

MAURO FACCIN

Curriculum Vitæ

Dip. di Scienze Mediche e Chirurgiche
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<https://maurofaccin.github.io>
Preferred pronouns: he/him

ACTUAL POSITION

2023-today **DIMEC at University of Bologna** University of Bologna, Italy
Interests/Research line

- Use of complex systems and machine learning tools to detect antibiotic resistance.
- Analysis of medical data through the use of Machine learning and complex networks combined approaches.
- Mesoscopic structures and their influence on the dynamical system.
- Applied data analysis for disease control.
- Analysis of information dynamics in social networks and medical systems.

PROFESSIONAL EXPERIENCE

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 Corelatore tesi magistrale with F. Durazzi and D. Remondini in Applied Physics	University of Bologna
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- Integration of artificial intelligence and network approaches to classify data in social networks
- 2019 **G. Izzì** 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

- **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 **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)
7-9 Dec 2020	Network Seminar 2021 Using predictive models and risk assessment tools to find unreported TB cases	Washington DC, USA (online)
20-24 Oct 2020	Global Digital Health Forum 2020 Data-driven TB active-case finding in South Kivu (DRC)	Paris, France (online)
10-12 Dec 2019	The Union 2020 Auto-information in non-Markovian diffusion systems	Lisbon, Portugal
22 Feb. 2019	Complex Networks 2019 Variable aggregation for dynamical systems on networks	Hasselt, Belgium
23-28 Sept. 2018	Benet 2019 A dynamical approach to block structure analysis	Thessaloniki, Greece
11-15 Jun 2018	CCS 2018 Dynamical Markov Modules	Paris, France
21-24 Mar 2017	Netsci 2018 Community detection in networks with non-Markovian dynamics	Dubrovnik, Croatia
30 Nov-2 Dec 2016	CompleNet 2017 Behind Communities: Dynamics Define Modules	Milan, Italy
19-22 Sep 2016	ComplexNetworks 2016 Beyond Communities: Dynamical Markov Modules	Amsterdam, Netherlands
May 30-June 3 2016	CCS 2016 Mesoscopic Structure And Diffusion Process Memory	Seoul, Korea
10-15 Jan 2015	NetSci 2016 Mesoscopic Structures and Diffusion Process Memory	Wrocław, Poland
2-6 Jun 2015	NetSci-X 2016 Structural controllability of EEG temporal causal networks	Zaragoza, Spain
22-26 Sep 2014	NetSci 2015 Quantum Approaches to Community Detection	Lucca, Italy
12-14 Mar 2014	ECCS 2014 Community detection on quantum systems	Bologna, Italy
22-24 Jan 2014	CompleNet 2014 Community Detection on Quantum Systems	Zaragoza, Spain
24-26 May 2013	BIFI2014 Degree distribution in quantum complex networks	Waterloo, Canada
6-8 Nov 2012	IQC workshop on quantum computation and complex networks Ground state spin logic	Torino, Italy
2-4 Feb 2011	Tensor Network States and Algebraic Geometry Workshop Equilibrium and kinetics of the ankyrin repeat protein Myotrophin through a simple statistical mechanical model	Zaragoza, Spain
5-7 Feb 2009	V BIFI National Conference Bayesian Characterization of Protein Tandem Mass Spectra	Zaragoza, Spain
8-9 May 2008	IV BIFI National Conference 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
17-25 Sept 2020	Netsci 2020 The variability of network structures inferred from time series data	Rome, Italy
10-12 Dec 2019	Netsci 2020 The variability of network structures inferred from time series data	Lisbon, Portugal
1-3 July 2019	Complex Networks 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**

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