



## Short bio

Associate Professor

Diego Garlaschelli is Associate Professor at the IMT School of Advanced Studies in Lucca (IT), where he directs the Networks research unit, and at the Lorentz Institute for Theoretical Physics of Leiden University (NL), where he leads the Econophysics and Network Theory group. His research interests are strongly interdisciplinary

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and include network theory, statistical physics, financial complexity, information theory, social dynamics and biological systems. He teaches courses in Complex Networks, Econophysics, and Complex Systems. He holds a 4-year master degree in theoretical physics from the University of Rome III (2001) and a PhD in Physics from the University of Siena (2005). He held postdoctoral positions at the Australian National University in Canberra (Australia), the University of Siena (Italy), the University of Oxford (UK) and the S. Anna School for Advanced Studies in Pisa (Italy). He has given more than 70 invited talks at international conferences, workshops, and scientific schools. He is author of more than 100 publications in peer-reviewed international journals and peer-reviewed book chapters, and of one co-authored monograph.

## Selected publications

(see below for full list of publications)

M Bardoscia, P Barucca, S Battiston, F Caccioli, G Cimini, D Garlaschelli, F Saracco, T Squartini, G Caldarelli (2021) The physics of financial networks. NATURE REVIEWS PHYSICS 3, 490-507.

G Cimini, T Squartini, F Saracco, D Garlaschelli, A Gabrielli, G Caldarelli (2019) The statistical physics of real-world networks. NATURE REVIEWS PHYSICS 1, 58-71.

T Squartini, G Caldarelli, G Cimini, A Gabrielli, D Garlaschelli (2018) Reconstruction methods for networks: the case of economic and financial systems. PHYSICS REPORTS 757, 1-47.

S Battiston, J Doyne Farmer, A Flache, D Garlaschelli, A G Haldane, H Heesterbeek, C Hommes, C Jaeger, R May, M Scheffer (2016) Complexity theory and financial regulation. SCIENCE 351 (6275), 818-819.

T Squartini, J de Mol, F den Hollander, D Garlaschelli (2015) Breaking of ensemble equivalence in networks. PHYSICAL REVIEW LETTERS 115, 268701.

M MacMahon, D Garlaschelli (2015) Community detection for correlation matrices. PHYSICAL REVIEW X 5, 021006.

L Valori, F Picciolo, A Allansdottir, D Garlaschelli (2012) Reconciling long-term cultural diversity and short-term collective social behavior. PNAS 109:4, 1068-1073.

D Garlaschelli, M I Loffredo (2009) Generalized Bose-Fermi Statistics and Structural Correlations in Weighted Networks. PHYSICAL REVIEW LETTERS 102, 038701.

D Garlaschelli, A Capocci, G Caldarelli (2007) Self-organized network evolution coupled to extremal dynamics. NATURE PHYSICS 3, 813-817.

D Garlaschelli, M I Loffredo (2004) Patterns of link reciprocity in directed networks. PHYSICAL REVIEW LETTERS 93, 268701.

D Garlaschelli, M I Loffredo (2004) Fitness-dependent topological properties of the World Trade Web. PHYSICAL REVIEW LETTERS 93, 188701.

D Garlaschelli, G Caldarelli, L Pietronero (2003) Universal scaling relations in food webs. NATURE 423: 6936, 165-168.

# Curriculum Vitae

## Personal information

## Current position(s)

Associate Professor (since 2018)  
Director of the NETWORKS unit  
IMT School of Advanced Studies, Lucca (IT)

Associate Professor (since 2016)  
Leader of the Econophysics and Network Theory (ENT) group  
Lorentz Institute for Theoretical Physics, University of Leiden (NL)

## Previous positions

2011-2016: Assistant Professor, Lorentz Institute for Theoretical Physics, Leiden Institute of Physics,  
University of Leiden (NL)

2010-2020: Associate Fellow, Said Business School, University of Oxford (UK)

2010-2011: Research Fellow, Laboratory of Economics and Management, Sant'Anna School of Advanced Studies, Pisa (Italy)

2009-2010: Research Associate, Green Templeton College, University of Oxford (UK).

2009-2010: Research Fellow, CABDyN Complexity Center, Said Business School, University of Oxford (UK).

2005-2009: Research Fellow and Lecturer, Physics Department, University of Siena (Italy).

2005: Visiting Fellow, Department of Applied Mathematics, Research School of Physical Sciences and Engineering, Australian National University, Canberra (Australia).

2005: Research Contract, Italian National Research Council (CNR), Institute of Complex Systems (ISC), Rome (Italy).

2005: Research Contract, Physics Department, University of Siena (Italy).

## **Education**

2005: PhD in Physics, University of Siena (Italy).

