Morena Porzio

Curriculum Vitae

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Education and Formation

2025-now	**Postdoctoral Fellow in the Department of Mathematics**, *University of Toronto, Scarborough*, 1265 Military Trail, Toronto ON M1C 1A4.
2020-2025	**PhD Student in Mathematics**, *Columbia University, GSAS*, New York, NY.
2022-2024	**Master of Philosophy in Mathematics**, *Columbia University, GSAS*, New York, NY.
2020-2022	**Master of Arts in Mathematics**, *Columbia University, GSAS*, New York, NY, GPA: 4.1.
2015-2020	**Master's & Bachelor's Degree in Mathematics**, *Scuola Normale Superiore, Honors College*, Pisa, Italy, 100/100 cum Laude, GPA: 4.0.
2018-2020	**Master's Degree in Mathematics**, *University of Pisa*, Pisa, Italy, 110/110 cum Laude, GPA: 4.0.
2015-2018	**Bachelor's Degree in Mathematics**, *University of Pisa*, Pisa, Italy, 110/110 cum Laude, GPA: 4.0.
2010-2015	**High School Diploma**, *Liceo Scientifico F. Vercelli*, Asti, Italy, 100/100 cum Laude.

Publications and Preprints

2024	**On the Stable Birationality type of Hilbert schemes of points**, *M. Porzio*, Preprint https://arxiv.org/abs/2408.07593.
2024	**On the homotopy type of the Beilinson–Drinfeld Grassmannian**, *G. Nocera, & M. Porzio*, Preprint https://www.math.columbia.edu/~morenaporzio/BDGrassmannian.pdf.
2022	**The Torsion–Free Rank of $Ext^1(A, \mathbb{Z})$ and Whitehead's Problem**, *M. Porzio*, The Graduate Journal of Mathematics, Volume 7, Issue 1 (2022), 10-16 https://gradmath.org/wp-content/uploads/2022/09/GJM2022-Porzio.pdf.
	For a longer version (Bachelor Thesis), see http://www.logicatorino.altervista.org/matteo_viale/Porzio.pdf
2022	**An Estimation of Hailstone Radii Using the Collatz Conjecture**, *R. Gupta, & M. Porzio*, 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 Projects

- **PhD Thesis advised by Aise Johan de Jong**, *Columbia Univesity*.
  The aim of this project is to investigate birational questions about the Hilbert schemes of points of a surface. The motivation is the *Cassels and Swinnerton-Dyer conjecture* for cubic surfaces.

- **Higher Beauville Components of Ceresa Cycles and Modified Diagonals**, *joint work with L. Lagarde, M. Moakher, J. Rawson, and F. Trejos*.
  This work studies the vanishing of the higher Beauville components $[C]^e_{(s)}$ (C is a curve embedded in its Jacobian using a degree 1 $\mathbb{Q}$-divisor e), relating it to the vanishing of *modified diagonal cycles*. We also extend the work of Polishchuk on the sl_2-action on $CH(J)_{\mathbb{Q}}$ and prove recurrence relations for the Beauville components of $[C]^e$ as well as between the modified diagonal cycles.

- **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. After discussing results and constructions for any genera, we focus on low genera (up to genus 2).

- **Project on full DP2's over characteristic 2**, *joint work with J. Desjardins, A. Knecht, J. Schneider, M. Trip.*

  A split del Pezzo surface X/k is called *full* if all k-rational points on X lie on the exceptional curves. Hirschfeld proved that over finite fields, in order to be full, the DP must have degree at most 5 and for degree up to 3 they are classified up to isomorphism. Partial results are known for degree 2 in odd characteristic. The aim of this project is to complete the classification of DP2's over a field of characteristic 2.

Grants and Awards

2023/2024 **Winner of PhD Candidate Recognition Award for Excellence in Teaching**, *Math Department of Columbia University*, New York, NY.

2020-2026 **Winner of Fellowship Package as a Dean's Fellow and doctoral student at the Math Department of Columbia University**, New York, NY.

2022-2024 **Sponsored 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/`

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/`

Teaching and Mentoring

Year 24-25 **Math Grad Representative**, *Columbia University*, New York.

Fall '24,'23 **TA of MATHGR6261, *Commutative Algebra***, *Columbia University*, New York.

Fall '23 to **Graduate Student Editor at *Columbia Journal of Undergraduate Mathematics***,
Fall '24 `https://journals.library.columbia.edu/index.php/cjum`.

Spring '24 **TA of MATHGR6262, *Arithmetic and Algebraic Geometry***, *Columbia University*, New York.

Spring '24 **TA of MATHV2030, *Ordinary Differential Equations***, *Columbia University*, New York.

