

Michele Barbato | Ph.D.

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Personal Data

Place of Birth **Avellino (AV) – Italy**
Date of Birth **May 17, 1987**
Citizenship **Italian**
Contact Address **Viale Marinai d'Italia 61, 83025 Montoro (AV) – Italy**

Current Position

Post-doc, OptLab, Dip. di Informatica, Univ. degli Studi di Milano, Milan - Italy.

Past Positions

2018–2020 **Post-doc**, OptLab, Dip. di Informatica, Univ. degli Studi di Milano, Milan - Italy.
2017–2018 **Post-doc**, DEIO - FCUL - Universidade de Lisboa, Lisbon - Portugal.
2016–2017 **Attaché Temporaire d'Enseignement et Recherche**, ENSIIE, Évry - France.
Post-doc, LIPN - Université Paris 13, Villetaneuse - France.
2015–2016 **Attaché Temporaire d'Enseignement et Recherche**, LIPN - Université Paris 13, Villetaneuse - France.
2012–2015 **Ph.D. student with teaching activity**, LIPN - Université Paris 13, Villetaneuse - France.

Education

October 2016 **Ph.D. in Computer Science**, with grade “*Très honorable*”, Université Paris 13, Villetaneuse - France.
February 2012 **Master degree in Mathematics**, with grade *110/110*, Università degli Studi di Padova, Padova - Italy.
February 2010 **Bachelor degree in Mathematics**, with grade *106/110*, Università degli Studi di Padova, Padova - Italy.

Ph.D. Thesis

Title ***A Polyhedral Approach for the Double TSP with Multiple Stacks and Lexicographical Orders***
Supervisors R. Grappe., M. Lacroix, R. Wolfler Calvo
Committee L. Gouveia, R. Grappe, M. Iori (reviewer), M. Lacroix, A. Ridha Mahjoub (president), F. Meunier (reviewer), F. Roupin, R. Wolfler Calvo.

Research Interests

Design and Experimental Analysis of Optimization Algorithms • Combinatorial Optimization • Graph Theory • Linear Programming • Polyhedral Theory

Current Research Activity

Simultaneous feature and outlier detection via MIPs: design of MIP-based resolution methods for the sparse linear regression problem in presence of outliers. *Diffusion control with interdiction*: design of ILP/QP models and of heuristic/exact resolution algorithms for the optimal control of diffusive phenomena on networks via network interdiction actions. *Warehouse management*: complexity analysis, design of ILP models and of heuristics for the optimization of automated warehouses. *Routing problems*: design of ILP models, strengthening inequalities and related resolution methods for problems involving synchronization of routes. *Polyhedral Theory*: (box-)total dual integrality of systems of inequalities associated with combinatorial structures in specific graph classes (e.g., multicuts in series-parallel graphs, digraph kernels, stable matchings in bipartite graphs).

Publications and Accepted Articles

- Journal **Box-Total Dual Integrality and Edge-Connectivity**, with R. Grappe, M. Lacroix, E. Lancini. In press for *Mathematical Programming* (available on-line since January 30th 2022).
DOI: <https://doi.org/10.1007/s10107-021-01743-x>
- Journal **Monopolar Graphs: Complexity of Computing Classical Graph Parameters**, with D. Bezzi. In: *Discrete Applied Mathematics*, 291, pp. 277–285 (2021).
DOI: <https://doi.org/10.1016/j.dam.2020.12.023>
- Journal **The Schrijver System of the Flow Cone in Series-Parallel Graphs**, with E. Lancini, R. Grappe, M. Lacroix, R. Wolfler Calvo. In: *Discrete Applied Mathematics*, 308, pp. 162–167 (2022).
DOI: <https://doi.org/10.1016/j.dam.2020.03.054>
- Journal **Lexicographical polytopes**, with R. Grappe, M. Lacroix, C. Pira. In: *Discrete Applied Mathematics*, 240, pp. 3–7 (2018).
DOI: <https://doi.org/10.1016/j.dam.2017.04.022>
- Journal **Polyhedral Results and a Branch-and-Cut Algorithm for the Double Traveling Salesman Problem with Multiple Stacks**, with R. Grappe, M. Lacroix, R. Wolfler Calvo. In: *Discrete Optimization*, 21, pp. 25–41 (2016).
DOI: <https://doi.org/10.1016/j.disopt.2016.04.005>
- Proceeding **Synchronized Pickup and Delivery Problems with Connecting FIFO Stack**, with A. Ceselli, N. Facchinetti. In: *Graphs and Combinatorial Optimization: from Theory to Applications*. AIRO Springer Series, Vol. 5, pp. 237–249 (2021).
DOI: https://doi.org/10.1007/978-3-030-63072-0_19
- Proceeding **On k -Edge-Connected Polyhedra: Box-TDIness in Series-Parallel Graphs**, with E. Lancini, R. Grappe, M. Lacroix. In: *Proceedings of 6th International Symposium on Combinatorial Optimization (ISCO)*. Lecture Notes in Computer Science, Vol. 12176, pp. 27–41 (2020).
DOI: https://doi.org/10.1007/978-3-030-53262-8_3

