Manuel Francesco Aprile

Contact information

Date and place of birth: 23 September 1991, Mascalucia (Italy)
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Research interests

Combinatorial optimization, extended formulations of polytopes, graphs and matroids

Employment

Since December 2022: Assistant Professor (RTD-B)
University of Padua, Italy

2020-2022: Post-doctoral researcher
University of Padua, Italy

2019-2020: Post-doctoral researcher
Mathematics Department, ULB, Belgium

2014-2018: PhD Student ("assistant doctorant")
EPFL, Lausanne, Switzerland

Education

2018: Ph.D. in Discrete Optimization
EPFL, Switzerland
Advisor: Prof. Friedrich Eisenbrand
Co-advisor: Prof. Yuri Faenza

2014: M. Sc. in Mathematics and Foundation of Computer Science
University of Oxford, United Kingdom
Advisor: Prof. Colin McDiarmid

2013: B. Sc. in Mathematics, *summa cum laude*
University of Catania, Italy
Advisor: Prof. Giuseppe Nicosia
Co-advisor: Prof. Vittorio Romano

Awards and scholarship

2020: Winner of Lorenzo Brunetta award from Venetian Institute of Sciences, Humanities and Arts for a PhD thesis in Operation Research

2010-13: Winner of the INdAM (National Institute of High Mathematics) scholarship to entirely support my Bachelors studies

	Math Olympics:	
	2010:	Bronze Medal at National Contest, Cesenatico, Italy.
	2005-09:	Selected for the Regional Contest, Sicily, Italy.
	2004:	Selected for the National Contest, Bocconi University, Milan, Italy.
	Physics Olympics:	
	2007-09:	Selected for the Regional Contest, Sicily, Italy.

Qualifications

2020: Qualification Conseil National des Universités, C.N.U. (France).
Maître de conférences, sections 25 (Mathematics), 26 (Applied Mathematics), 27 (Computer Science)

Teaching

	Lecturer at University of Padua:
2021, 2022:	"Discrete Mathematics" (Bachelor course)
	Teaching assistant at ULB:
Autumn 2019:	"Géométrie convexe et discrète" (Master's level course, in French)
	Teaching assistant at EPFL:
Spring 2015-2018:	Discrete Optimization
Fall 2017:	Combinatorial Geometry (Master's level course)
Fall 2016:	Combinatorial optimization (Master's level course)
Fall 2015:	Algèbre linéaire (in French)
	Activities on teaching:
June 2017:	SOTL workshop, Zurich (invited speaker)
Fall 2016:	Science and Engineering Teaching and Learning (semester course)
May 2015:	Instructional Skills Workshop (3 days)
October 2014:	Teaching toolkit for Doctoral Assistants (1 day)

Student supervision

University of Padua:	Co-supervisor of several Bachelor theses.
EPFL:	supervisor of student research projects:
Cslovjecsek Jana:	Master project *"Extension complexity of polytopes"* EPFL, Fall 2018
Gilbert Maystre:	Master project *"Non-repetitive coloring of line graphs"* EPFL, Spring 2017
Loris Di Natale:	Bachelor project *"On the mininum rainbow subgraph problem"* EPFL, Fall 2016 (jointly with A. Cevallos)
Maurice Amendt:	Bachelor project *"Non-repetitive graph coloring"* EPFL, Fall 2015

Professional service

Reviewer for journals and internetional conferences, such as: Discrete & Computational Geometry, European Journal of Combinatorics, Discrete Mathematics & Theoretical Computer Science, Discrete Applied Mathematics, IPCO (Integer Programming and Combinatorial Optimization), Operations Research Letters.

