LAURA RINALDI

Piove di Sacco (PD), 27/07/1996

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EDUCATION, TRAINING AND RESEARCH POSITIONS

2025 - today **Level III Researcher** at the Institute of Applied Mathematics and Information Technologies "E. Magenes" (IMATI), Pavia, contributing to the project "Digital Driven Diagnostics, prognostics and therapeutics for sustainable Health care" D34 Health – PNC 0000001 - CUP B53C22006100001 – Spoke 3.

2025, 11 mos. Recipient of a **research grant** at the University of Padua, contributing to the project "Tchakaloff-Davis-Wilhelmsen measure compression and applications to numerical modelling". The work focuses on the field of numerical analysis.

May 2025 Participating in Virtual-exchange course: "Learning-enhanced Data Assimilation" (4 CFU), promoted by the University of Padova and the University of Southern California (USA).

31-03-2025 **PhD in Mathematical Sciences** at the University of Padua, with a doctoral thesis on mathematical physics, modeling, numerical analysis, and machine learning. The thesis, titled "*A mathematical construction of the digital twin of bread leavening*", was developed within the framework of the project "Reduction of energy waste in food and beverage preparation activities". SOCINT–G-Research Award for the **best PhD thesis** in quantitative disciplines**.**

Jul 2024 Participating in Udine CISM "Advanced Course on Inverse Problems for Mechanical Systems: Methods, Simulations and Experiments".

Jul 2023 Participating in the "Barcelona XX Jacques-Louis Lions Spanish-French School on Numerical Simulations in Physics Engineering". **Best poster** presented "Bread leavening and baking: a modelling challenge".

25-09-2020 **Master's Degree in Mathematics** at the University of Padua with 110/110 with honors and thesis in the physical-mathematical field "*Bose Hubbard model of cold atoms to higher orders*".

28-09-2018 **Bachelor's degree in Mathematics** at the University of Padua with 100/110 and thesis in the physical-mathematical field entitled "*Shading properties and topological stability for discrete dynamical systems*".

2015 High School Diploma at "Istituto d'istruzione superiore A. Einstein", Scientific High School - Piove di Sacco.

PROFESSIONAL WORK EXPERIENCES

2021, 10 mos. Apprenticeship at the "SCAI ITEC S.r.l." company in Padua with database administration duties.

2020, 4 mos. Internship at the company "SCAI ITEC S.r.l." in Padua with training objectives in database administration.

2020, 1 mo. "Ready to Oracle" training course to learn Oracle Database, SQL Server and, SQL Language.

30-03-2021 Oracle Database SQL Certified Associate 1Z0-071.

TEACHING ACTIVITIES

2025 - 2026 **Teaching** of "Istituzioni di matematica con esercitazioni – mod.1" for the degree course in Environmental Science at the University of Ca' Foscari (Venice). Teacher (48 h).

2025, 4 mos.	**Supplementary teaching activity** of "Calcolo Numerico" for the degree course in Energy Engineering, Prof. Alvise Sommariva at the University of Padua. Teacher support activities during laboratory with Matlab exercises (24 h).
2022, 4 mos.	**Supplementary teaching activity** of "Calcolo Numerico" for the degree course in Mathematics, Prof. Michela Redivo-Zaglia at the University of Padua. Teacher support during laboratory with Python/Matlab scripts and exercises (25 h).
2021, 4 mos.	**Supplementary teaching activity** of "Fondamenti di Analisi Matematica 2" for the degree course of Chemical and Materials Engineering (nr. Channel 1), Prof. Luca Baracco at the University of Padua. Exercises and solution of past exams (24h).

MENTORING EXPERIENCE

19-09-2025	Co-supervisor of M. Storgato. **Bachelor's thesis** "*Quadratura subperiodica in python*".
19-09-2025	Co-supervisor of G. Traversin. **Bachelor's thesis** "*Implementazione in Python di un algoritmo per la cubatura numerica su elementi poligonali con un lato curvo*".
11-04-2025	Co-supervisor of E. Caregnato. **Master's thesis** "*Goal Oriented Operator Networks*".
19-04-2024	Co-supervisor of M. Dell'Orto. **Master's thesis** "*Variationally mimetic operator neural networks for the time-dependent heat equation*".

AWARDS AND PRIZES

2024	Winner of the "*SOCINT- G-Research Award*" for **the best PhD thesis** in quantitative subjects – II Edition.
2024	**Third place** in the "Three-Minutes Thesis Competition (3MT)" at the University of Padua, promoted by Coimbra Group.
2023	Winner of the **best poster** presented at the "XX Jacques-Louis Lions Spanish-French School on Numerical Simulations in Physics Engineering".
2023	Winner of the **best presentation** among PhD students at the conference "FEniCS 2023".

FUNDING AND SCHOLARSHIPS

2023	GNCS grant for participating in the "SIMAI 2023" conference in Matera.
2018/2019	Regional scholarship winner.
2018	Grant for participating in the "Junior Math days" workshop at the SISSA University of Trieste.
2017/2018	Regional scholarship winner.
2016/2017	Regional scholarship winner.

MEMBERSHIP AND GROUP ASSOCIATIONS

Since 2023	Member of the "Società Italiana di Matematica Applicata e Industriale" (SIMAI).
Since 2023	Student member of the "Society of Industrial and Applied Mathematics" (SIAM).
Since 2022	Member of the "Gruppo Nazionale Calcolo Scientifico" (GNCS) of the Istituto Nazionale di Alta Matematica (INdAM).
2022	Member of "Unione Matematica Italiana" (UMI).

