

CONTACT INFORMATION

Department of Industrial and Systems Engineering,
P.C. Rossin College of Engineering & Applied Science
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RESEARCH INTERESTS

Discrete optimization with contributions spanning theory, methodology, and computation toward more effective solution approaches for complex **mixed-integer linear problems** and the development of open-source tools for the community.

Combinatorial optimization, particularly the design of strong relaxations for graph problems, such as, the **maximum clique/independent set** and **graph coloring**.

ACADEMIC EXPERIENCE

Lehigh University, Dept. of Industrial and Systems Engineering, Bethlehem, PA, USA
Postdoctoral Researcher under [Ted Ralphs](#) *February 2023 – Present*

EDUCATION

Università di Roma Sapienza Dept. of Computer, Control, and Management Engineering, Rome, Italy
Ph.D in [Operations Research](#) *November 2019 – January 2023*
Thesis: [On Semidefinite Lift-and-Project of Combinatorial Optimization Problems](#)
Advisors: Marianna De Santis, Fabrizio Rossi, Stefano Smriglio

Alpen-Adria-Universität Institut für Mathematik, Klagenfurt, Austria
Visiting Ph.D student under [Angelika Wiegele](#) *February 2022 – July 2022*

Università degli Studi dell'Aquila Dept. of Inf. Eng., Computer Science and Mathematics, L'Aquila, Italy
Master's degree in [Computer Science](#), *Magna Cum Laude* *July 2019*
Bachelor's degree in [Computer Science](#), *Magna Cum Laude* *October 2017*

REFEREED PUBLICATIONS

- [1] F. **Battista** and M. De Santis. *Dealing with Inequality Constraints in Large-Scale Semidefinite Relaxations for Graph Coloring and Maximum Clique Problems*. In: *4OR. A Quarterly Journal of Operations Research* (2024), pp. 1–31. DOI: [10.1007/s10288-024-00569-5](https://doi.org/10.1007/s10288-024-00569-5).
- [2] F. **Battista**. *On Semidefinite Lift-and-Project of Combinatorial Optimization Problems*. PhD thesis. Università di Roma Sapienza, 2023. HDL: [11573/1668673](https://hdl.handle.net/11573/1668673). URL: <https://hdl.handle.net/11573/1668673>.

WORKING PAPERS

- [3] F. **Battista** and T. K. Ralphs. *Improving Directions in Mixed Integer Bilevel Linear Optimization*. arXiv preprint. COR@L Laboratory, Lehigh University, 2025. URL: <https://doi.org/10.48550/arXiv.2511.03566>.
- [4] F. **Battista**, F. Rossi, and S. Smriglio. *Application of the Lovász-Schrijver Operator to Compact Stable Set Integer Programs*. arXiv preprint. Università di Roma Sapienza, 2025. URL: <https://doi.org/10.48550/arXiv.2407.19290>. Accepted to *Mathematical Programming Computation* (2025+).
- [5] S. Fallah, F. **Battista**, and T. K. Ralphs. *A Branch-and-Bound Algorithm for Multiobjective Mixed Integer Linear Optimization*. Working paper. COR@L Laboratory, Lehigh University, 2025. Submitted.

SOFTWARE

- [6] F. **Battista**, F. Rossi, and S. Smriglio. *SDP_lift_and_project* (2025). URL: https://github.com/febattista/SDP_lift_and_project. Maintainer.
- [7] S. DeNegre, T. Ralphs, and S. Tahernejad. *MiB_S Version 1.2* (2024). URL: https://github.com/coin-or/MiB_S. Contributor.
- [8] T. Ralphs, M. Güzelsoy, and A. Mahajan. *SYMPHONY Version 5.7* (2023). URL: <https://github.com/coin-or/SYMPHONY/>. Contributor.

STUDENTS	Doctoral Students Mentorship	
	• Shannon Kelley, Lehigh University, ISE, Advisor: Ted Ralphs	2023 – Present
	• Samira Fallah, Lehigh University, ISE, Advisor: Ted Ralphs	2023 – Present
	• Hesam Shaelaie, Lehigh University, ISE, Advisor: Ted Ralphs	2023 – Present
	• Suresh Bolusani, Lehigh University, ISE, Advisor: Ted Ralphs	2023 – Present
TEACHING EXPERIENCE	Teaching Assistant	
	• ISE 418 Integer Programming, Ph.D. course, Lehigh University	2024
	• Operations Research Laboratory, B.Sc. course, Università Roma Sapienza	2020
	• Advanced Calculus, B.Sc. course, Università Roma Sapienza	2020
TALKS		
	[1] F. Battista , T. K. Ralphs, and S. Fallah. <i>The Restricted Value Function of MILPs and Its Construction with SYMPHONY</i> . In: <i>18th INFORMS Computing Society (ICS) Conference</i> (2025).	
	[2] F. Battista and T. K. Ralphs. <i>A Branch-and-Cut Algorithm for Mixed-Integer Bilevel Linear Optimization Based on Improving Directions</i> . In: <i>International Symposium on Mathematical Programming</i> (2024).	
	[3] F. Battista and T. K. Ralphs. <i>Exploiting Dual Functions in Mixed Integer Bilevel Linear Programs</i> . In: <i>INFORMS Annual Meeting</i> (2023).	
	[4] F. Battista , F. Rossi, and S. Smriglio. <i>Application of the Lovász-Schrijver Operator to Representative Formulation for Graph Coloring Problem</i> . In: <i>International Symposium on Combinatorial Optimization</i> (2022).	
	[5] F. Battista et al. <i>On Semidefinite Lift-and-Project Relaxations for Combinatorial Optimization Problems</i> . In: <i>University of Pavia</i> (2022).	
	[6] F. Battista and M. De Santis. <i>Dealing with Inequalities in Large Scale Semidefinite Programs</i> . In: <i>International Conference on Optimization and Decision Science</i> (2021).	
SERVICE	Editorial Board (Associate Editor)	
	• Operations Research (Area: Data, Software, and Computation)	2025 – Present