

# Davide Bolognini

## CURRICULUM VITAE

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### Professional Positions

- Sept 2021-present **Assegno di Ricerca**, Dipartimento di Ingegneria Industriale e Scienze Matematiche, Università Politecnica delle Marche (Italy), with Prof. Mario Marietti
- Research interests Algebraic Combinatorics.
- Dec 2019-Dec 2020 **Assegno di Ricerca INDAM**, Dipartimento di Matematica, Alma Mater Studiorum, Università di Bologna (Italy), with Prof. Luca Moci
- Research interests Algebraic Combinatorics.
- March 2019-Nov 2019 **Assegno di Ricerca**, Dipartimento di Matematica, Alma Mater Studiorum, Università di Bologna (Italy), with Prof. Luca Moci
- Research interests Algebraic Combinatorics.
- Oct 2018-Dec 2018 **SNF Postdoc**, Département de Mathématiques, Université de Fribourg (Switzerland), with Prof. Emanuele Delucchi
- Research interests Algebraic Combinatorics.
- Sept 2017-Sept 2018 **Swiss Government Excellence Postdoctoral Scholarship**, Département de Mathématiques, Université de Fribourg (Switzerland), with Prof. Emanuele Delucchi
- Research interests Group actions on combinatorial structures, hyperplane and toric arrangements.
- Spring 2017 **INDAM Research Grant**, Department of Mathematics, Osnabrück (Germany), with Prof. Martina Juhnke-Kubitzke and Prof. Tim Römer
- Research interests Algebraic Combinatorics.
- Summer 2016 **Contratto di collaborazione autonoma per attività di studio e ricerca**, Università degli Studi di Genova (Italy)
- Research interests Algebraic and Topological Combinatorics.
- 2015 **Visiting**, supported by Fondazione CARIGE, Department of Mathematics and Computer Science of Philipps-Universität Marburg (Germany), with Prof. Volkmar Welker
- Research interests Poset topology, characteristic-dependence of powers ideals, binomial edge ideals.

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### Education

- 2012-2014 **PhD in Mathematics** (23 February 2015), Università degli Studi di Genova (Italy), *Betti splitting of monomial ideals and simplicial complexes*, advisors Prof. Maria Evelina Rossi, Prof. Leila De Floriani, Prof. Emanuela De Negri
- Research interests Algebraic Combinatorics, properties of simplicial complexes, minimal graded free resolutions, Discrete Morse Theory.
- 2011 **Research period**, with the supervision of Prof. Anthony Vito Geramita, Università degli Studi di Genova (Italy)
- Research interests Representation theory and plethysm problems with applications to Algebraic Geometry: schemes, secant varieties, resolution of defining ideals of Grassmannians.
- 2008–2010 **Master Degree in Mathematics**, Università degli Studi di Genova (Italy), final grade 110/110 cum laude, *Intersezioni complete insiemistiche in spazi affini e proiettivi (Set-theoretic complete intersections in affine and projective spaces)*, advisor Prof. Giuseppe Valla.
- 2004–2007 **Bachelor Degree in Mathematics**, Università degli Studi di Genova (Italy), final grade 110/110, *Alcuni test di primalità, il problema della fattorizzazione nei numeri interi e crittografia (Some primality tests, the factorization problem on integers and cryptography)*, advisor Prof. Maria Evelina Rossi.

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## Publications and Preprints

