Curriculum Vitae of Alessandro Lonardi

Personal data

- Full name (pronouns): Alessandro Lonardi (he/him)
- Employment: PhD student at the Max Planck Institute for Intelligent Systems
- Address: Room S2.018, Max-Planck-Ring 4, 72076, Tübingen, Germany
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- Personal website: aleable.github.io

Short bio

I am a PhD student at the Max Planck Institute for Intelligent Systems (GER). Previously, I got my Master's degree in Mathematical Engineering at the University of Padova (IT), where I also obtained my Bachelor's degree in Physics. My PhD is supported by the International Max Planck Research School for Intelligent Systems (IMPRS-IS), which is part of the Cyber Valley initiative.
My research focuses on data-rich problems where inferential predictions and mechanistic models mutually inform each other to describe complex systems. To address these problems, I develop mathematical models rooted in statistical physics and scalable algorithms. My interests are mainly in, but not limited to, urban sciences, machine learning, and social sciences.

Research experience

Sep 1, 2020 – expected: 2024

PhD student | Max Planck Institute for Intelligent Systems: Physics for Inference and Optimization group, Tübingen, Germany

Mar 1, 2020 – Aug 31, 2020

Research Intern | Max Planck Institute for Intelligent Systems: Physics for Inference and Optimization group, Tübingen, Germany

Education

Sep 1, 2020 – expected: 2024

PhD in Computer Science | University of Tübingen, Max Planck Institute for Intelligent Systems, Tübingen, Germany
Thesis: Designing Networks with Adaptation Rules and Optimal Transport
Supervisor: Dr. Caterina De Bacco
Program: International Max Planck Research School for Intelligent Systems (IMPRS-IS)

Oct 1, 2018 – July 23, 2020

Master's Degree in Mathematical Engineering | University of Padova, Italy (cum laude)
Thesis: Developing new methods for routing and optimal transport on networks
Supervisor: Prof. Mario Putti
Co-supervisor: Dr. Caterina De Bacco
Curriculum: Mathematical Modelling for Engineering and Science

Oct 1, 2015 – Sep 24, 2018

Bachelor's Degree in Physics | University of Padova, Italy
Thesis: Dynamics and thermodynamics of the adiabatic piston (in Italian)
Supervisor: Prof. Giancarlo Benettin

Additional work experience

Oct, 2022 – Apr, 2023

Head, co-founder | Commute, Germany

Advancement: Our startup was dedicated to providing data-driven solutions to policymakers to build transportation infrastructures for better livability in cities. It was admitted to the initial phase of the MAX!mize incubation program (maximize-incubator.com) for the Max Planck Society, supported by Max Planck Innovation GmbH

Talks

Each category is in reverse chronological order.

Contributed talks

[CT3] Bilevel optimization for flow control in optimal transport networks
Netsci 2023 (Vienna, Austria, 2023) · Abstract · Slides

[CT2] Infrastructure adaptation and emergence of loops in network routing with time-dependent loads
Netsci 2023 Satellite, Networks & cities (Vienna, Austria, 2023) · Abstract · Slides

[CT1] Optimal transport in networks for design and flux optimization
NetPLACE Seminars (online, 2023) · Slides · Video

Teaching experience

Oct 21, 2021 – Feb 11, 2022

Teaching assistant of Advanced Probabilistic Machine Learning and Applications | University of Tübingen, Tübingen, Germany
Lecturer: Dr. Caterina De Bacco

Apr 19, 2021 – July 31, 2021

Teaching assistant of Advanced Probabilistic Machine Learning and Applications | University of Tübingen, Tübingen, Germany
Lecturer: Dr. Caterina De Bacco

Academic service

Peer-review: Journal of Physics Communications 3, Physica Scripta 2

Languages

English (proficient user) – IELTS score: 8/9 | Cambridge ESOL: CAE | CEFR: C1

Italian (native)

German (independent user) – CEFR: B1 (formal training in progress)

Spanish (basic user) – CEFR: ∼A1/A2 (personal interest)

IT skills

Advanced level: Python (libraries for scientific computing, data science, ML, data visualization), Linux: Debian-based distributions, macOS, LaTeX, code parallelization on computing infrastructures, git

Basic level: C++, Mathematica, Microsoft Office Suit, Linux: Arch-based distributions, MATLAB, HTML, CSS

Extracurricular activities

July 30-31, 2022 **Volunteer** for TReND in Africa Python Workshop 2022 | online (trendinafrica.org)

2016 – 2017 **Volunteer** for Pint of Science Italia, Padua, Italy (pintofscience.it)

Publications

Each category is in reverse chronological order. Asterisks denote equal contribution.

Journal Papers

[JP7] Message-Passing on Hypergraphs: Detectability, Phase Transitions, and Higher-Order Information
Nicolò Ruggeri*, Alessandro Lonardi*, Caterina De Bacco
Journal of Statistical Physics: Theory and Experiment · arXiv · GitHub · CO_2 compensation

[JP6] Bilevel Optimization for Traffic Mitigation in Optimal Transport Networks
Alessandro Lonardi, Caterina De Bacco
Physical Review Letters 131, 267401 (2023) · arXiv · GitHub

[JP5] Immiscible Color Flows in Optimal Transport Networks for Image Classification
Alessandro Lonardi*, Diego Baptista*, Caterina De Bacco
Frontiers in Physics 11:1089114 (2023) · arXiv · GitHub · Poster · CO_2 compensation

[JP4] Infrastructure adaptation and emergence of loops in network routing with time-dependent loads
Alessandro Lonardi, Enrico Facca, Mario Putti, Caterina De Bacco
Physical Review E 107, 024302 (2023) · arXiv · GitHub

[JP3] Multicommodity routing optimization for engineering networks
Alessandro Lonardi, Mario Putti, Caterina De Bacco
Scientific Reports 12, 7474 (2022) · arXiv · GitHub

[JP2] Optimal Transport in Multilayer Networks for Traffic Flow Optimization
Abdullahi Adinoyi Ibrahim, Alessandro Lonardi, Caterina De Bacco
Algorithms, 14(7), 189 (2021) · arXiv · GitHub

[JP1] Designing optimal networks for multicommodity transport problem
Alessandro Lonardi, Enrico Facca, Mario Putti, Caterina De Bacco
Physical Review Research 3, 043010 (2021) · arXiv · GitHub

Last updated March 13, 2024.