

Morena Porzio

Curriculum Vitae

523 West 112th Street, Apt. 73B
New York, NY 10025
☎ (+39) 333 3990115
✉ mp3947@columbia.edu

Education and Formation

- 2020-now **PhD Candidate in Mathematics**, *Columbia University, Graduate School of Arts and Science*, New York, NY.
- 2022-2024 **Master of Philosophy in Mathematics**, *Columbia University, Graduate School of Arts and Science*, New York, NY.
- 2020-2022 **Master of Arts in Mathematics**, *Columbia University, Graduate School of Arts and Science*, New York, NY.
- 2015-2020 **Master & Bachelor Degree in Mathematics**, *Scuola Normale Superiore, Honors College*, Pisa, Italy, 100/100 cum Laude.
- 2015-2020 **Master & Bachelor Degree in Mathematics**, *University of Pisa*, Pisa, Italy, 110/110 cum Laude.
- 2010-2015 **High School Diploma**, *Liceo Scientifico F. Vercelli*, Asti, Italy, 100/100 cum Laude.

Publications and Preprints

- 2022 ***The Torsion-Free Rank of $\text{Ext}^1(A, \mathbb{Z})$ and Whitehead's Problem***, M. Porzio, *The Graduate Journal of Mathematics*, Volume 7, Issue 1 (2022), 10-16.
For a longer version (Bachelor Thesis), see [https://www.semanticscholar.org/paper/The-ranks-of-Ext-1-\(-A-%2C-Z\)-and-Whitehead-%E2%80%99-s-Gaiffi-Porzio/bbf8d8df2b76480aad890876e87c837c2163a044](https://www.semanticscholar.org/paper/The-ranks-of-Ext-1-(-A-%2C-Z)-and-Whitehead-%E2%80%99-s-Gaiffi-Porzio/bbf8d8df2b76480aad890876e87c837c2163a044)
- 2022 ***An Estimation of Hailstone Radii Using the Collatz Conjecture***, Gupta, R., & Porzio, M., *Journal of Student Research (JSR)*, Vol. 11 No. 2 (2022).
<https://doi.org/10.47611/jsrhs.v11i2.3638>. Mentorship through Lumiere education, Premium Research & Publication Program.
- 2020 ***Picard Groups of Stacks of Elliptic and Hyperelliptic Curves***, M. Porzio, advised by Angelo Vistoli, Master Thesis (2020).
<https://etd.adm.unipi.it/t/etd-09102020-102635/>

Ongoing and recent Projects

- **PhD Thesis advised by Aise Johan de Jong**, *Columbia University*.
The aim of this project is to investigate rational questions about the Hilbert schemes of points of a cubic surface. The motivation is the *Cassels and Swinnerton-Dyer conjecture*.
- **On the Stable Birationality type of Hilbert schemes of points**.
This work aims to classify the stable birationality type of Hilbert schemes of points of a geometrically rational surface and its implications on the rationality of the motivic zeta function of the surface.
- **Project on Ceresa's cycles**, joint work with L. Lagarde, M. Moakher, J. Rawson, and F. Trejos.
Born after the Arizona Winter School, this work aims to study the vanishing of the Ceresa's cycle in the case we embed the curve in its Jacobian using a rational cycle of degree 1 instead of a point.
- **Project on density of degree d points on product of curves $C \times D$** , joint work with J. Berg, Y. Fu, E. Gazaki, J. Rawson, I. Vogt.
For curves (over number fields) the set of integers $d \in \delta(C/k)$ such that degree d points are dense is fairly understood. In particular it is closed under \mathbb{N}^+ -multiplication. The project focuses on the same set but for a product of curves (of low genus).

- **On the homotopy type of the Affine Grassmannian over the Ran Space**, joint work with G. Nocera.

The goal of this paper is to provide a detailed tractation of some homotopy-theoretic features of the *Ran-Grassmannian*. The upshot is to complete the proof of Lurie's conjecture about the existence of an \mathbb{E}_2 structure on a certain ∞ -category of constructible sheaves, used in <https://arxiv.org/abs/2012.08504>.

