

# MAURO FACCIN

Curriculum Vitæ

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

## ORGANIZING COMMITTEES

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

## REVIEWER

- APS (PRA, PRB, PRE, PRX)
- Advances in Complex Systems
- Applied Network Science
- Journal of Complex Networks
- Journal of Statistical Mechanics
- Natural Computing
- PLOS ONE
- Science Advances
- Scientific Reports

## TEACHING

2023-2024	DAT301 Social Network Analysis with F. Gargiulo and A. Apolloni	University Mohammed VI Polytechnic
2015-2020	LINMA2111 Algorithms and Complexity with J-C Delvenne	Université Catholique de Louvain
2005	Physics and Math at primary school NEST	Hetauda, Nepal
2004	guide in Science Museum Organizer: INFN	Padova, Italy

## 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

- **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. Boutachkout, 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

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

## CONFERENCES (POSTER CONTRIBUTIONS)

1 Dec 2021	<b>Directed hyper-graphs and dynamical systems</b> M. Faccin, F. Gargiulo	Complex Networks 2021 @ Madrid (Spain)
17-25 Sept 2020	<b>State aggregation in non-Markovian systems by auto-information maximization</b> Netsci 2020	Rome, Italy
17-25 Sept 2020	<b>The variability of network structures inferred from time series data</b> Netsci 2020	Rome, Italy

- 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  
CompleNet 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), Tikx (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