

Federico Bellisardi

Post Doc Researcher

Born: 1993

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About me

Physicist working on urban mobility with the tools of complex systems and data science. Ph.D. in Physics from the University of Bologna, now postdoctoral researcher at IFISC (CSIC–UIB). I build data-driven and physics-informed models of how people and vehicles move through cities, how networks congest, and how terrain shapes urban structure.

Programming Languages

LaTeX

Python

C++

Soft Skills

- Teamwork & Collaboration
- Problem Solving
- Project Management
- Scientific Communication
- Interdisciplinary Research

Experience

2025-now — Post Doc Researcher — IFISC (CSIC–UIB), Palma de Mallorca

Data analysis applied to urban mobility and study of urban structures. Developing data-driven models for sustainable smart cities. Machine learning applications for visual analysis and video processing. Collaborating on interdisciplinary projects combining physics and data science.

2021-2022 — Research Fellow — University of Bologna

Conducted research on traffic flow modeling and data analysis. Developed agent-based models for urban mobility. Collaborated with interdisciplinary teams on smart city projects.

2019-2020 — SAP - ABAP Developer — E-Services, De Longhi Company

Developed and maintained SAP applications using ABAP. Implemented business solutions and data management systems. Supported IT infrastructure for corporate operations.

Education

2022-2024 — Ph.D. Physics — University of Bologna

Dissertation Title: Data analytics and predictive models for sustainable multimodal mobility in future smart cities

Supervisor: A. Bazzani. Defended May 2025.

2015-2019 — M.Sc. Theoretical Physics — University of Bologna

Dissertation Title: Stability Of Gaseous Structures in Axisymmetric Rotation in presence of a Black Hole

2012-2015 — B.Sc. Physics — University of Bologna

Dissertation Title: Studio del Trapping Adiabatico per Mappe Stocastiche

Visiting

2024 — IFISC — February 11th - March 11th, November 11th - November 18th

Universitat de les Illes Balears

2023 — USJ — October 2nd - October 9th

Universidad San Jorge - Zaragoza

2023 — IFISC — March 1st - June 29th

Universitat de les Illes Balears

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Languages

Italian: Native
English: Advanced
Spanish: Advanced
French: Basic

Skills

I have extensive experience in programming, data analysis, and model development, with advanced proficiency in Python and C++, alongside expertise in LaTeX for technical documentation. My core skills include designing data-driven models, optimizing algorithms, and applying machine learning to real-world problems. I excel at analyzing large datasets, extracting actionable insights, and creating effective data visualizations.
Technical Stack: Python (NumPy, Pandas, Matplotlib, Seaborn), Machine Learning (scikit-learn, PyTorch, TensorFlow, Keras), Git, C++, SQL.
I work effectively in interdisciplinary teams, bridging technical challenges with strategic objectives. My problem-solving approach and attention to detail enable me to tackle complex challenges in dynamic environments. I leverage technology to drive innovation in smart cities, urban mobility, and sustainable development, staying at the forefront of emerging tools and technologies.

Publications

In Preparation

- The Spatial Hierarchy of Urban Traffic Congestion.
  Dalla F., Berselli G., Bellisardi F., Bazzani A., Ramasco J.J.
  In Preparation, 2026
- Characterizing mobility differences between leisure and working-days in cities.
  Bellisardi F., Luca M., Liu E., Lepri B., Mazzoli M., Ramasco J.J.
  In Preparation, 2026

Preprints

- Data-driven regional traffic simulation from heterogeneous mobility sources.
  Bellisardi F., Mizzi C., Fabbri A., Micheli D., Vannelli A., Bazzani A.
  arXiv preprint, 2026
- Mobility energetic balance frames spatial configuration of cities.
  Bellisardi F., Cano-Suñén E., Ruiz-Varona A., Ramasco J.J.
  arXiv:2610.21558 [physics.soc-ph]; doi, 2026

Published

- The Social Dynamics and Thermodynamics Mobility on Urban Networks.
  Turchetti G., Bellisardi F., Panichi F., Zanlungo F.
  International Interdisciplinary Chaos Symposium on Chaos and Complex Systems, Springer; doi, 2026
- Congestion transition on random walks on graphs.
  Di Meco L., Degli Esposti M., Bellisardi F., Bazzani A.
  Entropy 2024, 26(8), 632; doi, 2024
- Esercizi risolti di metodi matematici per le scienze applicate.
  Bellisardi F., et al.
  CEA, Zanichelli, 2024

