

# 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 *Politecnico di Milano* - Milano (Italy) 2/2023-present  
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-present  
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

- “Growth and integrability of some birational maps in dimension three”, with G. Gubbiotti. 2023  
To appear in *Annales Henri Poincaré*
- “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

- “A counterexample to the parity conjecture”, with F. Giovenzana, L. Giovenzana and P. Lella 2023
- “Moduli spaces of  $\mathbb{Z}/k\mathbb{Z}$ -constellations over  $\mathbb{A}^2$ ”. 2022

## TEACHING

**T.A. for Mathematical Analysis** at *University of Trieste, School of Engineering* - Trieste (Italy) 9/2022-1/2023  
**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

- “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

- “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
- “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

## LANGUAGES & IT SKILLS

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

## REFEREES

**Ugo Bruzzo**  
SISSA  
bruzzo@sisssa.it

**Andrea Tobia Ricolfi**  
SISSA  
aricolfi@sisssa.it

## ORGANISATION OF EVENTS & OTHER TASKS

- 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
- 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.