Sara Venturini

Curriculum Vitae et Studiorum

Network Science Institute, Northeastern University
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born on 1st August 1996

Career Objective

Since January 2025, I have been a Postdoctoral Associate at the **Network Science Institute**. Prior to this, I was a Postdoctoral Fellow at the **MIT Senseable City Lab**. I earned a **Ph.D. in Computational Mathematics** in 2023 from the University of Padova. I like to combine my background in computational and applied mathematics with my passion for complex networks into real-world social science applications. My focus areas are **network science, computational social science, the science of science, machine learning, and optimization methods**.

Education

Jan 2025 – Ongoing
Network Science Institute, Northeastern University, Boston, Massachusetts, USA
Laboratory for the Modeling of Biological and Socio-technical Systems (MoBS Lab)
Postdoctoral Associate,
Mentor: Alessandro Vespignani.

Jan 2024 – Jan 2025
Massachusetts Institute of Technology, Cambridge, Massachusetts, USA
Senseable City Laboratory (SCL)
Postdoctoral Fellow in complex dataset analysis,
Mentors: Carlo Ratti, Paolo Santi.

Nov 2023 – Dec 2023
University of Padova, Padova, Italy
Research Fellow,
Analysis of bibliometric data and development of models in the field of the science of science.

Oct 2020 – Dec 2023
University of Padova, Padova, Italy
Ph.D. student in Computational Mathematics,
Title: Complex networks: community detection and graph semi-supervised learning on higher-order networks, with an application to the science of science,
Advisors: Prof. Francesco Rinaldi (University of Padova),
Prof. Francesco Tudisco (The University of Edinburgh, Gran Sasso Science Institute).
Date: 21 December 2023

Feb 2022 – July 2022
Indiana University Network Science Institute (IUNI), Bloomington, Indiana, USA
Visiting Researcher - AccelNet-MultiNet fellow,
Research on networks applied to the science of science field, in collaboration with Prof. Santo Fortunato.

Oct 2018 – July 2020
University of Padova, Padova, Italy
Master Degree in Mathematics,
Application path: operations research and optimization
Final score: 110/110 cum laude,

MSc thesis:
Title: Methods for community detection in multi-layer networks
Advisor: Prof. Francesco Rinaldi (University of Padova)
Co-Advisor: Prof. Francesco Tudisco (Gran Sasso Science Institute).

Oct 2015 – Sept 2018
University of Padova, Padova, Italy
Bachelor Degree in Mathematics,
Final score: 102/110,

Bachelor thesis:
Title: Mathematical Programming Models for Air Traffic Management in the European Context
Advisor: Prof. Luigi De Giovanni (University of Padova).

Grants and Fellowships

July 2023
ICML grant for registration and accommodation,
which covers free conference registration and free 5 nights stay to attend the Conference on Machine Learning (ICML) 2023 in Honolulu, Hawaii, USA.

July 2021 – July 2022	**AccelNet-MultiNet fellowship travel award ($10,500)**, which assumes a five-month visit (from February 2022 to June 2022) to Indiana University, in Bloomington, Indiana, USA, collaborating with Prof. Santo Fortunato.
Oct 2020 – Sept 2023	**PhD fellowship from the University of Padova**.

List of Publications

[1] Matteo Bergamaschi, Sara Venturini, Francesco Tudisco, Francesco Rinaldi, **An efficient network-aware direct search method for influence maximization**, *Journal of Complex Networks, 13(6), 2025. doi: 10.1093/comnet/cnaf042*.

[2] Emanuele Zangrando, Sara Venturini, Francesco Rinaldi, Francesco Tudisco, **dEBORA: Efficient Bilevel Optimization-based low-Rank Adaptation**, *International Conference on Learning Representations (ICLR), 2025. url: https://openreview.net/forum?id=5M0ic2RxQZ*.

[3] Sara Venturini, Marianna De Santis, Jordan Frecon-Deloir, Martin Schmidt, Francesco Rinaldi[†], Saverio Salzo[†] **Relax and penalize: A new bi-level approach to mixed-binary hyperparameter optimization**, Transactions on Machine Learning Research (TMLR) 2025. url: https://openreview.net/forum?id=A1R1cQ93Cb.

[4] Satyaki Sikdar[†], Sara Venturini[†], Marie-Laure Charpignon, Sagar Kumar, Francesco Rinaldi, Francesco Tudisco, Santo Fortunato, Maiamuna S. Majumder, **What we should learn from pandemic publishing**, Nature Human Behaviour, pages 1-4, 2024. doi: 10.1038/s41562-024-01969-7.

[5] Sara Venturini*, Satyaki Sikdar*, Francesco Rinaldi, Francesco Tudisco, Santo Fortunato, **Collaboration and topic switches in science.**, Scientific Reports 14, 2024. doi: 10.1038/s41598-024-51606-6.