"Statistical Physics Approach to the Topology and Dynamics of Complex Networks".  
Supervisor: Prof. Maria I. Loffredo

2001: Degree in Physics, Third University of Rome (Italy).

"Proprietà Statistiche e di Auto-Organizzazione nelle Reti Ecologiche Complesse"  
Supervisor: Prof. Luciano Pietronero (Mark: 110/110)

## **Membership in scientific Institutes and Societies**

2023 - present: Associate Member of the Enrico Fermi Research Centre (CREF)

2021 - present: Member of the Italian National Institute for Advanced Mathematics (INDAM)

2019 - present: Member of the Italian Physics Society (SIF)

2019 - present: Member of the Italian Statistical Physics Society (SIFS)

2018 - present: Board Member and co-founder of the Dutch chapter of the Network Science Society (NetSci)

2011 - present: Member of the Dutch Physical Society (NNV)

## **Teaching activity**

at the IMT School of Advanced Studies, Lucca, Italy:

- Advanced Methods for Complex Systems I (PhD program in Systems Science): 2018 - present.
- Advanced Methods for Complex Systems II (PhD program in Systems Science): 2018 - present.
- Advanced Methods for Complex Systems III (PhD program in Systems Science): 2018 - 2020.

at the University of Leiden and in the Netherlands:

- Course "Physics of Finance" (BSc in Physics, Mathematics, and Computer Science, Leiden): 2022 - present.
- Course "Complex Networks" (MSc in Physics, Mathematics, and Computer Science, Leiden): 2014 - present.
- Course "Econophysics" (MSc and BSc in Physics, Leiden): 2011 - present.
- Course "Advanced Topics in Theoretical Physics" (PhD in Physics, Leiden): 2022.
- Honours course "Complexity and Networks", Leiden University Medical Centre: 2017-2018.

- Course "Complex Networks", Studium Generale, Leiden University: 2017.
- Lecturer at the Dutch Research School of Theoretical Physics: 2011.
- Lecturer at the graduate Casimir School (Leiden/Delft): 2011.

at the University of Siena, Italy:

- PhD Course "Network Theory and Complexity" (PhD Program in Chemistry): 2011.
- Organizing responsible of the "Chair in Econophysics": 2008-2011.
- Organizing responsible of the Multidisciplinary PhD Program "Physics and Complex Systems": 2008-2011.
- Course "Physics of Complex Systems" (MSc in Physics): 2006 - 2009.
- Cycle of seminars on "Statistical Mechanics" (BSc in Physics): 2007.
- Course "Structure of Matter II" (MSc in Physics): 2005 - 2006.
- Course "Physics" (BSc in Pharmacy): 2004 - 2009.
- Course "Probabilistic Models" (Postgraduate Diploma in BioInformatics): 2003 - 2010.

## **Supervision of postdocs and visiting scientists**

- Pablo Villegas (postdoc, IMT Lucca, September 2020 - January 2022).
- Ioannis Anagnostou (visiting scientist from the University of Amsterdam, May 2019).
- Emiliano Marchese (visiting scientist from IMT Lucca, June - December 2019).
- Federica Parisi (visiting scientist from IMT Lucca, January - June 2018).
- Alex Becker (visiting scientist from Boston University, January - March 2018).
- Carlo Nicolini (visiting scientist from IIT Rovereto, April - July 2017).
- Vasyil Palchikov (postdoc co-supervised with Alexey Boyarsky, January 2014 - May 2017).
- Tiziano Squartini (postdoc, January 2012 - December 2013).
- Rossana Mastrandrea (visiting scientist from S. Anna School of Advanced Studies in Pisa, March - May 2012 and March - June 2013).
- Francesco Picciolo (visiting scientist from Siena University, January - June 2013).
- Franco Ruzzenenti (visiting scientist from Siena University, October - December 2011).

## **Supervision of PhD students**

- Jingjing Wang (Leiden University, started June 2022).
- Riccardo Milocco (IMT Lucca, started November 2021).
- Anna Gallo (IMT Lucca, started November 2021).
- Massimiliano Fessina (IMT Lucca, started November 2021).
- Francesca Giuffrida (IMT Lucca, started November 2020).
- Alessio Catanzaro (IMT Lucca, started November 2020).
- Valentina Macchiati (Joint PhD in Data Science, IMT Lucca, started November 2019).
- Pierfrancesco Dionigi (University of Leiden, started October 2019).
- Margherita Lalli (IMT Lucca, started November 2018).
- Marzio Di Vece (IMT Lucca, started November 2018).
- Giulio Virginio Clemente (IMT Lucca, started November 2018).
- Leonardo Ialongo (Joint PhD in Data Science, IMT Lucca, started November 2018).
- Andrea Somazzi (Joint PhD in Data Science, IMT Lucca, started November 2018).
- Maria Mircea (co-supervised with Stefan Semrau, University of Leiden, started April 2018)
- Qi Zhang: "Statistical Physics and Information Theory for Systems with Local Constraints" (University of Leiden, 2016-2021).
- Janusz Meylahn: "Stochastic resetting and hierarchical synchronization" (co-supervised with F. den Hollander, University of Leiden, 2015-2019).
- Andrea Roccaverde: "Breaking of Ensemble Equivalence for Complex Networks" (co-supervised with F. den Hollander, University of Leiden, 2014-2018).
- Elena Garuccio: "Reconstruction, modelling and analysis of economic networks" (University of Siena, 2014-2018).
- Valerio Gemmetto: "On metrics and models for multiplex networks" (University of Leiden, 2013-2017).

