

## 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
- 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

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

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

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

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

## 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)**

## MEMBERSHIP

2018 - today **SICC - Italian Society for Chaos and Complexity**

2015 - today **Network Science Society**  
Member

2014 - today **Complex Systems Society**  
Member

2013 - today **Frontiers in Quantum Computing**  
Review Editor

## 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** Beaumont, Belgium  
Coorganized with Alexandre Bovet, Benjamin Chiem, Leo Gutierrez, Alexey Medvedev, Leto Peel, Mridul Seth

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

## REVIEWER

- Advances in Complex Systems
- Applied Network Science
- APS (Physical Review E)
- Journal of Complex Networks
- Journal of Statistical Mechanics
- Natural Computing
- PLOS ONE
- Science Advances
- Scientific Reports

## TEACHING

- 2015-2020 **LINMA2111 Algorithms and Complexity** Assistant Professor  
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

- 2019 **G. Izzi** University of Turin  
Computer Science (with A. Semeraro)
- 2016 **H. Devillez** UCLouvain  
Applied Maths (with L. Peel)
- 2016 **M. Huet** UCLouvain  
Elec. Eng. (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. 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**  
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	<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	<b>The variability of network structures inferred from time series data</b> Complex Networks 2019	Lisbon, Portugal
1-3 July 2019	<b>Variable aggregation on (broadcasting) networks</b> CCS/Italy 2019	Trento, Italy
23-25 Mar 2016	<b>Memory and Mesoscopic Structures in Diffusion Processes</b> CompleNet 2016	Dijon, France
7-10 Jul 2010	<b>Folding Pathways Characterization for Ankyrin Repeat Protein Myotrophin</b> IV Spanish Portuguese Biophysical Congress	Zaragoza, Spain
2-6 Jun 2008	<b>Statistical characterization of fragment ions in MSMS mass spectrometry</b> XXI Sitges Conference on Statistical Mechanics: Statistical Mechanics of Molecular Biophysics	Sitges, Spain

## COMPUTER SKILLS

Coding	Python, C, Matlab, Fortran
Shell	Bash, iPython/Jupyter
Versioning	GIT, Subversion, Mercurial
Plotting	Gnuplot, Matplotlib, 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