Talks at Seminars

- Apr 19 2024 **Spring 2024 Algebraic geometry learning seminar: Decomposition of the diagonal, Nilpotence conjecture and Kimura's theorem**, https://yoonjookim.github.io/seminars/spring_2024.html, Columbia University.
- Apr 10 2024 **Columbia Undergraduate Math Society, Spring 2024, Riemann–Roch Theorem for Graphs and Specialization of Divisors from Curves**, <https://math.columbia.edu/~ums/>, Columbia University.
- Mar 22 2024 **Degree d -points on Algebraic Surfaces - AIM Workshop, Spring 2024**, <https://aimath.org/workshops/upcoming/degreedsurface/>, *Stable Birationality Types of Hilbert schemes of points on Surfaces*, Caltech University, Pasadena, CA.
- Mar 6 2024 **Arizona Winter School 2024: Abelian Varieties, Spring 2024**, <https://swc-math.github.io/aws/2024/index.html>, *Project Group presentation on Ceresa's cycles*, University of Arizona, Tucson, AZ.
- Spring 2024 **Elliptic Curves and Abelian Varieties (Organizer)**, *Learning seminar in preparation for the Arizona Winter School 2024*, <https://www.math.columbia.edu/~morenaporzio/PAWSseminar.html>, Columbia University.
- Apr 19 2023 **Columbia Undergraduate Math Society, Spring 2023, Obstructions to the existence of rational points on algebraic varieties**, <https://www.math.columbia.edu/~ums/2023spring.html>, Columbia University.
- Apr 12 2023 **Preprint Seminar, Spring 2023, Smooth subvarieties of Jacobians**, <https://www.math.columbia.edu/~tpad/preprints2023.html>, Columbia University.
- Feb 24 2023 **Spring 2023 Informal AG Seminar on MMP, Minimal Model Program in dimension 2**, <https://www.math.columbia.edu/~andresfh/sp23agseminar.html>, Columbia University.
- Feb 16 2023 **Milnor-Witt motives seminar 2023, Milnor-Witt K -theory**, <https://math.columbia.edu/~magenroy/MilnorWittMotivesSeminar.html>, Columbia University.
- Nov 16 2022 **Rigid Analytic Geometry and Perfectoid Spaces, Generalities on Constructible Sets and Spectral Spaces**, <https://www.math.columbia.edu/~scheffelin/perfectoid>, Columbia University.
- Nov 9 2022 **Non-abelian Hodge correspondence and $P=W$ conjecture, Perverse sheaves and Lefschetz hyperplane theorem**, <http://math.columbia.edu/~anabasheva/pw.html>, Columbia University.
- Oct 14 2022 **Motivic homotopy theory learning seminar, Basics of the unstable motivic homotopy category**, <http://math.columbia.edu/~magenroy/motivicseminar.html>, Columbia University.
- Spring 2022 **Cycle "Motives, Standard Conjectures and Weil Cohomology Theories" (Organizer)**, *For the list of the talks, see* <https://math.columbia.edu/~morenaporzio/Motives&WCT.html>, Columbia University.
- Apr 1 2022 **Hyperbolicity Seminar, Strong Lang's conjecture for subvarieties of abelian varieties**, <https://www.math.columbia.edu/~dejong/seminar/seminar-hyperbolicity.html>, Columbia University.

- Nov 24 2021 **SNS Dissertation Talk**, *Surjectivity of Brauer Map for surfaces: positives results and counterexample*, Zoom – Scuola Normale Superiore.
- Oct 29 2021, **Deformation Theory Seminar**, *Application of deformation theory to contracting curves functor $M_{g,n+1} \rightarrow M_{g,n}$* , <https://www.math.columbia.edu/~dejong/seminar/seminar-deformation-theory.html>, Columbia University.
- Nov 5 2021
- Apr 27 2021, **Derived Algebraic Geometry Learning Seminar - Formal moduli problems**, *Ring Spectra and Generalized Cohomology Theory*, <https://uz.sns.it/~Wilhelm795/FMP2021.html>, Zoom – Scuola Normale Superiore.
- May 5 2021,
- May 11 2021
- Mar 26 2021 **Intersection Theory Learning Seminar**, *Grothendieck-Riemann-Roch*, <https://www.math.columbia.edu/~plei/s21-INT.html>, Columbia University.
- Oct 30 2020, **Geometric Invariant Theory Learning Seminar**, *GIT and Coarse Moduli Problems*, <https://www.math.columbia.edu/~plei/f20-GIT.html>, Columbia University.
- Nov 6 2020

