MAURO FACCIN
Curriculum Vitæ

Dip. di Scienze Mediche e Chirurgiche
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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 resitance.
- 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 bicroblogging 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 succesfully 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 Fundation**   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

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** Univestità 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

Mainteined 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. 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

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. Andé

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**
	Washingthon 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 statiscical 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
	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