Publications

Under revision:

- M. Aprile, G. Averkov, M. Di Summa, C. Hojny, *The role of rationality in integer-programming relaxations*
- M. Aprile, M. Conforti, M. Di Summa *Binary extended formulations and sequential convexification*
- M. Aprile, M. Drescher, S. Fiorini, T. Huynh *A simple 7/3-approximation algorithm for feedback vertex set in tournaments*

In conferences with published, peer-reviewed proceedings:

- M. Aprile, M. Drescher, S. Fiorini, T. Huynh *A Tight Approximation Algorithm for the Cluster Vertex Deletion Problem.* IPCO 2021.
- M. Aprile, M. Conforti, Y. Faenza, S. Fiorini, T. Huynh, M. Macchia *Recognizing Cartesian products of matrices and polytopes* Cologne-Twente Workshop on Graphs and Combinatorial Optimization (CTW). AIRO- Springer, 2020.
- M. Aprile, Y. Faenza *Extended formulations from communication protocols in output-efficient time* IPCO 2019.
- M. Aprile, Y. Faenza, S. Fiorini, T. Huynh, M. Macchia *Extension complexity of stable set polytopes of bipartite graphs* International Workshop on Graph-Theoretic Concepts in Computer Science, 2017.
- M. Aprile, N. Castro, F. Robledo, P. Romero *Analysis of Node-Resilience Strategies under Natural Disasters.* International Conference on Design of Reliable Communication Networks, 2017.
- M. Aprile, A. Cevallos, Y. Faenza *On Vertices and Facets of Combinatorial 2-Level Polytopes.* ISCO 2016.

In journals:

- M. Aprile, M. Conforti, Y. Faenza, S. Fiorini, T. Huynh, M. Macchia *Slack matrices, k-products, and k-level polytopes* Discrete Applied Mathematics, 2022
- M. Aprile, S. Fiorini *Regular matroids have polynomial extension complexity* Mathematics of Operations Research, 2022.
- M. Aprile *Extended formulations for matroid polytopes through randomized protocols.* Operations Research Letters, 2022.
- M. Aprile, M. Drescher, S. Fiorini, T. Huynh *A Tight Approximation Algorithm for the Cluster Vertex Deletion Problem.* (Extended version of the IPCO paper) Mathematical Programming B, 2022.

- M. Aprile, S. Fiorini, T. Huynh, G. Joret, D. R. Wood *Smaller extended formulations for spanning tree polytopes in minor-closed classes and beyond* Electronic Journal of Combinatorics, 2021.
- M. Aprile, Y. Faenza *Extended formulations from communication protocols in output-efficient time* Mathematical Programming B, vol 183, 2020.
- M. Aprile, A. Cevallos, Y. Faenza *On 2-level polytopes arising in combinatorial settings* SIAM Journal on Discrete Mathematics, 2018.
- M. Aprile, N. Castro, G. Ferreira, J. Piccini, F. Robledo, P. Romero *Graph fragmentation problem: analysis and synthesis* International Transactions in Operational Research, 2018.

Theses:

- M. Aprile *On some problems related to 2-level polytopes*, Ph.D. thesis, EPFL, 2018.
- M. Aprile *Constructive Aspects of Lovász Local Lemma and Applications to Graph Colouring*, MSc thesis, University of Oxford, 2014.
- M. Aprile *An algorithm for constructing magic squares*, Bachelor thesis, Univesity of Catania, 2013.

Presentations

Separating Integer Points in Polyhedra, 2022, Eindhoven, Netherlands (invited speaker)
MIP 2022 Mixed Integer Programming Workshop, Rutgers University, USA (invited speaker)
Cologne-Twente Workshop on Graphs and Combinatorial Optimization 2020.
Workshop on Extended Formulations and Symmetries 2019, Rancagua, Chile (invited speaker)
IPCO 2019, Ann Arbor, USA
Cargese Workshop on Combinatorial Optimization (2017-2019, 2022), France (on invitation)
Aussois Combinatorial Optimization Workshop (2018-2020), France (on invitation)
DRCN 2017, Munich, Germany
ISCO 2016, Vietri sul Mare, Italy

Languages

Italian (native), English (proficient), French (proficient).