

## Curriculum summary

### Employment History

Assistant Professor, Gran Sasso Science Institute, Italy	2019 – present
Marie Skłodowska–Curie fellow, University of Strathclyde, UK	2017 – 2019
Postdoc, University of Padua, Italy	2016 – 2017
Research assistant, Saarland University, Germany	2014 – 2016

### Education

PhD in Mathematics, University of Rome TorVergata, Italy	Dec 2015
M.S. in Applied Mathematics, University of Rome TorVergata, Italy	Dec 2010
B.S. in Mathematics, University of Rome TorVergata, Italy	Dec 2008

### Publications

No. of papers accepted or published in peer-reviewed international journals	32
No. of papers published in peer-reviewed international conference proceedings	6
No. of papers currently in review	3
No. of software packages	9

### Awards and grants

- 2019 INdAM-GNCS junior research project
- 2018 Shortlisted for UKRI Future Leaders Fellowship
- 2016 Marie Skłodowska–Curie Individual Fellowship
- 2010 Sebastiano e Rita Raeli degree prize

### Talks and organized events

No. of invited conference talks	15
No. of contributed conference talks	≈ 10
No. of invited seminar talks	16
No. of invited research visits	11
No. of organized workshops, minisymposia and minitutorials	13

### Service

2021 Associate Editor for <i>SIAM Review</i> (Survey & Review section)	
2021 Evaluator for the Horizon2020 MSCA Individual Fellowship program	
2020 Program Committee SIAM Network Science Conference	
2020 Steering Committee, Doctoral school in Mathematics, GSSI	
2019 Scientific Advisor of AI start-up company “QuantPi”	
2019 Assistant Editor for <i>ETNA: Electronic Transactions in Numerical Analysis</i>	
2017 Assistant Editor for <i>Open Mathematics</i>	
No. of student projects (co-)supervised	12
Referee activity for international journals/conferences	≈ 13 per year
Scientific memberships	SIAM, SIAG/LA, SIAG/DM, INdAM-GNCS

### Teaching activities (number of courses taught as)

Instructor	5
Instructor (invited)	3
Teaching assistant	9

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# Curriculum details

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## Employment History

- Assistant Professor RTDb (Sept 2019 – present)  
School of Mathematics, GSSI Gran Sasso Science Institute, Italy
- Marie Skłodowska–Curie fellow (July 2017 – July 2019)  
Department of Mathematics and Statistics, University of Strathclyde, UK.
- Postdoc (Oct 2016 – June 2017)  
Department of Mathematics, University of Padua, Italy.
- Research assistant (Oct 2014 – Oct 2016)  
Department of Computer Science, Saarland University, Germany

## Education

- **Doctor of Philosophy (PhD) in Mathematics** (December 2015)  
Dept. of Mathematics, University of Rome “Tor Vergata”  
Thesis title: *Advances in Perron-Frobenius theory and algebraic network analysis*  
Advisors: Carmine Di Fiore and Dario Fasino  
Merit: The University of Rome TorVergata did not award merit grades for postgraduate degrees.
- **B.S. – M. S. in Applied Mathematics** (December 2010)  
Dept. of Mathematics, University of Rome “Tor Vergata”  
Merit: 110/110 cum laude (highest grade awarded by the Italian University system)

## Publications

<b>Papers published in peer-reviewed international journals</b>	
Communications Physics .....	[J1]
ESAIM Mathematical Modeling and Numerical Analysis .....	[J4]
Proceedings Royal Society A .....	[J6]
Applied Network Science .....	[J10]
Networks .....	[J3]
Nonlinearity .....	[J11]
SIAM J. Matrix Analysis and Applications .....	[J12] [J13] [J15] [J30]
SIAM J. Applied Mathematics .....	[J7] [J16] [J18]
SIAM J. Mathematics of Data Science .....	[J5] [J14]
IEEE Trans. Pattern Analysis and Machine Intelligence .....	[J23]
Journal of Scientific Computing .....	[J2]
EMS J. Spectral Theory .....	[J20]
Numerical Linear Algebra with Applications .....	[J9]
Linear Algebra and its Applications .....	[J19] [J25] [J26] [J28] [J29] [J31] [J32]
Electr. Transactions on Numerical Analysis .....	[J8]
Special Matrices .....	[J17] [J27]
Czechoslovak Math. J. ....	[J24]
ILAS Electronic J. Linear Algebra .....	[J22]
J. Mathematical Inequalities .....	[J21]
<b>Papers published in peer-reviewed international conference proceedings</b>	
NeurIPS: Proc. Advances in Neural Information Processing Systems .....	[C2] [C6]
ICML: Proc. International Conference Machine Learning .....	[C3]
AISTATS: Proc. Artificial Intelligence and Statistics .....	[C5]
SDM: Proc. SIAM International Conference on Data Mining .....	[C4]
WWW: Proc. of the Web Conference .....	[C1]
<b>Papers currently in review</b> .....	[R1] [R2] [R3]
<b>Software Packages</b> .....	[S1–S9]