[6] Sara Venturini, Andrea Cristofari, Francesco Rinaldi, and Francesco Tudisco. **Learning the right layers a data-driven layer-aggregation strategy for semi-supervised learning on multilayer graphs**. In International Conference on Machine Learning (ICML), pages 35006–35023, 2023. url: https://proceedings.mlr.press/v202/venturini23a.html.

[7] Sara Venturini, Andrea Cristofari, Francesco Rinaldi, and Francesco Tudisco. **Laplacian-based semi-supervised learning in multilayer hypergraphs by coordinate descent**. EURO Journal on Computational Optimization, page 100079, 2023. doi: 10.1016/j.ejco.2023.100079.

[8] Sara Venturini, Andrea Cristofari[†], Francesco Rinaldi[†], and Francesco Tudisco[†]. **A variance-aware multiobjective louvain-like method for community detection in multiplex networks**. Journal of Complex Networks, 10(6), 2022. doi: 10.1093/comnet/cnac048.

List of Works Under Review, Preprints

[9] Sara Venturini, Satyaki Sikdar, Martina Mazzarello, Francesco Rinaldi, Francesco Tudisco, Paolo Santi, Santo Fortunato, Carlo Ratti, **The Effects of Remote Working on Scientific Collaboration and Impact**. arXiv:2511.18481, shortly under review.

[10] Anthony Palmieri, Francesco Rinaldi, Saverio Salzo, Sara Venturini, **Iteration complexity of Frank-Wolfe and its variants**. under review at ICML 2026, preprint forthcoming.

* These authors contributed equally to this work.

† These authors contributed equally to this work and are listed alphabetically by last name.

Invited Talks

July 2024	**Network Science Institute, Northeastern University**, Boston, MA, USA, Title: "Optimization Methods for Community Detection and Graph Semi-Supervised Learning in Multiplex Networks, and Analysis of Scholarly Collaborations".
May 2024	**SIAM Conference on Applied Linear Algebra**, Paris, France, Title: "Learning the right layers of a multilayer network in semi-supervised learning", Mini-symposium "The linear algebra of multilayer networks" (unable to attend - substitute presenter Francesco Tudisco).
November 2023	**Workshop: Future directions in Multilayer Network Science**, Zaragoza, Spain, Title: "Collaboration and Topic Switches in Science".
August 2023	**EUROPT Workshop on Advances in Continuous Optimization**, Budapest, Hungary, Title: "Learning the right layers: a zeroth-order bi-level optimization strategy for semi-supervised learning on multilayer graphs".
January 2023	**Graduate Seminar, Department of Mathematics "Tullio Levi-Civita", University of Padova**, Padova, Italy, Title: "Complex Networks: a highly interdisciplinary field. Tools and Applications".
October 2022	**AccelNet-MultiNet Webinar Series**, Title: "A Variance-aware Multiobjective Louvain-like Method for Community Detection in Multiplex Networks".

August 2022	**International Conference on Optimization and Decision Science 2022**, Firenze, Italy, Title: "Semi-supervised learning in multilayer hypergraphs".
July 2022	**Workshop: Future directions in Multilayer Network Science**, Boston, Massachusetts, USA, Title: "Social Contagion in Collaboration Networks".
October 2021	**INFORMS 2021**, Anaheim California, USA, Title: "Methods for Community Detection in Multilayer Networks" (flexible conference - virtual attendee).
July 2021	**NETWORKS 2021**, IU Network Science Institute, Bloomington, USA, Title: "Methods for Semi-Supervised Community Detection in Science of Science multilayer hypergraphs", AccelNet-MultiNet Satellite (virtual conference).

Contributed Talks

June 2024	**Network Science Conference (NetSci) 2024**, Québec City, Canada, Title: "The Effect of Colocation on Paper Coauthorships during COVID-19" (presenter: SV).
July 2023	**International Conference on Computational Social Science (IC2S2) 2023**, Copenhagen, Denmark, Title: "Social contagion in science" (Plenary talk - accepted 16 over 918 submissions) (presenter: Satyaki Sikdar) Title: "The COVID-19 research outbreak: how the pandemic culminated in a surge of new researchers" (presenter: Satyaki Sikdar).
July 2023	**Network Science Conference (NetSci) 2023**, Vienna, Austria, Title: "Learning the right layers: a data-driven layer-aggregation strategy for semi-supervised learning on multilayer graphs" (presenter: SV). Title: "Social contagion in science" (presenter: Satyaki Sikdar).
June 2023	**International Conference on the Science of Science and Innovation (ICSSI) 2023**, Evanston, Illinois, USA, Title: "Social contagion in science" (presenter: Satyaki Sikdar). Title: "The COVID-19 research outbreak: how the pandemic culminated in a surge of new researchers" (presenter: Sagar Kumar).
February 2021	**5th AIRO Young Workshop 2021**, Naples, Italy, Title: "Methods for Community Detection in Multilayer Networks" (virtual conference).

