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

- *"5d Conformal Matter", with M. De Marco, M. Del Zotto, A. Sangiovanni.* 2024
  To appear in *JHEP*
- *"Moduli spaces of $\mathbb{Z}/k\mathbb{Z}$-constellations over $\mathbb{A}^2$".* 2024
  To appear in *Communications in Contemporary Mathematics*
- *"A counterexample to the parity conjecture"*, with F. Giovenzana, L. Giovenzana and P. Lella. 2024
  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

- *"Unexpected but recurrent phenomena for Quot and Hilbert schemes of points"*, 2024
  with F. Giovenzana, L. Giovenzana and P. Lella.
- *"The geometry of double nested Hilbert schemes of points on curves"*, 2023
  with P. Lella, S. Monavari, A. T. Ricolfi and A. Sammartano.

TEACHING

T.A. for *Topics in advanced algebra* at *SISSA* - Trieste (Italy) 2022-2023
T.A. for *Algebraic Geometry* at *SISSA* - Trieste (Italy) 2023-2024
T.A. for *Mathematical Analysis* at *University of Trieste, School of Engineering* - Trieste (Italy) 9/2023-2/2024
T.A. for *Algebraic Geometry* at *SISSA* - Trieste (Italy) 2022-2023
T.A. for *Mathematical Analysis* at *University of Trieste, School of Engineering* - Trieste (Italy) 9/2022-2/2023

T.A. for *Mathematical Analysis* at *University of Trieste, School of Engineering* - Trieste (Italy) 9/2021-2/2022
T.A. for *Mathematical Analysis* at *University of Trieste, School of Engineering* - Trieste (Italy) 9/2020-2/2021
T.A. for *Mathematical Analysis* at *University of Trieste, School of Engineering* - Trieste (Italy) 9/2019-2/2020
T.A. for *Mathematical Analysis* at *University of Pisa, School of Engineering* - Pisa (Italy) 9/2017-2/2018
T.A. for *Linear Algebra* at *University of Pisa, School of Engineering* - Pisa (Italy) 9/2017-2/2018
T.A. for *Linear Algebra* 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* $\mathrm{Hilb}^{78}(\mathbb{A}^3)$*"* *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 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*
- *"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) *"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 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

Ugo Bruzzo
SISSA
bruzzo@sissa.it

Andrea Tobia Ricolfi
SISSA
aricolfi@sissa.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.