## Papers published in peer-reviewed journals

- [J1] F. Tudisco and D. J. Higham, *Node and edge nonlinear eigenvector centrality for hypergraphs*, Communications Physics 4:201, 2021  
<https://doi.org/10.1038/s42005-021-00704-2>
- [J2] A. Gautier, M. Hein and F. Tudisco, *The Global Convergence of the Nonlinear Power Method for Mixed-Subordinate Matrix Norms*, Journal of Scientific Computing, 88:21, 2021  
<https://doi.org/10.1007/s10915-021-01524-w>
- [J3] D. Fasino, A. Tonetto and F. Tudisco, *Generating large scale-free networks with the Chung–Lu random graph model*, Networks, 2020  
<https://doi.org/10.1002/net.22012>
- [J4] S. Cipolla, F. Durastante and F. Tudisco, *Nonlocal PageRank*, ESAIM Mathematical Modeling and Numerical Analysis 55:77 – 97, 2021  
<https://doi.org/10.1051/m2an/2020071>
- [J5] D. Fasino and F. Tudisco, *Ergodicity coefficients for higher-order stochastic processes*, SIAM J. Mathematics of Data Science 2:740–769, 2020  
<https://doi.org/10.1137/19M1285214>
- [J6] F. Arrigo, D. Higham and F. Tudisco, *A framework for second order eigenvector centralities and clustering coefficients*, Proceedings of the Royal Society A, 476 : 20190724, 2020  
<https://doi.org/10.1098/rspa.2019.0724>
- [J7] A. Cristofari, F. Rinaldi and F. Tudisco, *Total variation based community detection using a nonlinear optimization approach*, SIAM J. Applied Mathematics 80:1392–1419, 2020  
<https://arxiv.org/abs/1907.08048>
- [J8] S. Cipolla, M. Redivo-Zaglia and F. Tudisco, *Shifted and extrapolated power methods for tensor  $\ell^p$ -eigenpairs*, ETNA: Electronic Transactions on Numerical Analysis, 53:1–27, 2020  
[http://doi.org/10.1553/etna\\_vol53s1](http://doi.org/10.1553/etna_vol53s1)
- [J9] S. Cipolla, M. Redivo-Zaglia and F. Tudisco, *Extrapolation methods for fixed-point multilinear PageRank computations*, Numerical Linear Algebra Appl., 27:e2280, 2020  
<https://doi.org/10.1002/nla.2280>
- [J10] F. Tudisco and D. Higham, *A fast and robust kernel optimization method for core-periphery detection in directed and weighted graphs*, Applied Network Science, Special Issue “Machine Learning with Graphs”, 4:1–13, 2019  
<https://appliednetsci.springeropen.com/articles/10.1007/s41109-019-0173-9>
- [J11] A. Gautier and F. Tudisco, *The contractivity of multilinear cone-preserving mappings*, Nonlinearity 32:4713, 2019  
<https://doi.org/10.1088/1361-6544/ab3352>
- [J12] A. Gautier, F. Tudisco and M. Hein. *A unifying Perron-Frobenius theorem for nonnegative tensors via multi-homogeneous maps*, SIAM J. Matrix Analysis Appl., 40:1206–1231, 2019  
<https://doi.org/10.1137/18M1165049>
- [J13] A. Gautier, F. Tudisco and M. Hein. *The Perron-Frobenius theorem for multihomogeneous maps*, SIAM J. Matrix Analysis Appl., 40:1179–1205, 2019  
<https://doi.org/10.1137/18M1165037>
- [J14] F. Tudisco and D. J. Higham. *A nonlinear spectral method for core-periphery detection in networks*, SIAM J. Mathematics of Data Science, 1:269–292, 2019  
<https://doi.org/10.1137/18M1183558>
- [J15] S. Pozza and F. Tudisco, *On the stability of network indices defined by means of matrix functions*, SIAM J. Matrix Analysis Appl., 39:1521–1546, 2018  
<https://doi.org/10.1137/17M1133920>
- [J16] F. Tudisco, P. Mercado and M. Hein. *Community detection in networks via nonlinear modularity eigenvectors*, SIAM J. Applied Mathematics, 78:2393–2419, 2018  
<https://doi.org/10.1137/17M1144143>
- [J17] D. Fasino and F. Tudisco, *The expected adjacency and modularity matrices in the degree-corrected stochastic block model*, Special Matrices, 6:110–121, 2018  
<https://doi.org/10.1515/spma-2018-0010>

