Gabriele IOMMAZZO | Postdoctoral Researcher

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Main research interests

My current academic interests lie in continuous, convex optimization, particularly conditional gradient algorithms. On the theoretical side, my research tries to exploit the geometric properties of the problem at hand to achieve fast convergence rates. On the application side, I explored the applications of these methods in diverse contexts, such as quantum nonlocality and optimization over intersecting sets. In the past, particularly during my PhD, I worked on the integration of machine learning predictors in mathematical programs – MI(N)LP – and the subsequent optimization over them.

Background

Postdoctoral Researcher — *Zuse Institute Berlin, Germany* *May 2022–*
First-order methods for convex optimization, quantum information theory
Advisors: Sebastian Pokutta

Research Fellow — *Università di Pisa, Italy* *Jan 2021–Dec 2021*
Machine learning based approaches for the algorithm configuration problem
Advisors: Claudia D'Ambrosio, Antonio Frangioni, Leo Liberti

Joint Ph.D. in Computer Science — *École Polytechnique, France & Università di Pisa, Italy* *Oct 2017–Dec 2021*
Optimization solver configuration, learning-based mathematical programming, distance geometry
Advisors: Claudia D'Ambrosio, Antonio Frangioni, Leo Liberti

Research Intern — *CNRS LIX, École Polytechnique, France* *Mar 2017–Oct 2017*

M.Sc. in Business Informatics and Data Science — *Università di Pisa, Italy* *Oct 2013–Oct 2017*
Grade: 110/110 Summa Cum Laude

Erasmus student exchange program — *Universidad de Zaragoza, Spain* *Sep 2011–Mar 2012*

B.Sc. in Business Administration and Management — *Università di Roma Tor Vergata, Italy* *Oct 2008–Apr 2013*
Grade: 104/110

Grants and sponsorships

2023–2025: **MISTI Seed Fund** ($9k) — "Learning-symbolic programming", in partnership with MIT, USA and Università di Pisa, Italy

2022–: **MATH+ Postdoctoral Member**, Berlin Mathematics Research Center

Awards

2022: **Premio Lorenzo Brunetta 2019–2021** (€2.5k) — awarded by the "Istituto Veneto di Scienze, Lettere ed Arti" to the best Ph.D. thesis in operations research obtained in the years 2019–2020–2021 (assigned every three years)

Professional service

Program Committee Member: 15th and 16th LION conference, 32nd EURO conference

Organizer: 2023 Thematic Einstein Semester on Mathematical Optimization and Machine Learning (notably, workshop and conference)

Reviewer: conferences (LION, CPAIOR) and journals (Journal of Global Optimization, Annals of Mathematics and Artificial Intelligence, Graphs and Combinatorics, Optimization Methods and Software, EURO Journal on

Computational Optimization)

Conference attendance

QOPT Workshop 2023: ZIB, Berlin, Germany, May 3–June 02, 2023: invited speaker

Fifth Conference on Discrete Optimization and Machine Learning (DOxML): GRIPS, Tokyo, Japan, Aug 8–9, 2023: invited speaker

2022 European Conference on Operational Research (EURO): Aalto University, Espoo, Finland, Jul 3–6, 2022: invited speaker and session organizer

Machine Learning NeEDS Mathematical Optimization online seminar series: held online, organized by IMUS, Sevilla, Spain and Copenhagen Business School, Copenhagen, Denmark, May 17, 2021: invited speaker

2020 Journée "Hors les Murs" du groupe Polyèdres et Optimisation Combinatoire: LAMSADE, Université Paris Dauphine, Paris, France, Dec 15, 2020: speaker

2020 Cologne-Twente Workshop on Graphs and Combinatorial Optimization (CTW): held online, Sep 14-16, 2020: speaker

2020 International Conference on Machine Learning, Optimization, and Data Science (LOD): Università di Siena, Siena, Italy, Jul 19-23, 2020: speaker

CRM/DIMACS Mixed Integer Nonlinear Optimization Workshop: Polytechnique de Montréal, Montréal, Canada, Oct 07-10, 2019: poster presenter