Summer '23 **Instructor of MATHUN2030, *Ordinary Differential Equations***, *Columbia University*, New York.

Summers '23, '22	**Mentor at Lumiere Education**, *Premium Research and Publication Program*, `https://www.lumiere-education.com/`, Online.
Spring '23	**TA of MATHGU4043, *Algebraic Number Theory***, *Columbia University*, New York.
From '21 to '24	**Administrator of the *Putnam Exam***, *Columbia University*, New York, NY.
Spring 25', Fall '22, Spring '22, Fall '21	**TA of MATHUN2030, *Ordinary Differential Equation***, *Columbia University*, New York.
Spring '21	**Young Mentor in *THE STEM factor* project**, *Global Shapers* `https://www.globalshapers.org/`, Florence, Italy.
	Cycle of interviews and Q&A sessions, whose main goal is to address gender issues among the STEM world.
Fall '18	**TA of the master course *Algebra***, *University of Pisa*, Pisa, Italy.
Apr '18	**Staff member at EGMO 2018**, `http://www.egmo2018.org/`, Florence, Italy.
	Staff member and invigilator at the European Girls' Mathematical Olympiad, an international math competition.
Springs '16, '17, '18	**Trainer at Italian EGMO training**, *Staff Member – Problems proposer and grader.*
Winter '17	**Co-instructor at Math Olympiads Internship**, *UMI – Unione Matematica Italiana (Italian Mathematics Union)*, Massa, Italy.
Spring '16	**Staff Member of the National Mathematical Olympiads**, *UMI*, Cesenatico, Italy.
	Corrector of the problems proposed and a staff member at the national mathematical competition.

Invited Talks at Seminars

Jun 24 2025	**Algebraic Points on Curves**, *Lightning Talk - On the stable birationality of Hilbert schemes of points on surfaces*, `https://icerm.brown.edu/program/topical_workshop/tw-25-apc`, ICERM, Providence.
May 17 2025	**2025 AWM Research Symposium**, *Higher Beauville Components of Ceresa Cycles and Modified Diagonals*, `https://awm-math.org/meetings/awm-research-symposium/`, University of Wisconsin-Madison, Madison.
Apr 4 2025	**UVA Number Theory Seminar**, *On the stable birationality of Hilbert schemes of points on surfaces*, `https://math.virginia.edu/seminars/ntsem/`, University of Virginia, Charlottesville.
Dec 3 2024	**Utah Algebraic Geometry Seminar**, *On the stable birationality of Hilbert schemes of points on surfaces*, `https://www.math.utah.edu/agseminar/`, University of Utah, Salt Lake City.
Nov 19 2024	**Emory Algebra and Number Theory Seminar**, *On the stable birationality of Hilbert schemes of points on surfaces*, `https://sarangop1728.github.io/eants`, Emory University, Atlanta, GA.
Nov 11 2024	**Association for Women in Mathematics**, *On the density of algebraic solutions on products of curves*, `https://www.math.columbia.edu/diversity/awm/`, Columbia University.
Nov 4 2024	**Poster Session at Instructional Workshop on Rational Points**, *On the stable birationality of Hilbert schemes of points on surfaces*, University of Groningen `https://www.rationalpoints.nl/events-2/instructional-workshop-on-rational-points/`.
Nov 4 2024	**Seminar on Arithmetic Geometry and Algebraic Groups**, *On the stable birationality of Hilbert schemes of points on surfaces*, `https://seminaragag.github.io/`, Online.

Oct 30 2024	**University of Michigan algebraic geometry seminar**, *On the stable birationality of Hilbert schemes of points on surfaces*, `https://events.umich.edu/event/126925`, University of Michigan, Ann Arbor.
Oct 24 2024	**Tufts Algebra, Geometry, and Number Theory Seminar**, *On the stable birationality of Hilbert schemes of points on surfaces*, `https://sites.google.com/view/tuftsagents/home`, Tufts University, Boston.
Jun 28 2024	**WIAG 2** `https://sites.google.com/view/wiag2024/`, *Project Group presentation on Classification of del Pezzo surfaces*, IAS, Institute for Advanced Study, Princeton.
Oct 1 2024	**Poster Session at Workshop on Algebraic Cycles**, *On the stable birationality of Hilbert schemes of points on surfaces*, `https://sites.google.com/view/workshop-on-algebraic-cycles`, Leibniz Universität, Hannover.
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, NY.
Mar 22 2024	**Degree d-points on Algebraic Surfaces - AIM Workshop** `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.
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, NY.