Teaching and Mentoring

- Spring 2024 **TA of MATHGR6262**, *Arithmetic and Algebraic Geometry*, Columbia University, New York, NY.
Main duties: holding office hours, assisting students, grading exercises. Instructor I worked for: Robert Friedman.
- Spring 2024 **TA of MATHV2030**, *Ordinary Differential Equations*, Columbia University, New York, NY.
Main duties: holding office hours, assisting students, grading exercises. Instructor I work for: Yin Li.
- Fall 2023 **TA of MATHGR6261**, *Commutative Algebra*, Columbia University, New York, NY.
Main duties: holding office hours, assisting students, grading exercises. Instructor I worked for: Robert Friedman.
- Fall 2023 - **Graduate Student Editor of Columbia Journal of Undergraduate Mathematics**, Columbia University, New York, NY, <https://sites.google.com/view/columbia-mathematics-journal/home?authuser=0>.
- Spring 2024
- Summer 2023 **Instructor of MATHUN2030**, *Ordinary Differential Equations*, Columbia University, New York, NY.
Main duties: preparing and holding lectures, assisting students, issuing exercises and exams.
- Spring 2023 **TA of MATHGU4043**, *Algebraic Number Theory*, Columbia University, New York, NY.
Main duties: holding office hours, assisting students, grading exercises. Instructor I worked for: Aise Johan de Jong.
- Dec 2 2023, **Administrator of the Putnam Exam**, Columbia University, New York, NY.
- Dec 3 2022, The William Lowell Putnam Mathematical Competition is the preeminent mathematics competition for undergraduate college students in the United States and Canada. It consists of two 3-hour sessions, one in the morning and one in the afternoon.
- Dec 4 2021
- Fall 2022, **TA of MATHUN2030**, *Ordinary Differential Equation*, Columbia University, New York, NY.
- Spring 2022,
- Fall 2021 Main duties: holding office hours, assisting students, proctoring exams and grading exercises. Instructors I worked for: Panagiota Daskalopoulos, Evgeni Dimitrov, Florian Johne.
- Spring 2021 **Young Mentor in THE STEM factor project**, *Global Shapers* <https://www.globalshapers.org/>, Florence, Italy.
Cycle of interviews and Q&A sessions, whose main goals were bringing high school girls closer to and knowing the STEM world, and supporting undergrad STEM students.
- Fall 2018 **TA of the master course Algebra**, University of Pisa, Pisa, Italy.
Main duty: grading exercises assigned during the semester. Instructor: Andrea Maffei.

- Apr 18 **EGMO 2018**, <http://www.egmo2018.org/>, Florence, Italy, Staff Member - Invigilator.
The European Girls' Mathematical Olympiad (EGMO) is an international mathematical competition, which addresses worldwide talented high school girl students.
- Spring 2016-2017-2018 **Training EGMO 2018 – 2017 – 2016**, *Staff Member – Problems proposer and corrector*.
Born in 2016, the project consists of demanding training and competitions, as well as internships of mathematics at Scuola Normale Superiore. It is mainly though to highly prepare the EGMO team for international competitions.
- Winter 2017 **Held Mathematical Olympiads Internship**, *UMI – Unione Matematica Italiana (Italian Mathematics Union)*, Massa, Italy.
I gave mathematics lessons account of UMI concerning algebra and number theory in the setting of mathematical olympiads.
- Spring 2016 **Staff Member of the National Mathematical Olympiads**, *UMI*, Cesenatico, Italy.
Corrector of the problems proposed and a staff member at the national mathematical competition.

