

Alessio D'Alì

Curriculum vitae

Personal data

Surname D'Alì
Name Alessio Maria
Nationality Italian
Web page <https://alessiodali.github.io>

Employment and research visits

- 01/2024– **Ricercatore a tempo determinato di tipo B (tenure track assistant professor)**, *Politecnico di Milano*, Milano (Italy).
In progress.
- 09/2022–01/2024 **Ricercatore a tempo determinato di tipo A (non-tenure track assistant professor)**, *Politecnico di Milano*, Milano (Italy).
- 11/2020–08/2022 **Postdoctoral researcher**, *Universität Osnabrück*, Osnabrück (Germany).
- 09/2018–10/2020 **Research Fellow**, *University of Warwick*, Coventry (United Kingdom).
- 06/2017–08/2018 **Postdoctoral researcher**, *Max-Planck-Institut für Mathematik in den Naturwissenschaften*, Leipzig (Germany).
- 09/2016–05/2017 **Visiting Ph. D. student**, *Université de Fribourg*, Fribourg (Switzerland).
- 04/2015–11/2015 **Visiting Ph. D. student**, *Universitetet i Bergen*, Bergen (Norway).

Education

- 01/2014–02/2017 **Ph. D. in Mathematics**, *Università di Genova*, Genova (Italy).
Thesis title: *Homological Invariants and Combinatorial Constructions in Commutative Algebra* (advisor: Professor Aldo Conca).
- 10/2011–09/2013 **M. Sc. in Mathematics**, *Università di Genova*, Genova (Italy), *110/110 cum laude*.
Thesis title: *Koszul Algebras* (advisor: Professor Aldo Conca).
- 09/2008–09/2011 **B. Sc. in Mathematics**, *Università di Genova*, Genova (Italy), *110/110 cum laude*.
Thesis title: *The Wedderburn-Artin Theorem and its applications* (advisor: Professor Aldo Conca).

Last updated on August 23, 2025.

09/2003–07/2008 **High school diploma**, Liceo Scientifico “Leonardo da Vinci”, Genova (Italy), 100/100 *cum laude*.

Awards, grants and scholarships

- 2025– **Member** of the PoliMi local unit for the PRIN grant “Unirationality, Hilbert schemes, and singularities”, project 2022K48YYP. Principal investigator: G. Staglianò. Joint with U. Catania and U. Genova.
- 06/2022–06/2033 **Qualified** for an associate professor position in an Italian university (01/A2, Algebra and Geometry).
- 03/2023–03/2024 **Principal investigator** for the grant “INdAM–GNSAGA Project 2023”, CUP E53C22001930001 (2500 euros). Title of the project: “New theoretical perspectives via Gröbner bases”. Collaborators: A. Caminata, A. De Stefani, A. Sammartano.
- 2022–2024 **Member** of the PoliMi local unit for the PRIN grant “Squarefree Gröbner degenerations, special varieties and related topics”, project 2020355B8Y. Principal investigator: M. Varbaro. Joint with U. Catania and U. Genova.
- 02/2020–12/2024 **Qualified** for a “maître de conférences” position in a French university (Section 25, Mathématiques).
- 09/2016–05/2017 **Swiss Government Excellence Scholarship** for a Ph. D. research stay in Switzerland.
- 01/2014–12/2016 **Ph. D. scholarship** by Università di Genova.
- 2010 **IRIS prize** (Università di Genova) for being the best first-year undergraduate student in Mathematical, Physical and Natural Sciences (on a par with two other students).
- 2008–2011 **INdAM** (National Institute of Advanced Mathematics “F. Severi”) **three-year scholarship**.

Publications

13. (joint work with Martina Juhnke-Kubitzke and Melissa Koch) *On a generalization of symmetric edge polytopes to regular matroids*, International Mathematics Research Notices **2024** (2024), no. 14, pp. 10844–10864. <https://doi.org/10.1093/imrn/rnae107>
12. (joint work with Martina Juhnke-Kubitzke, Daniel Köhne, Lorenzo Venturello) *On the gamma-vector of symmetric edge polytopes*, SIAM Journal on Discrete Mathematics **37** (2023), pp. 487–515. <https://dx.doi.org/10.1137/22M1492799>
11. (joint work with Lorenzo Venturello) *Koszul Gorenstein algebras from Cohen–Macaulay simplicial complexes*, International Mathematics Research Notices **2023** (2023), no. 6, pp. 4998–5045. <https://dx.doi.org/10.1093/imrn/rnac003>
10. (joint work with Emanuele Delucchi and Mateusz Michałek) *Many faces of symmetric edge polytopes*, Electronic Journal of Combinatorics **29** (2022), P3.24, 42 pp. <https://doi.org/10.37236/10387>
9. (joint work with Emanuele Delucchi) *Stanley–Reisner rings for symmetric simplicial complexes*,