1. *Linear extensions and shelling orders*, (with Paolo Sentinelli), preprint. [arXiv:2212.09620](https://arxiv.org/abs/2212.09620) .
2. *Cohen-Macaulay binomial edge of small graphs*, (with Antonio Macchia, Giancarlo Rinaldo, Francesco Strazzanti), preprint. [arXiv:2212.09181](https://arxiv.org/abs/2212.09181).
3. *Immanant varieties*, (with Paolo Sentinelli), preprint; [arXiv:2211.11634](https://arxiv.org/abs/2211.11634).
4. *Powers of monomial ideals with characteristic-dependent Betti numbers*, (with Antonio Macchia, Francesco Strazzanti, Volkmar Welker), **Research in Mathematical Sciences**, Vol. 9(2), no. 26 (2022), [arXiv:2201.00571](https://arxiv.org/abs/2201.00571).
5. *Cohen-Macaulay binomial edge ideals and accessible graphs*, (with Antonio Macchia, Francesco Strazzanti), **Journal of Algebraic Combinatorics**, Vol. 55 (2022), [arXiv:2101.03619](https://arxiv.org/abs/2101.03619).
6. *P-flag spaces and incidence stratifications*, (with Paolo Sentinelli), **Selecta Mathematica**, Vol 27, no. 72 (2021); [arXiv:1907.09047](https://arxiv.org/abs/1907.09047).
7. *Non-chordal complexes whose clique complex has shellable Alexander dual*, (with Bruno Benedetti), **Journal of Combinatorial Theory, Series A**, Vol. 180 (2021); [arXiv:1910.06755](https://arxiv.org/abs/1910.06755).
8. *Betti splitting from a topological point of view*, (with Ulderico Fugacci), **Journal of Algebra and Its Applications**, Vol. 19, n. 6 (2020); [arXiv:1704.01105](https://arxiv.org/abs/1704.01105).
9. *Binomial edge ideals of bipartite graphs*, (with Antonio Macchia, Francesco Strazzanti), **European Journal of Combinatorics**, Vol. 70, pp. 1-25 (2018); [arXiv:1704.00152](https://arxiv.org/abs/1704.00152).
10. *The poset of proper divisibility*, (with Antonio Macchia, Emanuele Ventura, Volkmar Welker), **SIAM Journal on Discrete Mathematics**, Vol. 31 (3), pp. 2093-2109 (2017); [arXiv:1511.04558](https://arxiv.org/abs/1511.04558).
11. *Recursive Betti numbers for Cohen-Macaulay  $d$ -partite clutters arising from posets*, **Journal of Pure and Applied Algebra**, Vol 220, pp. 3102-3118 (2016); [arXiv:1411.5629v2](https://arxiv.org/abs/1411.5629v2).
12. *Betti splitting via componentwise linear ideals*, **Journal of Algebra**, Vol. 455, pp. 1-13 (2016); [arXiv:1410.6511v2](https://arxiv.org/abs/1410.6511v2).
13. *Cohomological dimension and arithmetical rank of some determinantal ideals*, (with Alessio Caminata, Antonio Macchia, Maral Mostafazadehfard), **Le Matematiche**, Vol. 70, Fasc. 1, pp. 273-300 (2015); [arXiv:1503.06184](https://arxiv.org/abs/1503.06184).

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## Teaching

2009 - 2014	<b>Teaching tutor</b> for the Courses of Analysis, Algebra and Linear Algebra at Dipartimento di Matematica, Università degli Studi di Genova (Italy).
Academic Year 2017-2018	<b>Assistant</b> for the course of Algebra und Geometrie I/II in University of Fribourg, covering topics on Commutative Algebra and Topology.
Fall 2018	<b>Assistant</b> for the course of Measure Theory in University of Fribourg.
Academic Year 2021-2022	<b>Professore a Contratto</b> di Algebra Lineare e Geometria per il Corso di Ingegneria Informatica e dell'Automazione presso l'Università Politecnica delle Marche (Ancona, Italia).
Academic Year 2022-2023	<b>Professore a Contratto</b> di Algebra Lineare e Geometria per il Corso di Ingegneria Informatica e dell'Automazione presso l'Università Politecnica delle Marche (Ancona, Italia).

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## Projects, Prizes and other scientific activities

2023	<b>Abilitazione scientifica nazionale a professore universitario di II fascia</b> nel settore concorsuale 01/A2-ALGEBRA E GEOMETRIA.
2022	<b>Premio per Giovani Ricercatori 2022/Area Matematica</b> , DIISM-UNIVPM (Ancona)
2013-2016	<b>Member of PRIN 2010</b> "Geometria delle Varietà Algebriche" (Responsabile Scientifico: Aldo Conca)
May 2013-May 2015	<b>Member of the project</b> "Algebra Commutativa e applicazioni", finanziato dalla Fondazione CARIGE (Responsabile Scientifico: Emanuela De Negri)
9-13 Feb. 2015	<b>Local Organizer</b> of the HTCA School <i>Homology: Theoretical and Computational Aspects</i> , held in Genova (Italy), sponsored by University of Genova, Gruppo Italiano Ricercatori in Pattern Recognition and Fondazione Carige.

since 2016 **Referee** for Journal of Algebraic Combinatorics, Journal of Algebra and Its Applications, Journal of Combinatorial Theory (Series A), European Journal of Combinatorics, Research in Mathematical Sciences, Hokkaido Mathematical Journal.