- [J18] F. Tudisco, F. Arrigo and A. Gautier, *Node and layer eigenvector centralities for multiplex networks*, SIAM J. Applied Mathematics 78:853–876, 2018  
<https://doi.org/10.1137/17M1137668>
- [J19] D. Fasino and F. Tudisco, *A modularity based spectral method for simultaneous detection of communities and anti-communities*, Linear Algebra Appl., 542:605–623, 2018  
<https://doi.org/10.1016/j.laa.2017.12.001>
- [J20] F. Tudisco and M. Hein. *A nodal domain theorem and a higher-order Cheeger inequality for the graph  $p$ -Laplacian*, EMS J. Spectral Theory, 8:883–908, 2018  
<https://doi.org/10.4171/JST/216>
- [J21] D. Fasino and F. Tudisco, *Modularity bounds for clusters located by leading eigenvectors of the normalized modularity matrix*, J. Math. Inequal., 11:701–714, 2017  
<http://dx.doi.org/10.7153/jmi-2017-11-56>
- [J22] S. Cipolla, C. Di Fiore and F. Tudisco. *Euler-Richardson method preconditioned by weakly stochastic matrix algebras: a potential contribution to PageRank computation*, Electronic J. Linear Algebra 32:254–272, 2017  
<https://doi.org/10.13001/1081-3810.3343>
- [J23] Q. Nguyen, F. Tudisco, A. Gautier and M. Hein. *A flexible multilinear optimization framework for hypergraph matching*, IEEE Trans. Pattern Analysis and Machine Intelligence, 39:1054–1075, 2016  
<https://doi.org/10.1109/TPAMI.2016.2574706>
- [J24] D. Fasino and F. Tudisco, *Localization of dominant eigenpairs and planted communities by means of Frobenius inner products*, Czechoslovak Math. J., 66:881–893, 2016  
<http://link.springer.com/article/10.1007/s10587-016-0298-2>
- [J25] C. Di Fiore, F. Tudisco, and P. Zellini. *Lower triangular Toeplitz-Ramanujan systems whose solution yields the Bernoulli numbers*. Linear Algebra Appl., 496:510–526, 2016  
<http://dx.doi.org/10.1016/j.laa.2016.02.007>
- [J26] D. Fasino and F. Tudisco. *Generalized modularity matrices*. Linear Algebra Appl. 502:327–345, 2016  
<http://dx.doi.org/10.1016/j.laa.2015.06.013>
- [J27] F. Tudisco. *A note on certain ergodicity coefficients*. Special Matrices, 3:175–185, 2015  
<http://dx.doi.org/10.1515/spma-2015-0016>
- [J28] F. Tudisco, V. Cardinali and C. Di Fiore. *On complex power nonnegative matrices*. Linear Algebra Appl., 471:449–468, 2015  
<http://dx.doi.org/10.1016/j.laa.2014.12.021>
- [J29] S. Cipolla, C. Di Fiore, F. Tudisco and P. Zellini. *Adaptive matrix algebras in unconstrained minimization*. Linear Algebra Appl., 471:544–568, 2015  
<http://dx.doi.org/10.1016/j.laa.2015.01.010>
- [J30] D. Fasino and F. Tudisco. *An algebraic analysis of the graph modularity*. SIAM J. Matrix Anal. Appl., 35:997–1018, 2014  
<http://dx.doi.org/10.1137/130943455>
- [J31] F. Tudisco, C. Di Fiore and E. E. Tytshnikov. *Optimal rank matrix algebras preconditioners*. Linear Algebra Appl., 438:405–427, 2013  
<http://dx.doi.org/10.1016/j.laa.2012.07.042>
- [J32] F. Tudisco and C. Di Fiore. *A preconditioning approach to the pagerank computation problem*. Linear Algebra Appl., 435:2222–2246, 2011  
<https://doi.org/10.1016/j.laa.2011.04.018>

## Papers published in peer-reviewed conference proceedings

- [C1] F. Tudisco, A. R. Benson and K. Prokopchik, *Nonlinear Higher-Order Label Spreading*, Proc. of the Web Conference 2021 (WWW), To appear.  
<https://arxiv.org/abs/2006.04762>
- [C2] P. Mercado, F. Tudisco and M. Hein, *Generalized Matrix Means for Semi-Supervised Learning with Multilayer Graphs*, Proc. Advances in Neural Information Processing Systems (NeurIPS), 2019  
<https://papers.nips.cc/paper/9626-generalized-matrix-means-for-semi-supervised-learning-with-multilayer-graphs>
- [C3] P. Mercado, F. Tudisco and M. Hein, *Spectral Clustering of Signed Graphs via Matrix Power Means*, Proc.