- G-semimatroids and Abelian arrangements*, Journal of Combinatorial Algebra **5** (2021), pp. 185–236. <http://dx.doi.org/10.4171/JCA/53>
8. (joint work with Alessio Borzi) *Graded algebras with cyclotomic Hilbert series*, Journal of Pure and Applied Algebra **225** (2021), 106764, 9 pp. <https://doi.org/10.1016/j.jpaa.2021.106764>
 7. (joint work with Tobias Boege, Thomas Kahle, Bernd Sturmfels) *The geometry of gaussoids*, Foundations of Computational Mathematics **19** (2019), pp. 775–812. <https://doi.org/10.1007/s10208-018-9396-x>
 6. (joint work with Gunnar Fløystad and Amin Nematbakhsh) *Resolutions of co-letterplace ideals and generalizations of Bier spheres*, Transactions of the American Mathematical Society **371** (2019), pp. 8733–8753. <https://doi.org/10.1090/tran/7560>
 5. *The Koszul property for spaces of quadrics of codimension three*, Journal of Algebra **490** (2017), pp. 256–282. <https://doi.org/10.1016/j.jalgebra.2017.06.032>
 4. (joint work with Gunnar Fløystad and Amin Nematbakhsh) *Resolutions of letterplace ideals of posets*, Journal of Algebraic Combinatorics **45** (2017), pp. 911–930. <http://dx.doi.org/10.1007/s10801-016-0729-z>
 3. (joint work with Adam Boocher, Eloísa Grifo, Jonathan Montaña, Alessio Sammartano) *On the growth of deviations*, Proceedings of the American Mathematical Society **144** (2016), pp. 5049–5060. <https://doi.org/10.1090/proc/13132>
 2. (joint work with Adam Boocher, Eloísa Grifo, Jonathan Montaña, Alessio Sammartano) *Edge ideals and DG algebra resolutions*, Le Matematiche **70** (2015), pp. 215–237. <https://www.dmi.unict.it/ojs/index.php/lematematiche/article/view/1236>
 1. *Toric ideals associated with gap-free graphs*, Journal of Pure and Applied Algebra **219** (2015), pp. 3862–3872. <https://doi.org/10.1016/j.jpaa.2014.12.025>

Preprints and works in preparation

- *On strongly Koszul algebras and tidy Gröbner bases* (tentative title). In preparation.
- (joint work with Akihiro Higashitani) *Order polytopes of graded posets are gamma-effective*. Preprint (2025). Submitted. arXiv version: <https://arxiv.org/abs/2505.07623>
- (joint work with Emanuele Delucchi) *Equivariant Hilbert and Ehrhart series under translative group actions*. Preprint (2023 v1, 2024 v2). Submitted. arXiv version: <https://arxiv.org/abs/2312.14088>

Selected talks

- May 15, 2025 **Fields Institute, Toronto (Canada)**, Commutative Algebra and Applications Seminar: *How to count wisely: f -vectors, h -vectors, h^* -vectors, γ -vectors and beyond* (introductory/survey talk) and *Symmetry counts: an introduction to equivariant Hilbert and Ehrhart series* (research talk).
- February 25, 2025 **Dobbiaco/Toblach (Italy)**, invited talk at the 7th Winter School in Geometry, Algebra and Combinatorics of Moduli Spaces and Configurations: *Symmetry counts: an introduction to equivariant Hilbert and Ehrhart series*.