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## Workshops, Schools, Conferences (selection)

- Dec, 2019 Speaker in the **EINSTEIN Workshop**, FU Berlin (Germany)
- Feb 19-23, 2018 Speaker in the School **Geometry, Algebra and Combinatorics of Moduli Spaces and Configurations II**, Toblach (Italy)
- Oct 22-24, 2015 Speaker in the Workshop **Incontro di Algebra Commutativa**, Genova (Italy)
- Oct 07-10, 2015 Participant in the Workshop **Combinatorial and Experimental Methods in Commutative Algebra and related fields**, Osnabrück (Germany)
- Sep 08-12, 2014 Participant in the INdAM Conference **Mocca 2014, Meeting On Combinatorial Commutative Algebra**, Levico Terme (Italy)
- Jun 23 - Jul 11, 2014 Participant in the **PRAGMATIC 2014, Local cohomology and syzygies of affine algebras**, Università di Catania (Italy)
- Sep 09-13, 2013 Participant in the INdAM Conference **Combinatorial Methods in Topology and Algebra**, Palazzone of Cortona (Italy)
- Jun 24-28, 2013 Participant in the **EACA's Second International School on Computer Algebra and Applications**, Valladolid (Spain)
- Jul 18 - Aug 01, 2012 Participant in the summer school **Discrete Morse Theory and Commutative Algebra**, *Institut Mittag-Leffler*, Djursholm, Stockholm (Sweden)

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## Given Talks (selection)

- January, 2023 Algebra/Geometry Seminar in DIMA, Unige, Genova (Italy).  
*Powers of monomial ideals with characteristic-dependent Betti numbers*
- February, 2022 Algebra/Geometry Seminar in Unimore, Reggio Emilia (Italy).  
*Towards a proof of Simon's conjecture*
- November, 2021 Algebra/Geometry Seminar in Politecnico di Milano, Milano (Italy).  
*Towards a proof of Simon's conjecture*
- September, 2020 Algebra/Geometry Seminar in Dipartimento di Matematica, Bologna (Italy).  
*Simon's conjecture and chordality*
- February 2020 Algebra/Geometry Seminar, Università degli Studi di Genova (Italy)  
*Simon's conjecture and chordality*
- December 2, 2019 EINSTEIN Workshop, FU Berlin (Germany)  
*Simon's conjecture and chordality*
- May 5, 2019 Discrete Geometry Seminar, FU Berlin (Germany)  
*Betti splitting from a topological point of view*
- March 5, 2019 Algebra/Geometry Seminar, Bologna (Italy)  
*An Introduction to Algebraic Combinatorics*
- December 19, 2018 Intercity Seminar, Bern (Switzerland)  
*Simon's conjecture and chordality*
- February 22, 2018 Geometry, Algebra and Combinatorics of Moduli Spaces and Configurations II, Toblach (Italy)  
*Binomial edge ideals of bipartite graphs*
- December 15, 2017 Intercity Seminar, Neuchatel (Switzerland)  
*Binomial edge ideals of bipartite graphs*
- April 4, 2017 Algebra Seminar, Institut Mathematik, Osnabrück (Germany)  
*Binomial edge ideals of bipartite graphs*
- June 9, 2016 Algebra Seminar, Institut Mathematik, Osnabrück (Germany)  
*Betti splitting of monomial ideals and simplicial complexes*
- April 7, 2016 Combinatorics Seminar, Department of Mathematics, University of Fribourg (Switzerland)  
*Betti splitting of monomial ideals and simplicial complexes*
- April 6, 2016 Seminar, Department of Mathematics, University of Neuchâtel (Switzerland)  
*Betti splitting of monomial ideals and simplicial complexes*
- October 23, 2015 Incontro di Algebra Commutativa, Università degli Studi di Genova (Italy)  
*The poset of proper divisibility*

- June 15, 2015 Discrete Math Seminar, Department of Mathematics, Philipps-Universität Marburg (Germany)  
*On Betti splittings and related topics*
- October 20, 2014 GTM Seminar: Topics in Comm. Algebra and Algebraic Geometry, Politecnico di Torino (Italy)  
*Betti splitting of componentwise linear ideals*
- June 23, 2013 Seminario di Algebra, Dipartimento di Matematica, Università degli Studi di Genova (Italy)  
*Computational homology: an algebraic approach*

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## Languages

**Italian:** Native.

**English:** Advanced (C1).

**German:** Beginner (A1).

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