

# MAURO FACCIN

Curriculum Vitæ

Dip. Fisica e Astronomia  
Via Marzolo 8  
35131 Padova  
[mauro.fccn@gmail.com](mailto:mauro.fccn@gmail.com)  
<https://maurofaccin.github.io>  
Preferred pronouns: he/him

## ACTUAL POSITION

2024-today **DFA at University of Padova** University of Padova, Italy  
Interests/Research line  

- Analysis of climate data and their interaction with human made networks
- Mesoscopic structures and their influence on the dynamical system.

## PROFESSIONAL EXPERIENCE

2023 - 2024 **University of Bologna, (DIMEC and INFN)** Bologna, Italy  
Postdoctoral researcher  

- Analysis of medical data through the use of Machine learning and complex networks combined approaches.
- Prediction of disease survival
- Analysis of information dynamics in social networks and medical systems.

2022 - 2023 **Istituto Professionale Statale "G. B. Garbin"** Schio, Italy  
High school math teacher

2021 - 2022 **Université de Paris, (CEPED and IRD)** Paris, France  
Postdoctoral researcher  

- Vaccines hesitancy unveiled through hypergraph analysis.
- We analyse the discussion on microblogging services as a dynamical system spreading on a hypergraph.
- Analysis of the textual content and its dynamical and geographic properties.

2020 - 2021 **University of Turin (Computer Science)** Torino (Italy)  
Visiting

2015 - 2020 **Université Catholique de Louvain (ICTEAM)** Louvain la Neuve, Belgium  
MOVE IN Louvain Research Fellow  

- Interplay between complex networks and dynamical systems.
- Making use of mathematical tools from information theory we could analyse dynamical systems, their evolution and the emerging mesoscopic structures.
- We successfully built a bridge between statistical inference and dynamical approaches in community or block detection.
- Development of a `python` library.
- Spatial analysis of disease spreading with compartmental models. (tuberculosis incidence inference in African countries)

2011 - 2015 **ISI Foundation** Torino, Italy  
Junior researcher  

- Quantum meets complex networks.
- I contributed to a multidisciplinary team interested in using tools from complex networks to study quantum system.

2006 - 2011 **Bifi Institute** Zaragoza, Spain  
PhD  

- Use of Ising-like models to characterize biopolymers with application to protein folding and protein sequencing.
- Development and release of corresponding software

## FELLOWSHIPS AND PROJECTS

2021 - 2022 **TRACTRUST (ANR-20-COVI-0102)**  
2017 - 2021 **Innoviris Iris-TB (D1.31402.007-F)**

2015 - 2017 MOVE-IN Louvain Fellowship (with support of Marie Curie Actions)

## PROGRAM COMMITTEES

1 Dec 2021	<b>Complex Networks 2021</b>	Madrid, Spain
1 Dec 2020	<b>Complex Networks 2020</b>	Madrid, Spain
10 Dec 2019	<b>Complex Networks 2019</b>	Lisbon, Portugal
22 Feb 2019	<b>BeNet 2019</b>	Hasselt, Belgium
11 Dec 2018	<b>Complex Networks 2018</b>	Cambridge, UK
29 Nov 2017	<b>Complex Networks 2017</b>	Lyon, France
30 Nov 2016	<b>Complex Networks 2016</b>	Milan, Italy

## ORGANIZING COMMITTEES

25 Oct 2024	<b>Networks Days</b> Local committee	Padova, Italy
August 2019	<b>Network Reconstruction Science-athon</b> Coorganized with Alexandre Bovet, Benjamin Chiem, Leo Gutierrez, Alexey Medvedev, Leto Peel, Mridul Seth	Beaumont, Belgium
15 Dec 2016	<b>Belgian Network Research Meeting (BeNet) 2016</b> Coorganized with Sophie Béreau, Jean-Charles Delvenne, Yerali Gandica, Leo Gutierrez, Leto Peel, Michael Schaub	Louvain-la-Neuve, Belgium
21 Sep 2016	<b>Conference on Complex Systems 2016 workshop on Coarse-graining Complex Systems</b> Coorganized with Leto Peel, Renaud Lambiotte, Michael Schaub	CCS2016, Amsterdam, Netherlands
2 Jun 2014	<b>Quantum Frontiers for Network Science</b> Coorganized with Filippo Radicchi and Zoltan Zimborás	NetSci 2014, Berkeley, California