International Conf. on Machine Learning (ICML), 2019  
<http://proceedings.mlr.press/v97/mercado19a/mercado19a.pdf>

- [C4] F. Arrigo and F. Tudisco. *Multi-Dimensional, Multilayer, Nonlinear and Dynamic HITS*, Proc. SIAM Conf. on Data Mining (SDM), 2019  
<https://doi.org/10.1137/1.9781611975673.42>
- [C5] P. Mercado, A. Gautier, F. Tudisco and M. Hein, *The power mean Laplacian for multilayer graph clustering*, Proc. International Conf. on Artificial Intelligence and Statistics (AISTATS), 2018  
<http://proceedings.mlr.press/v84/mercado18a.html>
- [C6] P. Mercado, F. Tudisco and M. Hein. *Clustering signed networks with the geometric mean of Laplacians*, Proc. Advances in Neural Information Processing Systems (NeurIPS), 2016  
<https://papers.nips.cc/paper/6164-clustering-signed-networks-with-the-geometric-mean-of-laplacians>

## Papers under review

- [R1] D. Fasino, A. Tonetto, F. Tudisco, *Hitting times for non-backtracking random walks*, s  
<https://arxiv.org/abs/2105.14438>
- [R2] F. Tudisco, K. Prokopchik, A. R. Benson, *A nonlinear diffusion method for semi-supervised learning on hypergraphs*,  
<https://arxiv.org/abs/2103.14867>
- [R3] S. Venturini, A. Cristofari, F. Rinaldi, F. Tudisco, *Louvain-like Methods for Community Detection in Multi-Layer Networks*,  
<https://arxiv.org/abs/2106.13543>

## Software packages

- [S1] *Implementation of NHOLS: Nonlinear Higher-Order Label Spreading algorithm* for Semi-Supervised Learning, public domain GitHub software package, Language: Julia  
<https://github.com/doublelucker/nhols>
- [S2] *Implementation of nonlocal PageRank algorithm*, public domain GitHub software package, Language: Matlab and Python  
<https://github.com/Cirdans-Home/NonLocalPageRank>
- [S3] *Fast Chung-Lu scale-free random graph generator*, public domain GitHub software package, Language: Matlab and Python  
<https://github.com/ftudisco/scalefreechunglu>
- [S4] *FAST-ATVO: Fast active-set approximate total variation optimization scheme for community detection*, public domain GitHub software package, Language: Matlab and C++  
<https://github.com/ftudisco/fast-atvo>
- [S5] *Nonlinear spectral method for detection of core and periphery*, public domain GitHub software package, Language: Matlab and Julia  
<https://github.com/ftudisco/nonlinear-core-periphery>
- [S6] *Multi-dimensional HITS: An always computable ranking for temporal multi-layer directed networks*, public domain GitHub software package, Language: Matlab  
<https://github.com/ftudisco/multi-dimensional-hits>
- [S7] *Clustering Signed Networks with the Geometric Mean of Laplacians*, public domain GitHub software package, Language: Matlab  
<https://github.com/ftudisco/GM>
- [S8] *The Power Mean Laplacian for Multilayer Graph Clustering*, public domain GitHub software package, Language: Matlab  
<https://github.com/ftudisco/PM>
- [S9] *Node and layer eigenvector centralities for multiplex networks*, public domain GitHub software package, Language: Matlab  
[https://github.com/ftudisco/node\\_layer\\_eigenvector\\_centrality](https://github.com/ftudisco/node_layer_eigenvector_centrality)

## Awards and grants

2019. Italian institute of Mathematics INdAM-GNCS one-year research project PI. Project name “Tensor methods for semisupervised learning on network data”. Fund granted €1,500.
2019. Italian institute of Mathematics INdAM-GNCS one-year research project Co-PI. Project name “Numerical methods for sparse data”. Fund granted €4,700.
2018. I reached the final interview stage of the **UKRI Future Leaders Fellowship**. This is a prestigious individual grant of up to £1.2 million to be awarded to early career UK-based researchers. The fellowship was awarded to around 10% of applicants, while around 20% of applications reached the interview phase. I was not selected for an award.
2016. I applied for the **first time** and have been awarded a **Marie Skłodowska–Curie Individual Fellowship**. This is a prestigious and highly competitive European fellowship, part of the European Research Council Horizon 2020 excellence funding scheme. Below are some detail about the fellowship:
- Evaluation Total Score: 95/100. Within the **top 3%** in its subject area
  - Evaluation Details: Excellence (4.8/5); Impact (4.8/5); Implementation (4.4/5)
  - Project acronym and title: MAGNET: Models and Algorithms for Graph mining based on Nonlinear Eigenvalue Techniques.
  - Grant number: 744014.
  - Fund granted  $\approx$  €190,000.
2010. *Sebastiano e Rita Raeli* degree prize in favor of the best university graduates in the academic year 2009/2010. Nominations were gathered among all the faculties and departments of the University of Rome Tor Vergata.