Conferences

2026	FisEs'26, Tarragona	October 14th - 16th
	Poster: Mobility energetic balance as a driver of urban spatial organization.	
2026	CS2Italy 2026, Turin	May 19th - 21st
	Highlight Talk: Energetic optimality of urban networks embedded in real landscapes.	
2026	4th Meeting Spanish Complex Systems Society, Seville	January 21st - 23rd
	Poster: Energetic optimality in the spatial organization of cities.	
2025	II Congreso Español sobre Investigación en Movilidad, Zaragoza	October 2nd - 3rd
	Invited Talk: Inferring Urban Morphology through gravitational work minimization of Twitter-derived trajectories.	
2025	Conference on Complex Systems 2025, Siena	September 1st - 5th
	Talk: Data-Driven Agent-Based Reconstruction of Inter-Urban System Dynamics.	
2024	NetSci-X 2024, Venice	January 22nd - 25th
	Poster: An Agent-Based Model for Traffic Flows Reconstruction from Distributed Data.	
2023	I Congreso Español sobre Investigación en Movilidad, Zaragoza	October 5th - 6th
	Invited Talk: Reconstrucción del Flujo de Tráfico a Partir de Datos Distribuidos. Caso de Estudio Emilia Romagna, Italia.	
2023	INFN IS BioPhys 2023, Rimini	September 18th - 20th
	Talk: Traffic Flows Reconstruction from Distributed Data: a Case Study.	
2022	INFN IS BioPhys 2022	September 14th - 16th
	Talk: Data Driven Dynamical Model for Traffic Flows on a Road Network.	

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Workshops

2024 — CaLISTA Geometry-Informed Machine Learning — September 2nd - 5th
Mines Paris, France
Presented: An Agent-Based Model for Traffic Flow Reconstruction from Distributed Data.

2023 — XI GEFENOL Summer School — July 17th - 28th
Statistical Physics of Complex Systems – Barcelona, Spain

2022 — S.LI.DES. Project Workshop — June 9th - 10th
Governance of Tourist Flows in Smart Cities – Rimini, Italy

2022 — INFN School of Statistics 2022 — May 15th - 20th
Paestum (SA), Italy

Teaching (University of Bologna)

2023-2024 Mathematics/Physics Support – Pharmacy
2023-2024 Applied Mathematics and Statistics – Biotechnology
2022-2023 Mathematics and Computer Science – Biotechnology
2022-2023 Mathematics, Computer Science and Physics – Pharmaceutical Sciences
2021-2022 Physics – Biological Sciences

Thesis Co-Supervision

2025-2026 — Ana Colomo Alonso – M.Sc.
Modeling Disease Spread in Urban Areas: The Role of Pollution
M.Sc. Physics of Complex Systems, UIB. With J.J. Ramasco.

2022 — Daniele Pucci – B.Sc.
Analisi di video con visione binoculare
B.Sc. Physics, Univ. of Bologna. With A. Bazzani.

Awards and Achievements

2026 — Awarded the MSCA Seal of Excellence for the project *"HYPER-MOB: HYbrid, Physics-guided AI model in Extra-rapid-growth Regions for urban MOBility"* (HORIZON-MSCA-2025-PF-01-01 — MSCA Postdoctoral Fellowships 2025).

2023 — Marco Polo Grant, University of Bologna
Awarded for research mobility abroad

Research Projects

2025-now — SIESTA — Horizon Europe - EOSC
Synthetic populations for computational epidemiology models.

2025-now — COSASTI — Agencia Estatal de Investigación
Complex systems approach to urban systems and computational epidemiology.

2025-2026 — DataRoad — Spanish Ministry, I+D on AI
AI tools for automatic detection of road infrastructure anomalies.

2023-2025 — PNRR - Spoke 7 CCAM — MUR - PNRR
Regional-scale traffic models for congestion and smart infrastructures.

2022-2024 — TIM - UNIBO — TIM S.p.A.
Data analytics and predictive models for sustainable multimodal mobility.

2020-2025 — Regional Traffic Monitoring — Emilia-Romagna Region
Traffic flow model for the regional road network and real-time simulation platform.

2020-2022 — S.LI.DES. — Interreg Italy-Croatia
Pedestrian mobility models for tourist flows in historical centers.