- Proceeding **Evaluating Automated Storage and Retrieval System Policies with Simulation and Optimization**, with A. Ceselli, M. Premoli. In: Advances in Optimization and Decision Science for Society, Services and Enterprises. AIRO Springer Series, Vol. 3 pp 127–137 (2019).
DOI: https://doi.org/10.1007/978-3-030-34960-8_12
- Proceeding **Paths and Matchings in an Automated Warehouse**, with A. Ceselli, A. Righini. In: Advances in Optimization and Decision Science for Society, Services and Enterprises. AIRO Springer Series, Vol. 3 pp 151–159 (2019).
DOI: https://doi.org/10.1007/978-3-030-34960-8_14
- Proceeding **A Computational Evaluation of Online ATSP Algorithms**, with A. Ceselli, F. Mosconi. In: Advances in Optimization and Decision Science for Society, Services and Enterprises. AIRO Springer Series, Vol. 3 pp 471–481 (2019).
DOI: https://doi.org/10.1007/978-3-030-34960-8_41
- Proceeding **A Set Covering Approach for the Double Traveling Salesman Problem with Multiple Stacks**, with R. Grappe, M. Lacroix, R. Wolfler Calvo. In: Proceedings of 4th International Symposium on Combinatorial Optimization (ISCO). Lecture Notes in Computer Science, Vol. 9849 pp. 260–272 (2016).
DOI: https://doi.org/10.1007/978-3-319-45587-7_23

Other Manuscripts

- Under Review **On the impact of resource relocation in facing health emergencies**, with A. Ceselli, M. Premoli. Submitted to European Journal of Operational Research.
- Submitted **Improved Simultaneous Feature Selection and Outlier Detection under ℓ_1 Norm**, with A. Ceselli. Submitted to European Journal of Operational Research.
- Submitted **A polynomial-time dynamic programming algorithm for an optimal picking problem in automated warehouses**, with A. Ceselli, G Righini. Submitted to Journal Scheduling.
- In preparation **Enhancing AS/RS Policies: a Methodology Combining Descriptive and Prescriptive Models**, with A. Ceselli, M. Premoli.
- In preparation **The Hamiltonian p -Median Problem: Polyhedral Results and Branch-and-Cut Algorithm**, with L. Gouveia.
- Seminar Note **Cheapest Routes with Integer Linear Programming**, Univ. degli Studi di Padova.

Computer Skills

Optimization Software	CPLEX, Gurobi, JuMP	Programming Languages	C, C++, Python, Julia
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Languages

English	Fluent	French	Proficiency
Italian	Native speaker	Portuguese	Basic

Invited Talks

- November 25, 2016 **Polyhedral Results and a Branch-and-Cut Algorithm for the Double Traveling Salesman Problem with Multiple Stacks**, *Universidade de Lisboa*, Lisbon - Portugal.
- October 10, 2014 **Lexicographical Polytopes**, *LIX-École Polytechnique*, Palaiseau - France.