## Talks, research visits and organized events

### Invited conference talks

1. “*Applied nonlinear Perron–Frobenius theory*”, SIAM Conference on Applied Linear Algebra 2021, **invited mini-tutorial**, New Orleans (now virtual), USA, May 17-21 2021
2. “*Nonlinear Spectral Coefficients for Higher-Order Network Data*”, SIAM Conference on Applied Linear Algebra 2021, workshop on “Latest Advances in Spectral Linear Algebra in Network Science” New Orleans (now virtual), USA, MAy 17-21 2021
3. “*Learning with nonlinear eigenvectors*”, Workshop on mathematical and computer science methods for new assistive technologies for visual impairments, University of Turin, Italy, Sept 8, 2020
4. “*Learning from network data with nonlinear Perron eigenvectors*”, **plenary talk** at Householder Symposium 2020, June 14–19, 2020 (conference postponed due to COVID19)
5. “*Nodal domain theorem for the graph  $p$ -Laplacian*”, SIAM Conference on Imaging Science, Toronto, Canada, July 6–9, 2020
6. “*Nonlinear spectral methods for mining and learning*”, 2 hrs lecture at Spanish Linear Algebra and Applied Matrix Analysis Society, Valencia, June 2019 (eventually withdrawn for personal reasons)
7. “*Nonlinear spectral methods for core–periphery quality optimization*”, EUROPT: Workshop on Advances in Continuous Optimization, Glasgow, UK, June 28–29 2018
8. “*A fast method for community detection via total variation optimization*”, IMA and OR Society Conference on Mathematics of Operational Research, Birmingham, UK, April 25–26 2018
9. “*Small updates of matrix functions used for network centrality*”, 6th IMA Conference on Numerical Linear Algebra and Optimization, Birmingham, UK, June 27–28, 2018
10. “*A fast method for detecting leading communities via tight nonlinear modularity relaxation*”, SIAM Conference on Imaging Science, Bologna, Italy, June 5–8, 2018
11. “*Nodal domains of the  $p$ -Laplacian on discrete graphs*”, ZiF Conference on Discrete and continuous models in the theory of networks, University of Bielefeld, Germany, November 27 – December 1, 2017
12. “*Modularity matrices and community detection under the degree-corrected stochastic block model*”, INdAM Workshop on Structured Matrices in Numerical Linear Algebra: Analysis, Algorithms and Applications, Cortona, Italy, September 4–8, 2017
13. “*A nonlinear Krylov-type method for differentiable mixed subordinate matrix norms*”, 28th Householder Symposium on Numerical Linear Algebra, Virginia Tech, Blacksburg, Virginia, USA, June 18–23, 2017.

14. “A nonlinear modularity operator for community detection in networks”, EPSRC workshop on Network Science meets Matrix Functions, Mathematical Institute, University of Oxford, UK, September 1–2, 2016.
15. “Nested nonlinear power method for matrix operator norms, with applications to spectral clustering”, workshop on Mathematical Models and Computational Methods for Complex Networks, Dept. of Computer Science, University of Pisa, Italy, June 6–7, 2016.

## Contributed conference talks (most relevant)

1. “Mutual reinforcement at higher-order”, NetSci2020 conference on Network Science, satellite on “Networks Beyond Pairwise Interactions”, Rome Italy, Sept 18-19 2020
2. “Higher order ergodicity coefficients”, International Congress on Applied and Industrial Mathematics (ICIAM), Valencia, Spain, July 15–19 2019
3. “Logistic core–periphery detection in networks”, **lightning plenary talk** at Complex Networks Conference, University of Cambridge, UK, December 11–13 2018
4. “A new Perron–Frobenius theorem for nonnegative tensors”, SIAM Applied Linear Algebra Conference, Hong Kong, May 4–8 2018
5. “Computing the norm of a matrix is not always NP-hard”, SIAM Annual Meeting, Pittsburgh, USA, July 10–14 2017
6. “Eigenvectors of the nonlinear graph  $p$ -Laplacian and applications to graph clustering”, SIAM conference on applied Linear Algebra, Atlanta, USA, October 26–30, 2015
7. “Finding communities in networks using generalized modularity matrices”, GAMM Workshop, Magdeburg, Germany, July 9–10 2015
8. “A new generation of matrix algebras preconditioners”, MMMA International Conference on Matrix Methods in Mathematics and Applications, Moscow, Russia, June 2011

