Alessandro Lonardi,
PhD student in Computer Science

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Contact Information

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Education

Max Planck Institute for Intelligent Systems, IMPRS-IS: International Max Planck Research School
Tübingen, Germany | Sep, 2020 – expected: 2024

- **PhD**, Computer Science
  Focus: Mathematical Optimization, Optimal Transport, Network Routing, Probabilistic Network Models
  Thesis: Designing Networks with Adaptation Rules and Optimal Transport
  Advisor: Caterina De Bacco (Max Planck Institute for Intelligent Systems)

Università degli Studi di Padova
Padua, Italy | Oct, 2015 – Jul, 2020

- **MSc**, Mathematical Engineering: Mathematical Modelling for Engineering and Science (cum laude)
- **BSc**, Physics

Experience

Head, co-founder | Commute | Oct, 2022 – Apr, 2023
Startup for data-driven solutions for efficient and sustainable transportation. Supported by the MAX!mize incubation program for the Max Planck Society by Max Planck Innovation GmbH

Research Intern | Max Planck Institute for Intelligent Systems | Jan, 2020 – Aug, 2020
Research on Routing Algorithm, Optimal Transport, Inference on Graphical Models

Research

Mathematical Optimization, Optimal Transport, Routing Algorithms
Discrete optimal transport on graphs: advancements in theory, efficient algorithms, applications to ML and science: from supervised classification to transportation networks. Pathfinding algorithms

Probabilistic Modelling: Inference on Graphical Models
Bayesian inference methods: focus on belief-propagation algorithms for inference and community detection

Complex Systems
Modeling of emergent phenomena in complex systems: community detection, network efficiency, and robustness, hypergraphs

Coding & Tools

Programming Languages (advanced): Python (scientific computing, ML, data science)
Programming Languages (intermediate-basic): MATLAB, C++, Mathematica
Tools: Git, HTCondor, LaTeX, HTML, CSS, Suites for scientific presentations, MacOS, Debian/Arch-based distros

Teaching

Tübingen University: Advanced Probabilistic Machine Learning and Applications (2 terms: 2020, 2021)

Languages

Italian (native), English (fluent), German (intermediate, learning), Spanish (basic)

Selected Recent Publications (from 7 peer-reviewed)

Lonardi, De Bacco, Bilevel Optimization for Traffic Mitigation in Optimal Transport Networks, Physical Review Letters (2024), 10.1103/PhysRevLett.131.267401

Ruggeri*, **Lonardi***, De Bacco, Message-Passing on Hypergraphs: Detectability, Phase Transitions and Higher-Order Information, Journal of Statistical Mechanics: Theory and Experiment, 2024 (* = equal contribution)

Review Service

Journals (# rev.): Journal of Physics Communications (3), Physica Scripta (2)

Talks

2 talks at Netsci 2023 (flagship conference in network science) | 2 talks at academic seminars | 4 talks at MPI IS scientific events

Volunteering

Volunteer for TReND in Africa Python Workshop 2022 — online (trendinafrica.org)
Volunteer for Pint of Science Italia 2016 – 2017 — Padua, Italy (pintofscience.it)

Other relevant interests

Role of inference and mechanistic modeling in science, coding best practices, efficient problem-solving, personal finance, AI and art