## REVIEWER

- **Advances in Complex Systems**  
World Scientific
- **Applied Network Science**  
Springer Nature
- **Entropy**  
Multidisciplinary Digital Publishing Institute (MDPI)
- **Journal of Complex Networks**  
Oxford University Press
- **Journal of Statistical Mechanics**  
IOP
- **Natural Computing**  
Springer Netherlands
- **PLOS ONE**  
Public Library of Science (PLoS)
- **PRA, PRB, PRE, PRX**  
American Physical Society
- **Science Advances**  
American Association for the Advancement of Science
- **Scientific Reports**  
Nature Portfolio

## TEACHING

2023-2024	<b>DAT301 Social Network Analysis</b> with F. Gargiulo and A. Apolloni	University Mohammed VI Polytechnic
2015-2020	<b>LINMA2111 Algorithms and Complexity</b> with J-C Delvenne	Université Catholique de Louvain

- 2005 **Physics and Math at primary school** Hetauda, Nepal  
NEST
- 2004 **guide in Science Museum** Padova, Italy  
Organizer: INFN

## STUDENT ADVISING

- 2024 **N. Barbieri** University of Bologna  
**Corelatore** tesi magistrale with F. Durazzi and D. Remondini in Applied Physics  
Integration of artificial intelligence and network approaches to classify data in social networks
- 2019 **G. Izzi** University of Turin  
Tesi magistrale with A. Semeraro and G. Ruffo (informal tutor). Computer Science  
Analysis of temporal patterns and forecasting of popularity for programming languages on Stack Overflow platform
- 2016 **H. Devillez** UCLouvain  
Applied Maths (project with L. Peel)
- 2016 **M. Huet** UCLouvain  
Elec. Eng. (project with L. Peel)

## EDUCATION

- 2020 **24CFU** Univesità telematica Pegaso  
Discipline antropo-psico-pedagogiche e in metodologie e tecnologie didattiche
- 14 Sept 2012 **PhD in Physics** University of Zaragoza  
supervisor: prof. Pierpaolo Bruscolini  
Analysis and Development of Algorithms for the Characterization of Biopolymers and Application to Protein Sequencing and Protein Folding
- 15 Oct 2008 **Master in Physics and Technology** University of Zaragoza  
supervisor: prof. Pierpaolo Bruscolini  
Coevolution of Strategy and Population Structure in the Prisoner Dilemma
- 10 Oct 2005 **MSc in Physics** University of Padova  
supervisor: prof. Enzo Orlandini  
Beris Edwards Model Simulations for Liquid Crystals in Oscillatory Poiseuille Flux

## MAINTAINED PROJECTS

- **AISA**  
Python module aimed at partitioning a network through Autoinformation maximization
- **CartoTB**  
Cartography of predicted tuberculosis in high burden settings

## PREPRINTS

- **Temporal and geographic analysis of the Hydroxychloroquine controversy in the French Twittosphere** arXiv:2304.14075  
M. Faccin, E. Schultz and F. Gargiulo

## PUBLICATIONS

- **Analyzing Satellite Imagery to Target Tuberculosis Control Interventions in Densely Urbanized Areas of Kigali, Rwanda: Cross-Sectional Pilot Study**  
JMIR Public Health Surveill 2025;11:e68355  
M. Faccin, C. Geenen, M. Happaerts, S. Ombelet, P. Migambi, E. André
- **Mapping of regions with low tuberculosis notification and estimation of diagnostic gaps in Cameroon evidence from OpenStreetMap and WorldPop data**  
Scientific Reports, 15, Article number: 4992 (2025)  
C.G. Jouego, T.N. Collins, B. Tegomoh, C. Geenen, P.M. Netongo, E. André, M. Faccin