Schools and Conferences

- June 24-28 2024 **Collaborative Workshop in Algebraic Geometry**, *IAS - Institute for Advanced Studies*, Princeton.
<https://www.ias.edu/math/events/collaborative-workshop-algebraic-geometry>
- May 6-10 2024 **The Geometry of Hilbert Schemes of Points**, *CIRM*, Leivo Terme (Italy).
<https://sites.google.com/view/ghisp2024/home>
- Apr 22-26 2024 **On the occasion of H el ene Esnault's 70th birthday**, *IHES - Centre de conf erence Marilyn et James Simons*, Bures-sur-Yvette (Paris).
<https://indico.math.cnrs.fr/event/11114/>
- Mar 18-22 2024 **Degree d points on algebraic surfaces**, *AIM Workshop*, *Caltech University*, Pasadena (CA).
<https://aimath.org/workshops/upcoming/degreesurface/>
- Mar 2-6 2024 **Arizona Winter School 2024: Abelian Varieties**, *University of Arizona*, Tucson (AZ).
<https://swc-math.github.io/aws/2024/index.html>
- Dec 7-9 2023 **Monodromy and Its Applications, Conference on the Occasion of Nicholas Katz' 80th Birthday**, *Princeton University*, Princeton.
<https://sites.google.com/princeton.edu/katz80>
- June 19-23 2023 **Conference on 100 Years of Noetherian Rings**, *IAS - Institute for Advanced Studies*, Princeton.
<https://www.ias.edu/math/events/conference-100-years-noetherian-rings>
- June 12-16 2023 **Arithmetic, Birational Geometry, and Moduli Spaces**, *Brown University*, Providence.
<https://sites.google.com/view/abgms2023/>
- Nov 18-20 2022 **AGNES Fall 2022 (Algebraic Geometry Northeastern Series)**, *University of Massachusetts*, Amherst.
<https://sites.google.com/site/agneshomepage/amherst-2022?authuser=0>
- Oct7, Nov4 2022, Sept22 2023 **ENYGMMa (Empowering New York Gender Minority Mathematicians)**, *CUNY, Columbia University, Stony Brook University*, New York City.
<https://sites.google.com/stonybrook.edu/enygmma/home?authuser=0>
- Sept 12-16 2022 **Summer school "Motives in Ratisbona"**, *University of Regensburg*, Regensburg.
<https://www.uni-regensburg.de/mathematics/motives2022/startseite/index.html>

- May 31-4(Jun) **O-minimality and foliations**, *CIRM (Centre International de Rencontres Mathématiques)*, Virtual Workshop.
2021 <https://conferences.cirm-math.fr/2682.html>
- Jun 8-20 **Algebraic and Tropical Online Meetings (ATOM)**, Virtual School.
2020 <https://researchseminars.org/seminar/ATOM>
- Aug 26-1(Sept) **Summer School of Logic**, *AILA (Italian Association of Logic and its Applications)/SILFS (Italian Society of Logic and Philosophy of Science)*, Gargnano, Italy.
2019 <http://sel.di.unimi.it/>
- Nov 27-30 **Young Perspectives in Deformation Theory**, *Politecnico of Turin*, Turin.
2018 <https://sites.google.com/site/ypdt2018/>

Grants and Awards

- 2020-2026 **Winner of Fellowship Package as a Dean's Fellow and doctoral student in the Math Department of Columbia University**, New York, NY.
- 2022-2023 **Sponsored Student Member of the Association for Women in Mathematics, AWM**, <https://awm-math.org/>.
- 2019 **Winner of the AILA Award 3+2 2019**, *Associazione Italiana di Logica e sue Applicazioni (Italian Association of Logic and its Applications)*.
<http://www.ailalogica.it/2019/06/03/vincitori-premio-aila-32-anno-2018-19/>
With this prize, the best bachelor or master degree theses on topics in Mathematical Logic of the 2017-2018 academic year are awarded, with a further invitation to the *Summer School of Logic*, Gargnano, Italy.
- 2015-2020 **Winner of Full Scholarship with Grant at Scuola Normale Superiore, SNS**, Pisa, Italy.
- 2015 **Winner of INdAM Scholarship**, *National Institution of High Mathematics "Francesco Severi"*, https://www.altamatematica.it/sites/default/files/graduatoria40-2015-2016_0.pdf.
- 2015 **National Gold Medal**, *Italian Mathematical Olympiads (preIMO)*, Cesenatico, Italy.
Scored as the ninth Italian high-school student, <http://olimpiadi.dm.unibo.it/archivio/medagliere/>.
- 2015 **International Bronze Medal**, *European Girls' Mathematical Olympiad (EGMO)*, Minsk, Belarus.
Scored in the top 50 worldwide participants, <https://www.egmo.org/egmos/egmo4/scoreboard/>.
- 2015 **National Bronze Medal**, *Italian Physics Olympiads (preIPhO)*, Senigallia, Italy.
Scored in the top 40 Italian high-school students <https://www.olifis.it/>
- 2014-2015 **Zero Robotics High School Tournament**, *NASA/ESA/MIT*.
Achieved the first place worldwide in the semifinal phase with the team *Cosmos 34 SCABB*.

Language Knowledge

Italian	Native Language	
English	Fluent	<i>TOEFL iBT Exam (passed with 100)</i>
French	Low Intermediate	<i>SNS exam (passed with B2)</i>
Latin	Translation and interpretation	<i>(studied at high school)</i>

Computer Skills

C, MATLAB, L^AT_EX, HTML, Wolfram Mathematica.