Matteo Raviola

Curriculum Vitae

I am an applied math PhD student with a strong interest in reduced-order modeling, uncertainty quantification, and optimization. My goal is to develop efficient and mathematically rigorous methods that exploit low-dimensional structures in high-dimensional models.

Education

November 2022–Present — **PhD & Doctoral Assistant**, *École Polytechnique Fédérale de Lausanne*, EDMA Doctorate in CSQI Lab.

October 2020–October 2022 — **Master's Degree in Mathematical Engineering**, *Politecnico di Torino*, final grade: 110 *cum laude*/110.
Master's thesis: *Training Kernel Neural ODEs with Optimal Control and Riemannian optimization*, supervised by Profs. Fabio Nobile and Claudio Canuto

October 2020–October 2022 — **"Alta Scuola Politecnica" excellence program**, *Politecnico di Milano & Politecnico di Torino*.
International honour program for advanced interdisciplinary training selecting top 1% students from Politecnico di Milano and Politecnico di Torino.

September 2021–February 2022 — **Erasmus+ exchange semester**, *École Polytechnique Fédérale de Lausanne*.

2017–2020 — **Bachelor's Degree in Mathematics For Engineering**, *Politecnico di Torino*, final grade: 110 *cum laude*/110, participation in "Giovani Talenti" excellence program.
Batchelor's thesis: *A kinetic approach to the Sznajd model of opinion formation on social networks*, supervised by Prof. Andrea Tosin.

Awards

2017 — Scholarship for the participation in "Giovani Talenti" excellence program (all bachelor's degree tuition fees covered).

2020 — Scholarship for the participation in "Alta Scuola Politecnica" excellence program (all master's degree tuition fees covered).

2021 — Erasmus+ scholarship.

2022 — Scholarship for master's thesis at EPFL.

2025 — EPFL Doc.mobility scholarship to visit Courant Institute of Mathematical Sciences for 6 months.

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Posters & Talks

May 2023 *Multilevel Active Subspaces Method*. Poster at "Stochastic Numerics and Statistical Learning: Theory and Applications Workshop" in KAUST (SA).

June 2023 *Multilevel Active Subspaces Method*. Poster at Swiss Numerics Day in Bern, CH.

February 2024 *Multilevel Active Subspaces Method*. Poster at SWICCOMAS 2024 in Zurich, CH.

June 2024 *Training Kernel Neural ODEs with Optimal Control and Riemannian optimization*. Poster at "Stochastic Numerics and Statistical Learning: Theory and Applications Workshop 2024" in KAUST, SA.

March 2024 *Multilevel Active Subspaces Method*. Talk at SIAM UQ 2024 in Trieste, IT.

September 2024 *A function approximation algorithm using multilevel active subspaces*. Poster at Swiss Numerics Day 2024 in Geneva, CH.

February 2025 *A function approximation algorithm using multilevel active subspaces*. Talk at GNCS-SIAM Chapters meeting 2024 in Trieste, IT.

March 2025 *A function approximation algorithm using multilevel active subspaces*. Talk at SIAM CSE 2025 in Fort-Worth, Texas, USA.

March 2025 *Stochastic gradient with least-squares control variates*. Poster at SWICCOMAS 2025 in Bern, CH.

July 2025 *Stochastic gradient with least-squares control variates*. Talk at MCM 2025 in Chicago, USA.

Scientific Service and Event Organization

July 2024 Co-organizer, *summer school "Numerical methods for random differential models (NUMRAD)", EPFL, Lausanne, Switzerland.* Website: https://numrad.epfl.ch/former-editions/

Publications

Nadia Loy, Matteo Raviola, and Andrea Tosin. Opinion polarization in social networks. *Philosophical Transactions of the Royal Society A*, 380, 2022.

Marco Nurisso, Matteo Raviola, and Andrea Tosin. Network-based kinetic models: Emergence of a statistical description of the graph topology. *European Journal of Applied Mathematics*, pages 1–22, 2024.

Fabio Nobile, Matteo Raviola, and Raúl Tempone. A function approximation algorithm using multilevel active subspaces. In *Monte Carlo and Quasi-Monte Carlo Methods 2024*. Springer, 2025. To appear; also available as arXiv:2501.12867.

Fabio Nobile, Matteo Raviola, and Nathan Schaeffer. Stochastic gradient with least-squares control variates. *arXiv preprint arXiv:2507.20981*, 2025.

Matteo Raviola and Benjamin Peherstorfer. A dirac-frenkel-onsager principle: Instantaneous residual minimization with gauge momentum for nonlinear parametrizations of pde solutions. Manuscript submitted to ICML 2026, under review, 2026.

Technical skills

Advanced C/C++/Python/MATLAB/Wolfram language/R

Languages

Italian **Mothertongue**

English **Fluent**

French **Intermediate** *B2 level*

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