## Invited seminar talks

1. “Learning with nonlinear Perron eigenvectors”, SCAN seminar at Cornell University, USA, Nov 2020
2. “A tensor method for semi-supervised learning on hypergraphs”, NumPi seminar at University of Pisa, Italy, Nov 2020
3. “Nonlinear spectral method for core-periphery detection”, Theory and Algorithms in Data Science, Alan Turing Institute, London, UK, (to be scheduled)
4. “Data science applications of nonlinear Perron–Frobenius theory”, Pure, Applied and Numerical Analysis seminar, University of Kent, UK, February 2020
5. “Learning with nonlinear Perron eigenvectors”, Rutherford Appleton Laboratory and Oxford University joint seminar on Computational Mathematics and Applications, RAL, UK, February 2020
6. “Nonlinear Perron Eigenvectors: Theory and applications to network science”, University of Udine, Department of Mathematics, Computer Science and Physics, Italy, December 2018
7. “Nonlinear Perron Eigenvectors: Theory and applications to network analysis”, KU Leuven, Numerical Analysis Seminar, Belgium, December 2018
8. “Computing the norm of nonnegative matrices and tensors”, KTH Royal Institute of Technology, Stockholm, Sweden, July 2018
9. “Nonlinear Perron-Frobenius theorem for multi-dimensional maps”, University of Edinburgh, Computational and Applied Math, UK, May 2018
10. “Mining and learning with graphs and nonlinear spectral methods”, University of Manchester, UK, April 2018
11. “Nonlinear spectral methods for data mining”, Heriot-Watt University, Edinburgh, UK, February 2018
12. “Spectral methods for community detection in networks”, ZIF Cooperation Group on Discrete and continuous models in the theory of networks, Bielefeld, Germany, November 2017
13. “Spectral method for clustering and community detection”, Dept. Mathematics and Computer Science, University of Perugia, Italy, April 2016.
14. “Spectral properties of the discrete  $p$ -Laplacian: Theoretical foundations of  $p$ -spectral clustering”, Institut für Mathematik der Universität Potsdam, Potsdam, Germany, February 2015.



15. “Spectral inequalities for the modularity of a graph”, Rome-Moscow summer school of Matrix Methods and Applied Linear Algebra, Institute of Numerical Mathematics, Moscow, Russia, August 2014
16. “Modularity spectral analysis for the community detection problem”, Exploiting positivity in linear algebra problems and applications, University of Perugia, May 2014, Italy

## Invited research visits

1. Alan Turing Institute, Theory and Algorithms in Data Science group, London, UK (to be scheduled). *Host:* Mihai Cucuringu
2. Department of Mathematics, University of Padua, Italy (Feb 10–23, 2020). *Host:* Michela Redivo–Zaglia
3. Department of Mathematics, Computer Science and Physics, University of Udine, Italy (Dec 3–10, 2018). *Host:* Dario Fasino
4. Department of Mathematics, University of Rome TorVergata, Italy (Sept 17–21, 2018). *Host:* Carmine Di Fiore
5. KTH Royal Institute of Technology, Department of Mathematics, Stockholm, Sweden (July 27 – Aug 9, 2018). *Host:* Elias Jarlebring
6. Department of Mathematics, University of Padua, Italy (Feb 5–9, 2018). *Host:* Francesco Rinaldi
7. ZiF center for interdisciplinary research, University of Bielefeld, Germany (Sept 18–27, 2018). *Host:* Delio Mugnolo
8. ISTI–CNR (National Research Council) - Pisa, Italy (Nov 28 – Dec 2, 2016). *Host:* Stefano Pozza
9. University of Strathclyde, Department of Mathematics and Statistics, UK (Sept 5 – 13, 2016). *Host:* Desmond J. Higham
10. Stanford University, Institute of Computational and Mathematical Engineering, USA (2015). *Host:* Tania Bakhos
11. University of Perugia, Dept of Mathematics and Computer Science, Italy(2015). *Host:* Bruno Iannazzo
12. Institute of Numerical Mathematics, RAS, Moscow, Russia (2010). *Host:* Eugene E. Tyrtshnikov.

## Workshops and minisymposia organization

1. **Co-Organizer** of minisymposium on *Nonlinear Laplacians on Graphs and Manifolds with Applications to Data and Image Processing*, SIAM Conference on Applied Linear Algebra, May 17–21, 2021, New Orleans USA (now virtual). Organized with Piero Deidda (Padua) and Mario Putti (Padua). Number of speakers: 8
2. **Selected to organize a minitutorial** on *Applied nonlinear Perron–Frobenius theory* at SIAM Applied Linear Algebra 2021 conference, May 17–21 2021, New Orleans, USA. Organized with Antoine Gautier (QuantPi). The minitutorial consists of two 100-hour lectures.
3. **Program committee** of SIAM Network Science workshop 2020, July 9–10 2020, Toronto, Canada
4. **Co-Organizer** of minisymposium on *Mathematics of inferring, computing and learning from data*, SIMAI bi-annual congress of the Italian Society of Applied and Industrial Mathematics, June 15–19 2020, Parma, Italy. Organized with Stefano Cipolla (Padua). Number of speakers: 6
5. **Co-Organizer** of minisymposium on *Learning from data on networks*, 1st SIAM conference on Mathematics of Data Science, May 5–7 2020, Cincinnati, USA. Organized with Michael Schaub (Oxford) and Santiago Segarra (Rice). Number of speakers: 8
6. **Co-Organizer** of minisymposium on *Matrix methods for networks*, Biennial Numerical Analysis Conference, Glasgow, UK, June 25–28 2019. Organized with Francesca Arrigo. Number of speakers: 6
7. **Co-Organizer** of minisymposium on *Mining and modeling evolving and higher-order complex data and networks*, International Congress on Industrial and Applied Mathematics (ICIAM), Valencia, Spain, July 15–19 2019. Organized with Austin Benson, Christine Klymko, Eisha Nathan. Number of speakers: 16
8. **Co-Organizer** of minisymposium on *Nonlinear Perron-Frobenius theory and applications*, SIAM conference on Applied Linear Algebra, May 4–8 2018, Hong Kong. Organized with Antoine Gautier. Number of speakers: 4
9. **Co-Organizer** of minisymposium on *Mathematics of large scale, time varying and higher-order networks*, SIAM annual meeting, July 10–14 2017, Pittsburgh, USA. Organized with Francesca Arrigo. Number of Speakers: 8
10. **Co-Organizer** of the Workshop *One day in Numerical Linear Algebra*, University of Padua, June 14 2017, Padova, Italy. Organized with Michela Redivo–Zaglia. Number of Speakers: 4



