

# 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.

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## Research Interests

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

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## Current Research Activity

*Structured quadratic problems*: design of exact resolution methods for solving binary problems under structured quadratic constraints. *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., multicut in series-parallel graphs, digraph kernels, stable matchings in bipartite graphs).

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## Publications and Accepted Articles

- 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 press for *Discrete Applied Mathematics* (available on-line since April 17th 2020)  
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](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](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](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](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](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](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.
- Under Review **Box-Total Dual Integrality and Edge-Connectivity**, with R. Grappe, M. Lacroix, E. Lancini. Submitted to Mathematical Programming.
- Under Review **Enhancing AS/RS Policies: a Methodology Combining Descriptive and Prescriptive Models**, with A. Ceselli, M. Premoli. Submitted to Flexible Services and Manufacturing Journal.
- Seminar Note **Cheapest Routes with Integer Linear Programming**, Univ. degli Studi di Padova.

### Computer Skills

Optimization Software **CPLEX, JuMP, Pyomo**

Programming Languages **C, C++, Python, Julia**

### 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

- 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.

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### Other Attended Conferences and Schools

- 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.

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### 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

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## Miscellanea

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