

# Giulia Bertagnolli

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## Education

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### University of Trento & CoMuNe Lab, ICT, Fondazione Bruno Kessler

Trento, Italy

PHD IN MATHEMATICS, CUM LAUDE

2019 - Dec. 2021

- Thesis title: *Modelling the geometry of complex networks*
- Main supervisor: Dr. Manlio De Domenico
- Co-supervisor: Prof. Claudio Agostinelli

### University of Trento

Trento, Italy

MASTER OF SCIENCE IN IN MATHEMATICS FOR LIFE SCIENCES

2016 - 2018

- Thesis title: *Complex Networks and Statistical Data Depths*
- Supervisors: Dr. Manlio De Domenico, Prof. Claudio Agostinelli

### Bologna Business School, Alma Mater Studiorum - Università di Bologna

Bologna, Italy

1ST LEVEL MASTER IN DATA SCIENCE

2015 - 2016

- With a scholarship from the Boston Consulting Group awarded on merit.

### University of Trento

Trento, Italy

BACHELOR IN MATHEMATICS

2010 - 2014

- Thesis Title: *Common Principal Component Analysis with Applications*
- Supervisor: Prof. Pierluigi Novi Inverardi

### Liceo Bertrand Russell

Cles (TN), Italy

DIPLOMA DI LICEO LINGUISTICO

2005 - 2010

- 4<sup>th</sup> year of study abroad at the Theo-Koch-Schule, Grünberg, Germany

## Publications

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Oriol Artime, Barbara Benigni, **Giulia Bertagnolli**, Valeria D'Andrea, Riccardo Gallotti, Arsham Ghavasieh, Sebastian Raimondo, Manlio De Domenico (2022). Multilayer Network Science: From Cells to Societies, Elements in Structure and Dynamics of Complex Networks, Cambridge University Press, coming soon.

**Giulia Bertagnolli**, Riccardo Gallotti and Manlio De Domenico (2021). Quantifying efficient information exchange in real network flows. *Commun. Phys.* 4, 125 (2021). DOI, arXiv.

**Giulia Bertagnolli** and Manlio De Domenico (2021). Diffusion geometry of multiplex and interdependent systems. *Phys. Rev. E* 103, 042301. DOI. arXiv

Riccardo Gallotti, **Giulia Bertagnolli**, Manlio De Domenico (2021). Unraveling the hidden organisation of urban systems and their mobility flows. *EPJ Data Sci.* 10, 3 (2021). DOI, arXiv

Nina Verstraete, Giuseppe Jurman, **Giulia Bertagnolli**, Arsham Ghavasieh, Vera Pancaldi, Manlio De Domenico (2020). CovMulNet19, integrating proteins, diseases, drugs, and symptoms: a network medicine approach to covid-19. *Network and systems medicine*, Volume 3, 1, 130–141. DOI.

**Giulia Bertagnolli**, Claudio Agostinelli, Manlio De Domenico (2019). Network depth: identifying median and contours in complex networks. *Journal of Complex Networks*, Volume 8, Issue 4. DOI, arXiv

Lorenzo Candeago, **Giulia Bertagnolli**, Paolo Bosetti, Michele Vescovi, Francesco Sacco and Bruno Lepri (2019). Cities of a feather flock together: a study on the synchronization of communication between Italian cities. *EPJ Data Sci.* 8 (1), 19 DOI

## Recent Talks

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### Workshop of the Italian chapter of the Complex Systems Society