11. **Co-Organizer** of **invited** minisymposium on *Matrix methods in network analysis*, 20th Conference of the International Linear Algebra Society, July 11–15 2016, Leuven, Belgium. Organized with Dario Fasino. Number of Speakers: 8
12. **Organizer** of minisymposium on *Recent spectral approaches to graph clustering*, SIAM conference on Applied Linear Algebra, Oct. 26–30 2015, Atlanta, USA. Number of Speakers: 4
13. Contribution to the Organization of the *Rome-Moscow school on Matrix Methods and Applied Linear Algebra*, held in Moscow, Russia and Rome, Italy from August 23 to September 21, 2014.

## Service

### Scientific Committees

1. I am part of the steering committee of the doctoral training program in mathematics at Gran Sasso Science Institute.
2. I am part of the program committee of the SIAM Workshop on Network Science 2020, co-located with the SIAM Annual Meeting 2020, July 9–10, Toronto, Canada.
3. I am scientific advisor and consultant for the start-up company QuantPi GmbH, Handelsregister HRB 106305, which specializes in developing trustworthy AI technologies, based in Saarbrücken, Germany. Webpage: <https://www.quantpi.com/>. The company has recently been granted €144,000 investment from EXIST Business Start-up Grant program by BMWi and €750,000 from StartupSecure Research Grant by BMBF.

### Editorial Activity

- I am an invited Evaluator for the EU's Horizon2020 Marie Skłodowska-Curie Individual Fellowship program
- I am part of the Editorial Board (Associate Editor) of *SIAM Review* (Surveys and Reviews section)
- I am Managing Editor for *ETNA: Electronic Transactions on Numerical Analysis*
- I am Assistant Editor for *Open Mathematics*
- I contribute to the scientific community by serving as a reviewer for MathRev
- I have been invited to referee papers submitted to several journals / conferences , including:
  - Proceedings Royal Society A; Proceedings of NeurIPS; Proceedings ICML; SIAM Journal on Mathematics for Data Science; SIAM Journal on Applied Mathematics; SIAM Journal on Matrix Analysis and Applications; SIAM Journal on Scientific Computing; Journal of Scientific Computing; Linear Algebra and its Applications; Journal of Complex Networks; Numerical Linear Algebra with Applications; Numerical Algorithms; Linear and Multilinear Algebra; ESAIM Mathematical Modeling and Numerical Analysis; Applied Network Science; International Journal of Computer Mathematics; PLOS ONE
- I review around 10 papers per year

### Supervision of student projects

- PhD Sara Venturini, PhD candidate in Optimization, University of Padua Since 2021, Co-supervised with Francesco Rinaldi.
- PhD [Dayana Savostianova](#), PhD candidate in Machine Learning, Gran Sasso Science Institute. Since 2021.
- PhD [Anton Savostianov](#), PhD candidate in Numerical Analysis, Gran Sasso Science Institute. Since 2020. Jointly with Nicola Guglielmi
- PhD [Konstantin Prokopchik](#), PhD candidate in Machine Learning, Gran Sasso Science Institute. Since 2019.
- PhD [Piero Deidda](#), PhD candidate in Numerical Analysis, University of Padua. Since 2019. Co-supervised with Mario Putti

### Past students

- PhD [Pedro Mercado](#), PhD in Machine Learning, Saarland University. 2016–2019. Co-supervised with Matthias Hein. Thesis title: *Beyond the Arithmetic Mean: Extensions of Spectral Clustering and Semi-Supervised Learning for Signed and Multilayer Graphs via Matrix Power Means*
- MSc Arianna Tonetto, Master Thesis in Applied Mathematics, University of Udine (2020). Co-supervised with Dario Fasino. Thesis title: *Hitting times for non-backtracking random walks*