Posters

July 2024	**International Conference on the Science of Science and Innovation (ICSSI)**, Washington DC, USA, Title: "How the COVID-19 pandemic affected science: collaboration and impact" (presenter: Satyaki Sikdar).
July 2023	**International Conference on Machine Learning (ICML) 2023**, Honolulu, Hawaii, USA, Title: "Learning the right layer: a data-driven layer-aggregation strategy for semi-supervised learning on multilayer graphs".

Other Activities

Nov. 2025 - Ongoing	**2025-2026 US CDC FluSight forecast challenge**, Participation in the US CDC FluSight collaborative challenge through weekly submission of influenza hospitalization forecasts generated by the *GLEAM Flu Reinforcement Learning forecasting model*.
March 2025	**Collabathon: coarse-grained network models**, Boston, Massachusetts, USA, 3-days collaboration with early researchers, with the aim of analyzing, implement and compare coarse-grained network models.
November 2023	**Workshop: Future directions in Multilayer Network Science**, Zaragoza, Spain, Discussion, with many of the experts in the field of multilayer networks, on the future directions of the field.
November 2023	**Collabathon: coarse-grained network models**, Jaca, Spain, 2-days collaboration with early researchers, with the aim of analyzing, implement and compare coarse-grained network models.
June 2023	**Mediterranean School of Complex Networks 2023**, Catania, Italy.
July 2022	**Collabathon: Rewired Networks**, Portland, Maine, USA, 3-days collaboration with early researchers, with the aim of analyzing, implement and comparing techniques to rewire networks. The result will be a Python library.
July 2022	**Workshop: Future directions in Multilayer Network Science**, Boston, Massachusetts, USA, Discussion, with many of the experts in the field of multilayer networks, on the future directions of the field.
August 2021	**EUROPT summer school 2021**, (virtual school).
February 2021	**AIRO PhD school 2021**, (virtual school).

Research Mentoring and Co-Supervision

Jan 2023 -
Dec 2023
Master's thesis co-supervision - **University of Padova, Padova, Italy**,
Angelica Crepaldi, *Louvain-like methods for community detection in multilayer hypergraphs*. Master Thesis in Mathematics, with Prof. Francesco Rinaldi, `https://thesis.unipd.it/retrieve/1697377f-3ae2-4387-8b7e-8481141befa4/Crepaldi_Angelica.pdf`
Matteo Bergamaschi, *Direct Search Methods for Influence Maximization problems*. Master Thesis in Data Science, with Prof. Francesco Rinaldi, `https://thesis.unipd.it/retrieve/a5037596-bcc5-45d6-abe4-6ee9820a77ea/Matteo_Bergamaschi_Master_Thesis.pdf` .

Teaching Experiences

April 2025
Guest talk - **Loyola University Chicago, Chicago, IL, USA**,
Invited talk in the network science course taught by Prof. Satyaki Sikdar.
Title: "A Glimpse Beyond Pairwise Interactions" (virtual).

June 2024
Teaching assistant - **Network Science Society (online)** ,
Assistant in the practical sessions of the network science online course taught by Santo Fortunato.

Oct 2022 –
June 2023
Teaching assistant - **Agronomy Department, University of Padova, Padova, Italy**,
Didactic support for the course of Mathematics of the Department of Territory and Agro-Forestry Systems.

May 2021 –
Sept 2021
Teaching assistant - **Agronomy Department, University of Padova, Padova, Italy**,
Didactic support and preparation of exercises for all the courses of Mathematics of the Department of Agronomy, Food, Natural Resources, Animals and Environment.

Mar 2020 –
June 2020
Teaching assistant – Science Department, University of Padova, Padova, Italy,
Didactic support and preparation of exercises for the course of Mathematics 2 of the Degree in Materials Sciences.

Services

Oct. 2024 –
Ongoing
Reviewer,
Science Advanced, Complex Networks Conferences, IEEE BigData, Computers & Operations Research, EPJ Data Science.

June 2026
NetSci2026 Poster and Lightning talks Committee.

June 2024
NetSci2024 Best Posters Awards Committee.

Other Experience

Sept 2010 –
Dec 2019
Bussolengo Music Band, Bussolengo (Verona), Italy,
Participation in amateur concerts and competitions – Trumpet.

Language Proficiencies

Italian Mother tongue
English Fluent

Computer Skills

Microsoft Office Excel (intermediate), PowerPoint (advanced) and Word (advanced)

Programming languages **Python** (advanced), **SQL (BigQuery)** (advanced), **Matlab** (advanced), **Ampl** (advanced)

Markup languages Latex (advanced)