Talks in Conferences and Workshops

- June 24 2022 **The Hamiltonian p -Median Problem: Polyhedral Results and Branch-and-Cut Algorithm**, *3rd Workshop on Combinatorial Optimization*, online.
- June 14 2022 **Multi-Purpose Machine Scheduling: An Application to Smart Cosmetic Manufacturing**, *15th Workshop on Models and Algorithms for Planning and Scheduling (MAPSP 2022)*, Oropa - Italy.
- May 18 2022 **The Hamiltonian p -Median Problem: Polyhedral Results and Branch-and-Cut Algorithm**, *7th International Symposium on Combinatorial Optimization*, online.
- November 19 2020 **Combining epidemiologic and clustering models to limit the spreading of pandemic diseases**, *ODS 2019 – Meeting of AIRO*, online.
- September 14 2020 **Synchronized Pickup and Delivery Problems with Connecting FIFO Stack**, *18th Cologne-Twente Workshop on Graphs and Combinatorial Optimization*, online.
- September 7, 2019 **A Computational Evaluation of Online ATSP Algorithms**, *ODS 2019 – 49th AIRO Meeting*, Genova - Italy.
- March 28, 2019 **Monopolar Graphs: Complexity of Computing Classical Graph Parameters**, *3rd AIRO Young Workshop*, Rome - Italy.
- September 7, 2017 **New inequalities and formulations for the double TSP with multiple stacks**, *Optimization 2017*, Lisbon - Portugal.
- July 11, 2017 **A new model and strengthening inequalities for the double TSP with multiple stacks**, *VeRoLog 2017*, Amsterdam - Netherlands.
- February 22, 2017 **Polyhedral Results on the Double TSP with Multiple Stacks**, *ROADEF 2017*, Metz - France.
- October 14, 2016 **Polyhedral Results and a Branch-and-Cut Algorithm for the Double TSP with Multiple Stacks**, *Workshop “Problèmes d’ordonnancement et de routing intégrés”*, Tours - France.
- May 17, 2016 **A Set Cover Approach for the Double Traveling Salesman Problem with Multiple Stacks**, *4th International Symposium on Combinatorial Optimization*, Vietri sul Mare - Italy.
- July 30, 2014 **Bounded revlex polytopes**, *Recent Advances in Linear Optimization*, Paris - France.
- February 27, 2014 **An exact method for solving the Double Traveling Salesman Problem with two stacks**, *ROADEF 2014*, Bordeaux - France.

Other Attended Conferences and Schools

- 2022 **ISCO Spring School on Quantum Algorithms for Optimization**, on-line.
- 2021 **5th AIRO Young Workshop**, on-line.
- 2020 **4th AIRO Young Workshop**, Bolzano - Italy.
- 2018 **7th Winter School on Network Optimization**, Lisbon - Portugal.

- 2017 **International Network Optimization Conference (INOC) 2017**, Lisbon - Portugal.
- 2016 **Workshop on Polyhedral Approaches for Combinatorial Optimization**, Paris - France.
ISCO Spring School on Extended Formulations, Vietri sul Mare - Italy.
- 2015 **4th Winter School on Network Optimization**, Lisbon - Portugal.
- 2014 **GERAD Spring School on Column Generation**, Paris - France.
- 2013 **JPOC8 School on Sub-Modular Functions**, Clermont-Ferrand - France.
Order and Geometry: School on Posets and Discrete Geometry, Berlin - Germany.
ECCO XXVI, Paris - France.

Relevant Teaching Activities

- 2018-2020 *Undergraduate student advisor:* **Andrea G. Staibano** – Computer Science undergraduate thesis: “Algorithms for the real-time optimization of an automated warehouse” (in Italian) • **Nicolas Facchinetti** – Computer Science undergraduate thesis: “Heuristic Algorithms for a Pickup and Delivery Problem with Single Intermediate Stack” (in Italian) • **Antonio Belotti** – Computer Science undergraduate thesis: “Algorithms for Scheduling Problems with Multi-Purpose Machines” (in Italian) • **Filippo Mosconi** – Computer Science undergraduate thesis: “Experimental Analysis of Algorithms for the On-Line ATSP” (in Italian)
Lectures and exercise sessions: **Laboratory of Mathematics, data processing, interpretation and elaboration (20 hours)**, Consorzio per la Formazione Professionale e per l'Educazione Permanente, Casalpusterlengo (LO), Italy
- 2016-2017 *Exercise sessions:* **Graph Theory (42 hours)** • **Operations Research (42 hours)** • **Mathematical Optimization (28 hours)**, ENSIIE, France
- 2015-2016 *Exercise sessions and computer laboratory:* **Calculus (27 hours)** • **Linear Algebra (9 hours)** • **Imperative Programming (36 hours)**, Université Paris 13, France
Computer laboratory: **Combinatorial Optimization (9 hours)** • **Graph Algorithms (19.5 hours)** • **Data Structures (12 hours)** • **Shell Programming (24 hours)**, Université Paris 13, France
Lectures and computer laboratory: **UNIX (28.5 hours)**, Université Paris 13, France
- 2012-2015 *Computer laboratory:* **Graphical Interfaces (69 hours)** • **UNIX (30 hours)**, Université Paris 13, France
Exercise sessions and computer laboratory: **Imperative Programming (49.5 hours)**, Université Paris 13, France

Other Activities

- 2021-2024 Member of the board of the AIRO Young Researchers Chapter. Web curator of [AIRO Young website](#)