- **Measuring dynamical systems on directed hypergraphs** Phys Rev E, 106 (034306), 2022  
M. Faccin
- **Assessing the influence of French vaccine critics during the two first years of the COVID-19 pandemic** PLOS ONE, 17(8): e0271157  
M. Faccin, F. Gargiulo, L. Atlani-Duault, J.K. Ward
- **Data-driven identification of communities with high levels of tuberculosis infection in the Democratic Republic of Congo.** Sci Rep 12, 3912 (2022)  
M. Faccin, O. Rusumba, A. Ushindi, M. Riziki, T. Habiragi, F. Boutachkourt, E. André
- **State aggregations in Markov chains and block models of networks** Phys. Rev. Lett., 127, 078301 (2021)  
M. Faccin, M.T. Schaub and J.-C. Delvenne  
Figure selected for the journal cover
- **Complex Networks from Classical to Quantum** Communications Physics 2-53 (2019)  
J. Biamonte, M. Faccin, M. De Domenico
- **Outbreak of multidrug-resistant tuberculosis in South Africa undetected by WHO-endorsed commercial tests: an observational study** The Lancet Infectious Diseases 2018  
Makhado, Matabane, Faccin, Pinçon, Jouet, Boutachkourt, Goeminne, Gaudin, Maphalala, Beckert, Niemann, Delvenne, Delmée, Razwiedani, Nchabeleng, Supply, de Jong, André
- **Entrograms and coarse graining of dynamics on complex networks** Journal of Complex Networks  
M. Faccin, M.T. Schaub, J.-C. Delvenne
- **Chiral Quantum Walks** Phys. Rev. A 93, 042302  
D. L. Lu, J. D. Biamonte, J. Li, H. Li, T. H. Johnson, V. Bergholm, M. Faccin, Z. Zimborás, R. Laflamme, J. Baugh, and S. Lloyd
- **Mapping the topography of a protein energy landscape** J. Am. Chem. Soc., 2015, 137 (46), pp 14610–14625  
R. D. Hutton, J. Wilkinson, M. Faccin, E. M. Sivertsson, A. Pelizzola, A. R. Lowe, P. Bruscolini, L. S. Itzhaki
- **Community Detection in Quantum Complex Networks** Phys. Rev. X 4 (4 2014), p. 041012  
M. Faccin, P. Migdał, T. H. Johnson, V. Bergholm, and J. D. Biamonte
- **Degree Distribution in Quantum Walks on Complex Networks** Phys. Rev. X 3 (4 2013), p. 041007  
M. Faccin, T. Johnson, J. Biamonte, S. Kais, and P. Migdał
- **Quantum Transport Enhancement by Time-Reversal Symmetry Breaking** Sci. Rep. 3 (2013). Ed. by NPG, p. 2361  
Z. Zimboras, M. Faccin, Z. Kadar, J. Whitfield, B. Lanyon, and J. Biamonte
- **MS/MS Spectra Interpretation as a Statistical-Mechanics Problem** Analytical Chemistry 85.10 (2013), pp. 4884–4892  
M. Faccin and P. Bruscolini
- **Ground-state spin logic** Europhysics Letters 99.5 (2012), p. 57004  
J. D. Whitfield, M. Faccin, and J. D. Biamonte
- **Analysis of the equilibrium and kinetics of the ankyrin repeat protein myotrophin** The Journal of Chemical Physics 134.7, 075102 (2011), p. 075102  
M. Faccin, P. Bruscolini, and A. Pelizzola

## CONFERENCE (ORAL CONTRIBUTIONS)

- 7 March 2023 **Dynamical systems as a mean for complex systems analysis**  
seminar at the University of Bologna  
M. Faccin
- 9 Nov 2022 **Data-driven mapping of tuberculosis incidence allows identifying communities with high circulation of tuberculosis in the Democratic Republic of Congo**  
The Union Conference 2022 – Online  
M. Faccin, C. Nsop Mulaj, E. Swana Kawana, T. Yav Ikum, E. André
- 9 Nov 2022 **Identification of urban areas presenting high incidence of tuberculosis using satellite images allows increasing the yield of active case finding in Kigali, Rwanda.**  
The Union Conference 2022 – Online  
M. Faccin, P. Uwizeye, F. Nsabimana, P. Migambi, E. André

