear Algebra</i></b> at University of Pisa, School of Engineering - Pisa (Italy)	9/2016-2/2017

## HELD SEMINARS, POSTER SESSIONS & WRITTEN ESSAYS

• “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 session at the Workshop “Integrable Probability, Classical and Quantum Integrability”	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
• “Crepan 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) “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
• “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

## LANGUAGES & IT SKILLS

- Italian: native; English: fluent; French: basic.
- Macaulay2, GAP, Latex, Unity, Windows OS, Android OS (Developer), Microsoft application, Office suite (ECDL) (Advanced), Ubuntu, C programming language, html.

## REFEREES

<b>Ugo Bruzzo</b>	<b>Paolo Lella</b>	<b>Andrea Tobia Ricolfi</b>
SISSA	Politecnico di Milano	SISSA
bruzzo@sisssa.it	paolo.lella@polimi.it	aricolfi@sisssa.it

## ORGANISATION OF EVENTS

- 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.