CONFERENCES, SEMINARS, AND WORKSHOPS

Sep 2025	Trieste SIMAI 2025. Talk "*Building a surrogate model for coupled, time-dependent PDEs using Operator Networks for thermal applications*" - **invited**.
May 2025	University of Pavia. 7th Lombardy Young Numerical Analysts Meeting (LYNUM-VII).
Apr 2025	University of Padua. Mathematical Physics and Dynamical Systems Seminar. Talk "*A mathematical model of bread leavening for building a digital twin*" – **invited**.
Feb 2025	Padova DTW 2025 International Workshop on Digital Twins: Mathematical Analysis, Formal Methods and Scientific Machine Learning. Poster "*Digital twin of bread leavening for energy saving*".
Nov 2024	Milano M4E: mathematics for Planet Earth. Poster "*Digital twin of bread leavening for energy saving*".
Aug 2023	Matera SIMAI 2023. Talk "*On approximating fictitious heat sources arising in an inverse heat transfer problem*" - **invited**.
Jun 2023	Pula FEniCS 2023. Talk "*Bread baking simulation with FEniCS*".
Sep 2022	Arenzano YAMC Second Conference of Young Applied Mathematicians. Talk "*Modelling for bread preparation to avoid energy waste*".
Sep 2022	Pavia GIMCS SIMAI Young 2022. Talk "*Modelling for bread preparation to avoid energy waste*".
May 2020	University of Padua. Talk "*The quantum harmonic oscillator: analysis and resolution*".
Dec 2018	SISSA University of Trieste. Workshop "Junior Math Days".

SCIENTIFIC PUBLICATIONS

IN PREPARATION

1. **L. Rinaldi,** G. G. Giusteri. "Variationally mimetic operator network approach to transient viscous flow".

SUBMITTED

2. **L. Rinaldi,** A. Sommariva, M.Vianello. "*ORTHOCUB: integral and differential cubature rules by orthogonal moments*". https://arxiv.org/abs/2512.06049

3. **L. Rinaldi,** A. Sommariva, M.Vianello. "*Effective numerical integration on complex-shaped elements by discrete signed measures*", https://arxiv.org/abs/2510.23069

PUBLISHED

4. E. Chinellato, P. Martin, **L. Rinaldi**, F. Marcuzzi. "*Exploiting scientific machine learning on embedded digital twins*", Springer series: Lecture Notes in Computational Science and Engineering - Math to Product (2025), https://link.springer.com/chapter/10.1007/978-3-031-95709-3_12.

5. **L. Rinaldi,** G. G. Giusteri. "*Modelling and simulation of bread leavening to monitor energy consumption in industrial processes*", Commun. Appl. Ind. Math. 16(1), 41-61 (2025), **impact factor**: 0.6. https://doi.org/10.2478/caim-2025-0003.

6. G. G. Giusteri, F. Marcuzzi, **L. Rinaldi**. "*Replacing voids and localized parameter changes with fictitious forcing terms in boundary-value problems*", Results Appl. Math. 20, 100402 (2023), **impact factor**: 1.3. Citations 5. https://doi.org/10.1016/j.rinam.2023.100402.

DOCTORAL THESIS

7. **L. Rinaldi**. "*A mathematical construction of the digital twin of bread leavening*". Ph.D. thesis (2025). https://hdl.handle.net/20.500.14242/218031.

LANGUAGES

Italian: mother tongue.
English: good knowledge of spoken and written language, B2 certified at the University Language Center (CLA) of the University of Padua.
French: school level.

COMPUTER SKILS

Good command of IT tools, excellent knowledge of Windows and Linux operating systems, and familiarity with Word, Excel, and PowerPoint, as well as the Microsoft Office suite. Knowledge of the KNIME analytics platform for data analysis and machine learning. Knowledge of Oracle and SQL Server databases and the related SQL query language. Knowledge and use of SQL Developer, Toad, Putty, FileZilla, and WinSCP. I learned the latter during my time at the company. Excellent knowledge of programming languages such as Python with the FeniCS/FEniCSX libraries for solving partial differential equations, PyTorch for deep learning, as well as Wolfram Mathematica, and software environments such as Matlab and Octave. I developed the latter skills during my studies and my phd. Excellent knowledge of the TEX program and its applications for writing LaTeX texts and presentations using Beamer, acquired during my various university studies.

SOFTWARES

A code repository is available on my GitHub page: laura-rinaldi (Laura Rinaldi) · GitHub

ORGANIZATION AND EVENTS

Since 2023   Organizer duties for **Science4all:** a volunteering initiative promoted by the University of Padua, designed for primary school students aged 8 to 11. The program offers interactive workshops and hands-on science labs that aim to spark curiosity, foster critical thinking, and inspire a love for science in a fun and engaging way.

EXTRACURRICULAR INTERESTS

Practiced at the amateur level in figure skating, speed skating, and ice skating.
License of volleyball referee manager obtained at the provincial committee FIPAV of Padua.
Certificate of attendance in the piano course.
Practiced activities with the task of assistant-educator for children aged 3 to 6 years.

Autorizzo il trattamento dei miei dati personali presenti nel curriculum vitae ai sensi del Decreto Legislativo 30 giugno 2003, n. 196 e del GDPR (Regolamento UE 2016/679).

Pavia, 17/12/2025

Laura Rinaldi