- 17 Oct 2022 **Use of compartmental models to detect high TB incidence rates in South-Kivu (DRC)**  
CCS 2022 @ Palma de Mallorca/Online  
M. Faccin, E. André
- **Reach of vaccine-critical content on Twitter during the COVID-19 pandemic**  
French Regional Conf. on Complex Systems (FRCCS) @ Paris  
M. Faccin, F. Gargiulo
- 30 May 2022 **Outreach of vaccine-critic content on French-speaking Twitter**  
CompleNet 2022 – Online  
M. Faccin, F. Gargiulo, J. Ward
- 2 Dec 2021 **Autoinformation state aggregation**  
Complex Networks 2021 @ Madrid (Spain)  
M. Faccin, M. T. Schaub, J-C. Delvenne
- 30 Nov 2021 **Vaccine-critical discourse on French-speaking Twitter and its outreach**  
Complex Networks 2021 @ Madrid (Spain)  
M. Faccin, F. Gargiulo, J. Ward  
Best lightning talk award
- 19 Oct 2021 **State aggregation for dynamical systems: An information-theoretic approach**  
Math Dept, Oxford University, (UK – Online)  
Network Seminar 2021
- 7-9 Dec 2020 **Using predictive models and risk assessment tools to find unreported TB cases**  
Washington DC, USA (online)  
Global Digital Health Forum 2020
- 20-24 Oct 2020 **Data-driven TB active-case finding in South Kivu (DRC)**  
Paris, France (online)  
The Union 2020
- 10-12 Dec 2019 **Auto-information in non-Markovian diffusion systems**  
Lisbon, Portugal  
Complex Networks 2019
- 22 Feb. 2019 **Variable aggregation for dynamical systems on networks**  
Hasselt, Belgium  
Benet 2019
- 23-28 Sept. 2018 **A dynamical approach to block structure analysis**  
Thessaloniki, Greece  
CCS 2018
- 11-15 Jun 2018 **Dynamical Markov Modules**  
Paris, France  
Netsci 2018
- 21-24 Mar 2017 **Community detection in networks with non-Markovian dynamics**  
Dubrovnik, Croatia  
CompleNet 2017
- 30 Nov-2 Dec 2016 **Behind Communities: Dynamics Define Modules**  
Milan, Italy  
ComplexNetworks 2016
- 19-22 Sep 2016 **Beyond Communities: Dynamical Markov Modules**  
Amsterdam, Netherlands  
CCS 2016
- May 30-June 3 2016 **Mesoscopic Structure And Diffusion Process Memory**  
Seoul, Korea  
NetSci 2016
- 10-15 Jan 2015 **Mesoscopic Structures and Diffusion Process Memory**  
Wrocław, Poland  
NetSci-X 2016
- 2-6 Jun 2015 **Structural controllability of EEG temporal causal networks**  
Zaragoza, Spain  
NetSci 2015
- 22-26 Sep 2014 **Quantum Approaches to Community Detection**  
Lucca, Italy  
ECCS 2014
- 12-14 Mar 2014 **Community detection on quantum systems**  
Bologna, Italy  
CompleNet 2014
- 22-24 Jan 2014 **Community Detection on Quantum Systems**  
Zaragoza, Spain  
BIFI2014
- 24-26 May 2013 **Degree distribution in quantum complex networks**  
Waterloo, Canada  
IQC workshop on quantum computation and complex networks
- 6-8 Nov 2012 **Ground state spin logic**  
Torino, Italy  
Tensor Network States and Algebraic Geometry Workshop
- 2-4 Feb 2011 **Equilibrium and kinetics of the ankyrin repeat protein Myotrophin through a simple statistical mechanical model**  
Zaragoza, Spain  
V BIFI National Conference
- 5-7 Feb 2009 **Bayesian Characterization of Protein Tandem Mass Spectra**  
Zaragoza, Spain  
IV BIFI National Conference
- 8-9 May 2008 **Noise description in MSMS mass spectrometry, looking for a de novo sequencing algorithm**  
San Sebastian, Spain  
VI Jornadas Aragonesas de Estabilidad y Plegamiento de Proteínas

## CONFERENCES (POSTER CONTRIBUTIONS)

- 1 Dec 2021 **Directed hyper-graphs and dynamical systems** Complex Networks 2021 @ Madrid (Spain)  
M. Faccin, F. Gargiulo
- 17-25 Sept 2020 **State aggregation in non-Markovian systems by auto-information maximization** Rome, Italy  
Netsci 2020
- 17-25 Sept 2020 **The variability of network structures inferred from time series data** Rome, Italy  
Netsci 2020
- 10-12 Dec 2019 **The variability of network structures inferred from time series data** Lisbon, Portugal  
Complex Networks 2019
- 1-3 July 2019 **Variable aggregation on (broadcasting) networks** Trento, Italy  
CCS/Italy 2019
- 23-25 Mar 2016 **Memory and Mesoscopic Structures in Diffusion Processes** Dijon, France  
Complemet 2016
- 7-10 Jul 2010 **Folding Pathways Characterization for Ankyrin Repeat Protein Myotrophin** Zaragoza, Spain  
IV Spanish Portuguese Biophysical Congress
- 2-6 Jun 2008 **Statistical characterization of fragment ions in MSMS mass spectrometry** Sitges, Spain  
XXI Sitges Conference on Statistical Mechanics: Statistical Mechanics of Molecular Biophysics

## COMPUTER SKILLS

- Coding Python, C, Matlab, Fortran  
Shell Bash, iPython/Jupyter  
Versioning GIT, Subversion, Mercurial  
Plotting Matplotlib (python), Gnuplot, PGFPlots (LaTeX)  
Typesetting LaTeX, LibreOffice, MSOffice, Markdown  
Imaging Gimp (Raster), Tikz (LaTeX), Inkscape (Vectorial), Rawtherapee (RAW)  
Web HTML5, CSS/SCSS, static site generators, Wordpress

## LANGUAGES

- Italian Mother tongue  
English Fluent  
Spanish Fluent  
French Fair

Mauro Faccin