Lorenzo Baldi

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Research Interests

Real Algebra, Real Algebraic Geometry and their Applications, in particular:

- Positive Polynomials
- Sums of Squares
- Polynomial Optimization
- Moment Problems

Current Position

2022– **Postdoctoral researcher**, *Sorbonne University*, PolSys team
Mentors: Jérémy Berthomieu and Pierre Lairez

Education

2019–2022 **Ph. D. in Mathematics**, *Inria Sophia Antipolis – Université Côte d'Azur*, ESR9 of POEMA network. Title: Effective Representations in Real Algebraic Geometry and Polynomial Optimization, Advidor: B. Mourrain
Jury members: M-F. Roy (president), M. Laurent (reviewer), M. Schweighofer (reviewer), J-B. Lasserre, A. Parusiński and M. Putinar.

2017–2019 **Master Degree in Mathematics**, *Università di Trento*, *110H/110*, Title: Real Tensors and Algebraic Geometry. Supervisor: E. Ballico.

2014–2017 **Bachelor Degree in Mathematics**, *Università di Firenze*, *110H/110*, Title: Introduzione ai gruppi di movimenti rigidi. Supervisor: C. Casolo.

Grants and Academic Distinctions

12–25.3.2023 **Grant Oberwolfach Leibniz Graduate Students**, *Workshops funding*

2019–2022 **Ph. D. Scholarship in POEMA**, *European Union's H2020 research and innovation programme*, Marie Skłodowska-Curie Actions, grant n. 813211

2017–2019 **Path of Excellence for the Master in Mathematics**, *Università di Trento*, including extra academic assignments and awarded on merit base

2014–2017 **Prize for the Bachelor in Mathematics and Computer Science**, *Università di Firenze*, awarded to the four best Bachelor's students

Engagement in the Research System

2023 **Reviewer** for **Journal of Algebra** and **SIAM Journal on Optimization**

11.2.2022 **Organizer** of the POEMA ESR Day, in POEMA Workshop 4, online

Selected Research Visits

5–9.7.2023	Technical University of Dortmund, Algebra und Geometrie group
24–27.6.2023	Max Plank Institute Leipzig, Nonlinear Algebra group
19–23.6.2023	University of Magdeburg, Discrete, Convex and Toric Geometry group
8–10.6.2022	University of Konstanz, Research Group in Real Algebraic Geometry
30.5–3.6.'22	Max Plank Institute Leipzig, Nonlinear Algebra group

Teaching Activity

2023	Lecturer (with S. Debus) for the Ph. D. course *Semidefinite programming for Algebra, Geometry and Combinatorics*, University of Magdeburg, 30h
2019	*Informatica*, tutorial exercises (teaching professor: R. Zunino), Department of Mathematics, Trento
2018	*Geometria e algebra lineare*, tutorial exercises (teaching professors: A. Bernardi and S. Siboni), Department of Civil, Environmental and Mechanical Engineering, Trento

Programming Skills

Languages	Julia, C, Singular, Magma, Maple, Macaulay2, Git, LaTeX
Packages developed	MomentTools.jl, PMO.jl, MultivariateSeries.jl

Selected Talks

10.7.2023	**The Cone of Nonnegative Forms on Genus One Curves**, *SIAM Conference on Applied Alg. Geom.*, invited minisymposium speaker, Eindhoven
6.7.2023	**The Effective Putinar's Positivstellensatz on the Hypercube**, *Oberseminar Algebra und Geometrie*, invited, TU Dortmund
22.6.2023	**Non-negative Polynomials on Real Plane Curves**, *Math Oberseminar Universitat Magdeburg*, invited, University of Magdeburg
16.6.2023	**Complexity in Polynomial Optimization**, *Foundations of Computational Mathematics*, invited workshop speaker, Paris
2.6.2023	**Local Algebro-Geometric Properties for Complexity Estimates in Pol. Opt.**, *SIAM Conf. on Opt.*, invited minisymposium speaker, Seattle
20.3.2023	**Non-negative forms on cubic curves**, *New Directions in Real Algebraic Geometry*, contributed, Oberwolfach
13.3.2023	**Degree bounds for Putinar's Positivstellensatz on the hypercube**, *Real Algebraic Geometry with a View toward Koopman Operator Methods*, contributed, Oberwolfach

25.7.2022	**On Putinar's Positivstellensatz and Convergence Rates in Polynomial Opt.**, *ICCOPT*, invited minisymposium speaker, Lehigh University
24.6.2022	**On Łojasiewicz Inequalities and the Effective Positivstellensatz**, *MEGA 2022*, contributed, Krakow
10.6.2022	**Convergence Rates and Flat Truncation in Lasserre's Hierarchies**, *seminar Reelle Geometrie und Algebra*, invited, University of Konstanz
1.6.2022	**Flat Truncation in Polynomial Opt.: a Geometric and Algebraic Perspective**, *Seminar on Nonlinear Algebra*, invited, MPI Leipzig
3.2.2022	**On Finite Convergence and Convergence Rates in Polynomial Optimization**, *Joint PolSys–SpecFun Seminar*, invited, online
16.12.2021	**On Moment Approximation and the Effective Putinar's Positivstellensatz**, *POEMA Industrial Workshop*, invited, INRIA
20.8.2021	**Exact Moment Representation in Polynomial Optimization**, *SIAM Conference on Applied Alg. Geom.*, invited minisymposium speaker, online
20.7.2021	**Computing real radicals by moment opt.**, *ISSAC*, contributed, online
10.6.2021	**Exact Moment Representation in Polynomial Optimization**, *MEGA*, contributed, online