Vincenzo Di Florio, PhD

Curriculum vitae

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CURRENT POSITION

Post-doctoral Research Fellow at MOX - Modeling and Scientific Computing Jan 2025 – Present
Dipartimento di Matematica, Politecnico di Milano, Italy

ABOUT ME

Research Fellow at Politecnico di Milano, enrolled since January 2025. Research focuses include:

- Developing hybrid physics-based models to predict bio-molecular interactions, with a strong interest in integrating mathematics and biology to advance computational methods in biophysics.
- Investigating non-equilibrium statistical dynamics and the behavior of low dimensional systems.

EDUCATION

Ph.D, in Pure and Applied Mathematics [EQF 8] 2021-2025
Politecnico di Torino, Turin, Italy
Istituto Italiano di Tecnologia, Genoa, Italy

Research topics: Biomolecular modeling, continuum electrostatics, and the development and customization of protocols and software tools for biological systems
Thesis: Mathematical, Algorithmic and Numerical Solutions to enhance Electrostatic Calculations for Biomolecules in Electrolytic Solutions
Supervisors: Dr. Walter Rocchia, Prof. Lamberto Rondoni

Masters in Physics of Complex Systems [EQF 7] 2019-2021
Università degli studi di Torino, Turin, Italy

GPA: 110/110 cum Laude and Distinction (received from the examination board)
Related coursework: Statistical Physics and Mathematical modelling
Thesis: State equations and order fluctuations in 1D and 3D
Advisor: Prof. Lamberto Rondoni

Bachelor Studies in Physics [EQF 6] 2016-2019
Università degli studi di Trieste, Trieste, Italy

GPA: 110/110 cum Laude
Related coursework: Major in Physics with minor courses in Numerical Analysis and Dynamical Systems
Thesis: Quantum dots for quantum computation
Advisor: Prof. Angelo Bassi

RESEARCH EXPERIENCE

Post-doctoral Research Fellow at Politecnico di Milano Jan 2025 – Present
Milan, Italy

Advanced Models and Efficient Numerical Methods for Molecular Electrostatics

Collaboration with IIT Concept Lab Nov 2024 – Dec 2024
Genoa, Italy

Selection of the theoretical model and feasibility analysis for developing a code to solve the nonlinear Poisson-Boltzmann equation.

Internship at City College of New York (CUNY) May 2024 – Aug 2024
New York, USA

- Integrated NextGenPB as an electrostatic solver within the MCCE workflow
- Developed a benchmark application for the calculation of pK_a values

Internship at SISSA Sep 2018 – Dec 2018
Trieste, Italy

Sparse identification of dynamical systems from data

PUBLICATIONS

Journal Articles

- **Di Florio, V.**, Ansalone, P., Siryk, S. V., Decherchi, S., De Falco, C., & Rocchia, W. (2025). NextGenPB: An analytically-enabled super resolution tool for solving the Poisson-Boltzmann Equation featuring local (de) refinement. Computer Physics Communications, 109816.
- **Di Florio, V.**, Giberti, C., Rondoni, L. & Zhao, H. (2024). *Microscopic state equation for oscillator chains*. The European Physical Journal Plus, 139(7), 622. DOI: 10.1140/epjp/s13360-024-05419-1.
- Rondoni, L., & **Di Florio, V**. (2024). *Probability Turns Material: The Boltzmann Equation*. Entropy, 26(2), 171. DOI: 10.3390/e26020171.

PRESENTATIONS

Contributed talk

- *"State equation for oscillator chain"*, ICIAM 2023, Tokyo, Japan (Aug 2023)

Poster Presentation

- *"Biomolecular Electrostatics applications of the NextGenPB solver"*, Protein Electrostatic 2025, Lisbon, Italy (June 2025)
- *"NextGenPB: a novel Poisson-Boltzmann Solver leveraging super-resolution and local refinement"*, ACS Fall 2024, Denver, USA (Aug 2024)
- *"Efficient and Scalable implementation of a Linearized Poisson-Boltzmann Solver on Hierarchically refined Cartesian Meshes"*, Protein Electrostatic 2023, Genoa, Italy (June 2023)

SCHOOLS & CONFERENCES

- 50th Summer School on Mathematical Physics, Ravello, Italy (Aug 2025)
- Boltzmann Equation and Irreversibility: after 150 years an evergreen problem, Pisa, Italy (Nov 2022)
- XLVII Summer School on Mathematical Physics, Ravello, Italy (Aug 2022)
- Machine Learning Crash Course 2022, Geova, Italy (June 2022)

TEACHING

Tutor – Methods for environmental engineering Feb 2024 – Apr 2024
Politcnico di Torino, Turin, Italy
Teaching assistant – Calculus 1 Sep 2022 – Jan 2023

Politcnico di Torino, Turin, Italy
Teaching assistant – Physics 1 Mar 2021 – May 2021
Università degli studi di Torino, Turin, Italy

SKILLS

Computational

- **C++**: *Daily user*, focused on numerical methods and code development.
- **OCTAVE/MATLAB**: *Daily user*, applied to numerical methods and code development.
- **PYTHON**: *Intermediate proficiency*, primarily for building user interfaces for C++/C codes.
- **BASH**: *Basic knowledge*, used for scripting.
- **FORTRAN**: *Basic knowledge*, mainly for reading code.

Operating Systems

- **Linux**: *Daily user*.
- **MacOS**: *Daily user*.

Document Creation

- **LaTeX**: *Daily user*.
- **Microsoft Office Suite**: *Intermediate proficiency*.

Languages

- **Italian**: Native speaker.
- **English**: Fluent.

AUTHORIZATION TO PERSONAL DATA PROCESSING

In compliance with the GDPR and Italian Legislative Decree no. 196 dated 30/06/2003, I hereby authorize the recipient of this document to use and process my personal details for the purpose of recruiting and selecting staff and I confirm to be informed of my rights in accordance to art. 7 of the above mentioned Decree.