- February 20, 2025 **Università di Milano Bicocca (Italy)**, Geometry Seminar: *Symmetry counts: an introduction to equivariant Hilbert and Ehrhart series.*
- February 18, 2025 **Università di Bologna (Italy)**, Algebra and Geometry Seminar: *Symmetry counts: an introduction to equivariant Hilbert and Ehrhart series.*
- July 26, 2024 **Università di Palermo (Italy)**, invited talk at the 2nd AMS–UMI joint meeting, section B20 “Recent Developments in Commutative Algebra”: *On strongly Koszul algebras and tidy Gröbner bases.*
- July 26, 2024 **Università di Palermo (Italy)**, invited talk at the 2nd AMS–UMI joint meeting, section B16 “Discrete and Combinatorial Homotopy, Theory and Applications”: *Symmetry counts: an introduction to equivariant Hilbert and Ehrhart series.*
- March 27, 2024 **Università di Pisa (Italy)**, Seminar on Combinatorics, Lie Theory, and Topology: *Symmetry counts: an introduction to equivariant Hilbert and Ehrhart series.*
- February 1, 2024 **SUPSI, Lugano (Switzerland)**, Bern–Konstanz–Lugano–Neuchâtel InterCity Seminar: *On a generalization of symmetric edge polytopes to regular matroids.*
- December 7, 2023 **Max-Planck-Institut Leipzig (Germany)**, Seminar on Nonlinear Algebra: *On a generalization of symmetric edge polytopes to regular matroids.*
- October 31, 2023 **Università di Genova (Italy)**, Algebra & Geometry Seminar: *On a generalization of symmetric edge polytopes to regular matroids.*
- September 5, 2023 **Università di Pisa (Italy)**, talk at Congresso UMI (Italian Mathematical Union), section S14 “Algebra”: *Sulla proprietà di Koszul per algebre artiniane Gorenstein.* In Italian.
- February 22, 2023 **Kwansei Gakuin University (Japan)**, invited talk at the workshop Combinatorial and Algebraic Aspects on Lattice Polytopes: *On a generalization of symmetric edge polytopes to regular matroids.*
- September 8, 2022 **Università di Catania (Italy)**, invited talk at the Workshop on Commutative Algebra and Algebraic Geometry: *An introduction to symmetric edge polytopes and their γ -vector.* In Italian.
- June 27, 2022 **SUPSI, Locarno (Switzerland)**, invited talk at the workshop Arrangements in Ticino: *Symmetric edge polytopes and their γ -vectors.*
- June 16, 2022 **Universität Osnabrück (Germany)**, invited talk at the workshop 75+80=155 Years of Commutative Algebra: *Koszul Gorenstein rings from flag Cohen–Macaulay simplicial complexes.*
- May 15, 2022 **AMS Spring Western Sectional Meeting (online)**, invited talk at the Special Session on Algebraic, Combinatorial, and Optimization Methods for Kuramoto and Power-flow Equations: *On the γ -vector of symmetric edge polytopes.*
- May 2, 2022 **Stockholms universitet (Sweden)**, Commutative Algebra online seminar: *On the Koszul property for quadratic Artinian Gorenstein graded rings.*