2019 Mixed Integer Programming Workshop (MIP): MIT, Boston, Jul 15-18, 2019: poster presenter

2019 Cologne Twente Workshop (CTW): University of Twente, Enschede, Netherlands, Jul 1-3, 2019: speaker

1st EUROYoung Workshop, IMUS: Sevilla, Spain, May 02-03, 2019: speaker

2018 International Symposium of Mathematical Programming (ISMP): Bordeaux, France, Jun 26-28, 2018: attendee

2018 Cologne Twente Workshop (CTW): CNAM, Paris, France, Jun 18-20, 2018: speaker

2017 Data Science Summer School (DS3): École Polytechnique, Paris, France, Aug 28 to Sep 1, 2017: poster presenter

Visiting terms and seminars

- Feb 2023: **MIT Sloan School**, Cambridge, MA. Research visit, invited by Prof. Dimitris Bertsimas
- Jun 2022: **ZIB**, Germany. 1 seminar, invited by Prof. Thorsten Koch
- Oct–Nov 2019: **CRM/DIMACS, Polytechnique de Montréal**, Canada, "Mixed Integer Nonlinear Optimization" thematic month. 1 seminar, invited by Prof. Andrea Lodi
- May 2019: **DIAG, Università La Sapienza**, Italy. 1 seminar, invited by Prof. Laura Palagi

Teaching experience

Apr–Jun 2018: **Big Data with C++ (INF442)** — teaching assistant (32h), École Polytechnique, France

Supervision

MS.c./Ph.D. internships

2022, 2 months: M. Aïdli, B. Liang, E. Vercesi, A. Zhang — *GRIPS research internship program*, organized by IPAM, USA, FU Berlin and ZIB, Germany. Topic: machine learning for optimization solver configuration

Computer Science skills

Coding: AMPL, C++, Julia, Matlab, Python, SQL

Software: optimization solvers (IBM ILOG CPLEX, Baron, Bonmin), platforms (Azure, KNIME), deep learning (PyTorch)

Deployment: Git, Jupyter

Typesetting: LaTeX, Microsoft Office

Languages

Italian (mothertongue), **English** (proficient), **French** (proficient), Spanish (elementary)

Publications

Conference proceedings

[IDF+21]: G. Iommazzo and C. D'Ambrosio and A. Frangioni and L. Liberti (2021), *A Learning-based Mathematical Programming Formulation for the Automatic Configuration of Optimization solvers*. In: Nicosia, G., et al. Machine Learning, Optimization, and Data Science. LOD 2020. Lecture Notes in Computer Science, vol 12565. Springer, Cham. [DOI][ArXiv]

[LIL+20]: L. Liberti, G. Iommazzo, C. Lavor and N. Maculan (2020), *A Cycle-based Formulation for the Distance Geometry Problem*. In: Gentile, C., Stecca, G., Ventura, P. (eds) Graphs and Combinatorial Optimization: from Theory to Applications. AIRO Springer Series, vol 5. Springer, Cham. [DOI]

[IDF+20]: G. Iommazzo, C. D'Ambrosio, A. Frangioni, L. Liberti (2020), *Learning to Configure Mathematical Programming Solvers by Mathematical Programming*. In: Kotsireas, I., Pardalos, P. (eds) Learning and Intelligent Optimization. LION 2020. Lecture Notes in Computer Science, vol 12096. Springer, Cham. [DOI][ArXiv]

Book chapters

[IDF+23]: G. Iommazzo, C. D'Ambrosio, A. Frangioni, L. Liberti (2023), *The Algorithm Configuration Problem*, In: Pardalos, P.M., Prokopyev, O.A. (eds) Encyclopedia of Optimization. Springer, Cham. [DOI][ArXiv]

International journals

[DIB+23]: S. Désignolle, G. Iommazzo, M. Besançon, S. Knebel, P. Gelß, S. Pokutta (2023), *Improved local models and new Bell inequalities via Frank–Wolfe algorithms*. In Phys. Rev. Research 5, 043059, 6 p. American Physical Society [DOI][ArXiv]

[LIL+23]: L. Liberti, G. Iommazzo, C. Lavor, N. Maculan (2023), *Cycle-based Formulations in Distance Geometry*. Open Journal of Mathematical Optimization, Volume 4, article no. 1, 16 p. [DOI][ArXiv]

PhD Thesis

[Iom21]: G. Iommazzo, *Algorithmic Configuration by Learning and Optimization*.

Other

Interests: Climbing, boardgames, second-hand book shops

Classical Music: 5th-year Piano Diploma, Conservatorio di Roma S. Cecilia, Roma, Italy (2006)

Extracurricular activities: Children's activity leader (volunteering), Oratorio Salesiano Don Bosco Cinecittà, Roma, Italy (2003–2010)

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