- MSc Sara Venturini, Master Thesis in Optimization, University of Padua (2019), Co-supervised with Francesco Rinaldi. Thesis title: *Methods for community detection in multi-layer networks*
- MSc Fabio Brotto, Master Thesis in Optimization, University of Padua (2017), Co-supervised with Francesco Rinaldi. Thesis title: *Locating leading components in networks through the optimization of nonlinear modularity functions*
- MSc [Stefano Cipolla](#), Master Thesis in Mathematics, University of Rome TorVergata (2014). Co-supervised with Carmine Di Fiore. Thesis title: *Adaptive matrix algebras in unconstrained optimization*.
- MSc [Lorenzo Ferrone](#), Master Thesis in Computational Linguistic, University of Rome TorVergata (2013), Co-supervised with Carmine Di Fiore. Thesis title: *Towards distributed smoothed tree kernels*.
- MSc [Valerio Cardinali](#), Master Thesis in Mathematics, University of Rome TorVergata (2012), Co-supervised with Carmine Di Fiore. Thesis title: *Modern Perron-Frobenius theory*,

## Scientific Memberships

I am part of the *Numerical analysis and data science* group at GSSI

SIAM, SIAG/LA, SIAG/DM, INdAM–GNCS (Italian society for scientific computing)

## Teaching activities

### Instructor

- 2020/21. Graduate course “*An introduction to computational machine learning*”, Gran Sasso Science Institute
- 2020/21. Graduate course “*Advanced numerical methods*”, Gran Sasso Science Institute
- 2019/20. Graduate course “*Advanced numerical methods*”, Gran Sasso Science Institute
- 2016/17. Graduate course “*Topics in spectral theory for network analysis*”, Doctoral school of Mathematics, Dept. of Applied Mathematics, University of Padua
- 2016/17. Graduate course “*Numerical methods for PDE*”, Master program in Mathematics, Dept. of Mathematics, University of Padua.
- 2013/14. Undergraduate course “*Mathematical methods in computer graphics*”, Undergraduate program of Science and Technologies for Media, Dept. of Mathematics, University of Rome “Tor Vergata”.

### Instructor (invited)

- Sept 2020. Invited lecture series on “*Spectral methods in data mining*”, Rome–Moscow summer school on Matrix Methods and Applied Linear Algebra
- Feb 2020. Invited lecture series on “*Eigenvector methods for learning from data on networks*”, Doctoral School of Applied Mathematics, University of Padua, Italy (to be rescheduled)
- Aug 2018. Invited lecture series on “*Nonlinear Perron-Frobenius theorems*”, Rome–Moscow summer school on Matrix Methods and Applied Linear Algebra

### Teaching Assistant

Depending on the course, duties included designing and grading problem sets and exams, holding office hours and conducting problem-solving sessions

- 2018/19. MM111 (Calculus), 12 hrs, Undergraduate students attending: Chemical and Process Engineering, Pure and Applied Chemistry, Naval Architecture and Physics, University of Strathclyde. Mean Condensed Item Analysis Report (students feedback) score: 4.50/5.
- 2018/19. MM112 (Linear Algebra and Numerical Methods), 12 hrs, Undergraduate students attending: Chemical and Process Engineering, Pure and Applied Chemistry, Naval Architecture and Physics, University of Strathclyde. Mean Condensed Item Analysis Report (students feedback) score: 4/5.
- 2017/18. MM111 (Calculus), 12 hrs, Undergraduate students attending: Chemical and Process Engineering, Pure and Applied Chemistry, Naval Architecture and Physics, University of Strathclyde. Mean Condensed Item Analysis Report (students feedback) score: 4.35/5.
- 2017/18. MM112 (Linear Algebra and Numerical Methods), 12 hrs, Undergraduate students attending: Chemical

and Process Engineering, Pure and Applied Chemistry, Naval Architecture and Physics, University of Strathclyde. Mean Condensed Item Analysis Report (students feedback) score: 3.90/5.

- 2017/18. MM117 (Calculus and linear algebra), 24 hrs, Undergraduate students attending: Mechanical and Aerospace Engineering, University of Strathclyde. Mean Condensed Item Analysis Report (students feedback) score: 4.50/5.
- 2013/14. *Scientific computing*, 16 hrs, Undergraduate program of Civil Engineering, Dept. of Engineering, University of Rome "Tor Vergata".
- 2011/12. *Mathematical methods in computer graphics*, 36 hrs, Undergraduate students attending: Mathematics, Computer Science, Science and Technologies for Media, University of Rome "Tor Vergata".
- 2011/12. *Calculus*, 24 hrs, Undergraduate program of Chemistry, University of Rome "Tor Vergata".
- 2010/11. *Numerical analysis*, 12 hrs, Undergraduate program of Science and Technologies for Media, Dept. of Mathematics, University of Rome "Tor Vergata". Academic Year 2010–11