online

WORKSHOP CSS/ITALY

May 25 2022

**Giulia Bertagnolli** and Manlio De Domenico. Functional rich-clus in complex networks. Invited talk.

## Conference on Complex Systems

CCS2021

Lyon, FR

Oct 25-29 2021

**Giulia Bertagnolli** and Manlio De Domenico. Diffusion geometry of multiplex and interdependent systems.

## A Joint Sunbelt and NetSci Conference

NETWORKS 2021

IUNI Indiana, US

Jul 5-10 2021

**Giulia Bertagnolli** and Manlio De Domenico. Diffusion geometry of multiplex and interdependent systems.

## International (Online) Conference on Complex Networks

COMPLENET LIVE 2021

Exeter, UK

May 24-26 2021

**Giulia Bertagnolli** and Manlio De Domenico. Diffusion geometry of multiplex and interdependent systems.

## International (Online) Conference on Complex Systems

CCS 2020

Thessaloniki, GR

Dec 4-11 2020

**Giulia Bertagnolli** and Riccardo Gallotti and Manlio De Domenico. Quantifying efficient information exchange in real network flows. DOI: 10.5281/zenodo.4419178

## International School and Conference (Online) on Network Science

NETSCI 2020

Rome, IT

Sept 7-15 2020

**Giulia Bertagnolli** and Riccardo Gallotti and Manlio De Domenico. Quantifying efficient information exchange in real network flows.

## International School and Conference (Online) on Network Science

NETSCI 2020 - NETCENT SATELLITE

Rome, IT

Sept 7-15 2020

**Giulia Bertagnolli** and Claudio Agostinelli and Manlio De Domenico. Network depth: identifying median and contours in complex networks.

## Higher-order connectivity and correlations in complex systems

CSH WORKSHOP ON HIGHER-ORDER INTERACTIONS

Vienna, AT

Nov 25-26 2019

**Giulia Bertagnolli** and Manlio De Domenico. Diffusion processes and the functional organization of complex networks.

## Teaching Activity

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### Probability and Statistics Undergraduate Course

TUTOR

Trento, Italy

Spring sem. 2021/2022

30h of tutoring/teaching in the Probability and Statistics course for the Undergraduate degree in Computer Science

### Graphical models and network science

INVITED LECTURER

Trento, Italy

12h Dec. 2021

An introduction to network science for the Master degree in Mathematics, inside the course "Graphical models and network science" of prof. Veronica Vinciotti.

### Fundamentals of network analysis: hands on

SEMINAR

Trento, Italy

4h Spring 2021

Seminar for the course "Network Science: theory and lab" of the MSc in Data Science.

### Fundamentals of network analysis: hands on

SEMINAR

Trento, Italy

6h Spring 2020

Seminar for the course "Network Science: theory and lab" of the MSc in Data Science.

### Probability and Statistics Undergraduate Course

TUTOR

Trento, Italy

Autumn sem. 2018/2019

34h of tutoring/teaching in the Probability and Statistics course for the Undergraduate degree in Computer Science

## Other projects

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**R package: intsegration** Released on [github.com/gbertagnolli/intsegration](https://github.com/gbertagnolli/intsegration), this R package enables the evaluation of the efficiency of weighted networks. The main algorithm is written in C, as a variation on the classic Floyd-Warshall algorithm for computing weighted shortest paths and distances. This package collects the code used in the paper [EPJ Data Sci. 10, 3 (2021)] and [Commun. Phys. 4, 125 (2021)].

**R package: diffudist** Released on [gbertagnolli.github.io/diffudist](https://github.com/gbertagnolli/diffudist), this R package collects the functions for the computation of diffusion distances on complex (single-layer) networks.

**R package: muxViz 3.0** I contributed in this R package by Dr. Manlio De Domenico. In particular I built the R package, starting from

R scripts, built the package website, using pkgdown, and helped deploying it on github.

**Notte dei Ricercatori 2021** TBD: Sep. 24, 2021

**Notte dei Ricercatori 2019** Demo hands-on: *Sei connesso?*

## Reviewer Activity

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**Statistics Surveys**

*Institute of Mathematical Statistics*

**Journal of the Royal Statistical Society: Series A (Statistics in Society)**

*Royal Statistical Society*

**Physical Review E**

*American Physical Society*

**Physical Review E**

*American Physical Society*

**Journal of Physica A: Mathematical and Theoretical**

*IOP Publishing*

Selected as an Outstanding Reviewer for Journal of Physics A: Mathematical and Theoretical for 2019.

**Physical Biology**

*American Physical Society*