- December 13, 2021 **Universität Osnabrück (Germany)**, joint Algebra and Discrete Mathematics / Applied Algebra and Data Analysis seminar: *Symmetric edge polytopes and their γ -vectors*.
- April 15, 2021 **Freie Universität Berlin (Germany)**, Discrete Geometry online seminar: *Koszul Gorenstein algebras from simplicial complexes*.
- June 29, 2020 **Università di Genova (Italy)**, online guest talk at the local Commutative Algebra reading course: *Koszul Gorenstein algebras and a conjecture by Charney and Davis*.
- December 4, 2019 **Freie Universität Berlin (Germany)**, talk at the Einstein Workshop on Polytopes and Algebraic Geometry: *Symmetric edge polytopes and their applications*.
- September 13, 2019 **Università di Genova (Italy)**, invited talk at the workshop Algebraic Combinatorics in Genova: *Symmetric edge polytopes in combinatorics and beyond*.
- August 22, 2019 **University of Swansea (Wales, UK)**, invited talk at the 9th Applied Algebra and Geometry network meeting: *Symmetric edge polytopes and their applications*.
- July 17, 2019 **Université de Neuchâtel (Switzerland)**, invited talk at the workshop Algebra meets combinatorics in Neuchâtel: *Symmetric edge polytopes in combinatorics and beyond*.
- July 9, 2019 **Universität Bern (Switzerland)**, invited talk at the SIAM conference on Applied Algebraic Geometry: *Group actions on generalized Stanley–Reisner rings*.
- May 20, 2019 **University of York (England, UK)**, Algebra seminar: *Generalized Stanley–Reisner rings and translative group actions*.
- November 6, 2018 **University of Warwick (England, UK)**, Algebraic Geometry seminar: *Generalized Stanley–Reisner rings and translative group actions*.
- May 31, 2018 **Università di Genova (Italy)**, invited talk at the workshop Giornate di Geometria Algebrica ed Argomenti Correlati XIV: *Anelli di Stanley–Reisner generalizzati e azioni di gruppo traslative*. In Italian.
- March 23, 2018 **Universität Osnabrück (Germany)**, Graduate Student Meeting on Applied Algebra and Combinatorics: *Translative group actions on simplicial posets*.
- December 18, 2017 **Technische Universität Berlin (Germany)**, Berlin–Leipzig Seminar on Algebra, Geometry and Combinatorics: *What is... a gaussoid?*
- April 28, 2017 **Universität Bern (Switzerland)**, Bern–Fribourg–Neuchâtel InterCity Seminar: *Resolutions of letterplace and co-letterplace ideals*.
- February 23, 2017 **Università di Genova (Italy)**, Genova–Torino–Milano Seminar: *Resolutions of letterplace and co-letterplace ideals*.
- August 22, 2016 **Moieciu de Sus (Romania)**, talk at the EMS Summer School on Multigraded Algebra and Applications (24th National School on Algebra): *Resolutions of letterplace and co-letterplace ideals*.

- October 9, 2015 **Universität Osnabrück (Germany)**, invited talk at the workshop Combinatorial and Experimental Methods in Commutative Algebra and Related Fields: *Deviations of graded algebras*.
- September 28, 2015 **Universitetet i Bergen (Norway)**, Algebra and Geometry Seminar: *Deviations of graded algebras*.
- April 22, 2015 **Universitetet i Bergen (Norway)**, Algebra and Geometry Seminar: *Commutative algebra on graphs*.
- March 6, 2013 **Technische Universiteit Eindhoven (the Netherlands)**, Discrete Math Seminar: survey talk about *Koszul algebras*.

Teaching

- 09/2024–12/2024 **Lecturer** (with P. Lella, 36 hours out of 72) for the course “Topologia Algebrica Computazionale”, Corso di Laurea Magistrale in Ingegneria Matematica (“Computational Algebraic Topology”, Master’s Degree in Mathematical Engineering), Politecnico di Milano, Italy.
- 09/2024–12/2024; 09/2023–12/2023 **Lecturer** (60 hours) for the course “Analisi Matematica e Geometria 1”, Corsi di Laurea in Ingegneria Aerospaziale, Energetica, Meccanica (“Calculus and Geometry 1”, Degrees in Aerospace, Energy and Mechanical Engineering), Politecnico di Milano, Italy.
- 04/2023; 03/2022 **Lecturer** (with A. Conca, E. Delucchi and U. Fugacci, 8 hours out of 24) for the short course “Matematica discreta e applicazioni” (Discrete Mathematics and Applications), Università di Genova, Italy.
- 09/2022–12/2022 **Lecturer** (36 hours) for the Geometry section of the course “Analisi Matematica e Geometria”, Corso di Laurea in Ingegneria per l’Ambiente e il Territorio (“Calculus and Geometry”, Degree in Environmental and Land Planning Engineering), Politecnico di Milano, Italy.
- 04/2022–06/2022 **Teaching assistant** (22 hours) for the course “Mathematische Grundlagen der Datenanalyse” (“Mathematical Foundations of Data Analysis”) taught by P. Breiding, Universität Osnabrück, Germany.
- 04/2022–06/2022 **Organizer and grader** of the seminar “Hyperplane Arrangements” by and for Mathematics students, Universität Osnabrück, Germany.
- 10/2021–02/2022 **Teaching assistant** (26 hours) for the course “Zahlentheorie” (“Number Theory”) taught by M. Spitzweck, Universität Osnabrück, Germany.
- 10/2021–01/2022 **Organizer and grader** (with H. Döring) of the seminar “Elemente der Mathematik” (“Elements of Mathematics”) by and for BEU students (i.e. future teachers), Universität Osnabrück, Germany.
- 08/2021 **Lecturer** (40 hours) for the crash course “Gröbner bases in applied algebra”, Universität Osnabrück, Germany.
- 04/2021–07/2021 **Teaching assistant** (28 hours) for the course “Diskrete Mathematik” (“Discrete Mathematics”) taught by M. Juhnke-Kubitzke, Universität Osnabrück, Germany.