Organized Learning Seminars

Spring 2025	**Talk till you are stuck, AG Research Seminar**, `https://www.math.columbia.edu/~morenaporzio/TTURTseminar.html`.
Spring 2024	**Elliptic Curves and Abelian Varieties**, `https://www.math.columbia.edu/~morenaporzio/PAWSseminar.html`.
Spring 2022	**Motives, Standard Conjectures and Weil Cohomology Theories**, `https://math.columbia.edu/~morenaporzio/Motives&WCT.html` .

Talks at Learning Seminars

Apr 19 2024	**Spring 2024 AG learning seminar: Decomposition of the diagonal**, *Nilpotence conjecture and Kimura's theorem*, `https://yoonjookim.github.io/seminars/spring_2024.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.

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*
Nov 5 2021 *curves functor $\mathcal{M}_{g,n+1} \to \mathcal{M}_{g,n}$*, `https://www.math.columbia.edu/~dejong/seminar/seminar-deformation-theory.html`, Columbia University.

Apr 27 2021, **Derived Algebraic Geometry Learning Seminar - Formal moduli problems**,
May 5 2021, *Ring Spectra and Generalized Cohomology Theory*, `https://uz.sns.it/~Wilhelm795/`
May 11 2021 `FMP2021.html`, Zoom – Scuola Normale Superiore.

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*,
Nov 6 2020 `https://www.math.columbia.edu/~plei/f20-GIT.html`, Columbia University.

Schools and Conferences

June 23-27 **ICERM - Algebraic Points on Curves**, *Brown University*, Providence, `https://icerm.`
2024 `brown.edu/program/topical_workshop/tw-25-apc`.

May 16-18 **2025 AWM Research Symposium**, *University of Wisconsin-Madison*, Madison, `https:`
2025 `//awm-math.org/meetings/awm-research-symposium/`.

Nov 4-8 **Instructional workshop on rational points**, *University of*
2024 *Groningen*, Netherlands, `https://www.rationalpoints.nl/events-2/`
`instructional-workshop-on-rational-points/`.

Sept30- **Workshop on Algebraic Cycles**, *Leibniz Universität*, Hannover, `https://sites.`
Oct2 2024 `google.com/view/workshop-on-algebraic-cycles`.

June 24-28 **Collaborative Workshop in Algebraic Geometry**, *IAS - Institute*
2024 *for Advanced Studies*, Princeton, `https://www.ias.edu/math/events/`
`collaborative-workshop-algebraic-geometry`.

May 6-10 **The Geometry of Hilbert Schemes of Points**, *CIRM*, Levico Terme (Italy), `https:`
2024 `//sites.google.com/view/ghisp2024/home`.

Apr 22-26 **On the occasion of Hélène Esnault's 70th birthday**, *IHES - Centre de conférence Mar-*
2024 *ilyn et James Simons*, Bures-sur-Yvette (Paris), `https://indico.math.cnrs.fr/event/`
`11114/`.

Mar 18-22 **Degree d points on algebraic surfaces, AIM Workshop**, *Caltech University*,
2024 Pasadena (CA), `https://aimath.org/workshops/upcoming/degreedsurface/`.

Mar 2-6 **Arizona Winter School 2024: Abelian Varieties**, *University of Arizona*, Tucson (AZ),
2024 `https://swc-math.github.io/aws/2024/index.html`.

Dec 7-9 **Monodromy and Its Applications, Conference on the Occasion of Nicholas**
2023 **Katz' 80th Birthday**, *Princeton University*, Princeton, `https://sites.google.com/`
`princeton.edu/katz80`.

June 19-23 **Conference on 100 Years of Noetherian Rings**, *IAS - Institute*
2023 *for Advanced Studies*, Princeton, `https://www.ias.edu/math/events/`
`conference-100-years-noetherian-rings`.

June 12-16 **Arithmetic, Birational Geometry, and Moduli Spaces**, *Brown University*, Provi-
2023 dence, `https://sites.google.com/view/abgms2023/`.

Nov 18-20 **AGNES Fall 2022 (Algebraic Geometry Northeastern Series)**, *University of Mas-*
2022 *sachusetts*, 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) 2021	**O-minimality and foliations**, *CIRM (Centre International de Rencontres Mathématiques)*, Virtual Workshop, `https://conferences.cirm-math.fr/2682.html`.
Jun 8-20 2020	**Algebraic and Tropical Online Meetings (ATOM)**, Virtual School, `https://researchseminars.org/seminar/ATOM`.
Aug 26-1(Sept) 2019	**Summer School of Logic**, *AILA (Italian Association of Logic and its Applications)/SILFS (Italian Society of Logic and Philosophy of Science)*, Gargnano, Italy, `http://sel.di.unimi.it/`.
Nov 27-30 2018	**Young Perspectives in Deformation Theory**, *Politecnico of Turin*, Turin, `https://sites.google.com/site/ypdt2018/`.