- Alexandru-Ionut Babeanu: "Empirical signatures of universality, hierarchy and clustering in culture" (University of Leiden, 2013-2018).
- Assaf Almog: "Maximum entropy models for financial systems" (University of Leiden, 2013-2017).
- Tiziano Squartini: "Information-theoretic approach to the analysis of complex networks" (University of Siena, 2008-2011).
- Luca Valori: "Complex systems approach to socioeconomic and cultural dynamics" (University of Siena, 2007-2010).

## Supervision of masters students

- Benjamin Claus (Leiden University, in progress).
- Sylvain Bangma (Leiden University, in progress).
- Vladyslav Verteletskyi: "Renormalization of networks with weighted links" (University of Leiden, 2022).
- Camille de Valk: "Statistical Ensembles of Financial Networks and the Dynamics of Cascading Defaults" (University of Leiden, 2021).
- Andrea Rachkov: "Bias in Non-Entropy-Maximizing Network Reconstruction Methods" (University of Leiden, 2020).
- Joseph Salaris: "Creating a Holographic Statistical Mechanical-Network Model with Tree Networks" (University of Leiden, 2020).
- Serop Lazarian: "Maximum entropy models for the reconstruction of financial networks" (University of Utrecht, 2017).
- Toms Reksna: "Complex Network Analysis of Darknet Black Market Forum Structure" (University of Leiden, 2017).
- Nedim Bayrakdar: "Coupled Multilayer Networks" (University of Leiden, 2018).
- Thomas van Hees (co-supervised with L. Avena) (University of Leiden, in progress).
- Matteo Insolia (University of Padova, Erasmus program 2016).
- Sander van Lidth de Jeude (University of Leiden, 2015).
- Ruben Krantz: "Maximum entropy justification for an economical performance indicator" (University of Leiden, 2016).
- Hans Frijters: "Maximum-Entropy method to detect financial market events" (University of Leiden, 2016).
- Ferry Besamusca: "Maximum Entropy Matrices: Filtering Randomness" (University of Leiden, 2016).
- Matteo Quattropiani (co-supervised with L. Avena): "Spectral Techniques of Community Detection - a probabilistic perspective" (University of Leiden, 2016).
- Marc van Kralingen: "Detecting stock market clustering - Pattern recognition and the maximum entropy principle" (University of Leiden, 2016).
- Stella Xenou: "Fluctuation-Dissipation relationships for the evolution of the International Trade Network" (University of Leiden, 2015).
- Arjen Aerts: "Social multiplexity in a generalised Axelrod model of cultural dissemination" (University of Amsterdam, 2015).
- Jorinde van de Vis (University of Leiden, 2014).
- Eli van Es: "An improved maximum-likelihood solver for the analysis of graph ensembles" (University of Leiden, 2014).
- Marc de Voogt (co-supervised with K. Schalm): "A Study in Configuration Relaxation of Space: Resonant Tunneling in Field Theory and The Freezing of Bubbly Space" (University of Leiden, 2012).
- Assaf Almog: "Maximum Entropy Matrices: Towards a Statistical Physics of Time Series" (University of Delft, 2012).
- Mel MacMahon: "Application of Complex Network Theory to Time Series Clustering: Probing the Mesoscopic Structure of Financial Markets" (University of Delft, 2012).
- Silvia Bottini: "Analysis of protein structure in the framework of a complex systems perspective" (University of Siena, Italy, 2010).
- Tiziano Squartini: "Entropia di reti complesse: teoria e risultati empirici" (University of Siena, Italy, 2008).
- Luca Valori: "Analisi di comportamenti sociali complessi e dinamiche culturali attraverso i dati europei di percezione pubblica della scienza" (University of Siena, Italy, 2007).
- Francesco Picciolo: "Studio di reti sociali ed eterogeneità culturale tramite i dati europei di percezione pubblica della scienza" (University of Siena, Italy, 2007).