- 10/2020–12/2020 **Lecturer** (56 hours) for the mathematical section of the course “Matematica e Informatica”, Corso di Laurea in Biotecnologie (“Mathematics and Computer Science”, Degree in Biotechnology), Università di Genova, Italy. Out of 370 student-filled questionnaires, 98,65% contained a positive evaluation of my teaching activity.
- 06/2020 **Lecturer** (with U. Fugacci, 6 hours out of 12) for the short course “Geometria e applicazioni all’analisi dei grafi” (Geometry and Applications to Graph Analysis) at Scuola Superiore dell’Università di Genova IANUA – ISSUGE, STSI (Scienze e Tecnologie per la Società dell’Informazione) branch.

Student supervision

- 2022 **Co-supervisor** for a Bachelor’s thesis at Universität Osnabrück, Germany. Candidate: Melissa Koch, supervisor: Martina Juhnke-Kubitzke. Title: “Symmetrische Kanten-Polytope: Eine Verallgemeinerung zu Matroiden”.
- 2019–2020 **Supervisor** for a fourth year project (thesis) at the University of Warwick, UK. Candidate: River Sparkes. Title: “Conjectures on Face Vectors of Simplicial Complexes”.

Organization

- 02/2021–03/2021 **Creator and organizer** (with M. Supina and L. Venturello) of the online workshop for graduate students “Research Encounters in Algebraic and Combinatorial Topics” (REACT). <https://sites.google.com/view/react-2021>
- 06/2020 **Organizer** (with D. Maclagan) of the 2020 virtual Warwick Macaulay2 workshop. <https://sites.google.com/view/warwick-m2-workshop/home>
- 02/2018–07/2018 **Seminar organizer** for the Nonlinear Algebra group at the Max Planck Institute for Mathematics in the Sciences, Leipzig (Germany).
- 08/2017, 11/2017 **Organizer** (with E. Duarte, C. Görgen, C. Lehn, V. Limic) of the *Algebraic Statistics Days 1 and 2* at the Max Planck Institute for Mathematics in the Sciences, Leipzig (Germany). <https://www.mis.mpg.de/calendar/conferences/2017/asd2.html>
- 10/2014, 03/2016 **Creator and organizer**, with the scientific collaboration of Professor Giuseppe Rosolini, of the interactive exhibit *A hundred years of Martin Gardner* presented in Genova (Italy) during the 2014 edition of Festival della Scienza (Science Festival). The exhibit was dedicated to the American popular mathematics writer Martin Gardner (1914–2010) and proposed mathematical games and puzzles made famous by him. More than 1600 people visited the exhibit from October 25 to November 2, 2014. The exhibit was then presented again during the mathematical festival Pi Greco Rovigo held in Rovigo (Italy) from March 18 to March 20, 2016.

Languages (self-assessment)

Italian **Native speaker**
English **Fluent**
French **Good**
German **Basic**

Other professional activities

- 05/2025–06/2025 **Participant** (five weeks) in the Thematic Program in Commutative Algebra and Applications, Fields Institute, Toronto (Canada).
- 02/2019 **Invited participant** in the conference “Singularities and Homological Aspects of Commutative Algebra” at the Mathematisches Forschungsinstitut Oberwolfach (Germany).
- 05/2021 **Member of a PhD committee**, Universität Osnabrück, Germany. Candidate: Jan-Marten Brunink. Thesis: “Subdivisions of simplicial complexes”.
- 2016– **Referee** for several international mathematical journals, including *Mathematische Annalen*, *Journal of Algebra*, *Algebraic Combinatorics*, *Annals of Combinatorics*.
- 2017– **Reviewer** for *Mathematical Reviews*.
- 2015– **Member** of GNSAGA (Gruppo Nazionale per le Strutture Algebriche, Geometriche e le loro Applicazioni).