europass

Flavio Giuliani

WORK EXPERIENCE

University of Rome Sapienza

Address: Piazzale Aldo Moro 5, 00185, Rome, Italy

[01/12/2022 – 30/11/2025] **Fellow Researcher in Physics**

The project focuses on investigating the behavior of antimony-rich phase-change materials with the tools of statistical mechanics and of atomistic simulations assisted by neural-network interatomic potentials.

- Project title: *Atomistic study of the potential energy surface and the configurational entropy of phase-change materials.*
- Principal Investigator: Prof. Riccardo Mazzarello.
- Funding 2022/23: Progetti Medi Sapienza 2021, P.I. Prof. Riccardo Mazzarello.
- Funding 2023/25: Progetto PRIN 2020 - EMPHASIS, P.I. Prof. Riccardo Mazzarello.

EDUCATION AND TRAINING

[01/11/2022 – 29/01/2026] **Ph.D. in Physics**

University of Rome Sapienza

City: Rome | **Country:** Italy | **Field(s) of study:** Natural sciences, mathematics and statistics: ● *Physics* | **Final grade:** Maximum with honors | **Level in EQF:** EQF level 8 | **Thesis:** Study of the thermodynamics and kinetic anomalies of Antimony-based phase-change materials by machine-learned molecular dynamics

Supervised by Prof. Riccardo Mazzarello and Prof. Lilia Boeri.

The project involves the study of thermodynamic and kinetic anomalies and crystallization features in supercooled liquid Sb, a candidate phase-change material, and the development of a neural-network interatomic potential trained on density functional theory for Ge-alloyed Sb.

[08/05/2024 – 10/05/2024] **Course: HPC Molecular Modelling**

CINECA https://eventi.cineca.it/en/hpc/hpc-molecular-modelling

City: Rome | **Country:** Italy | **Field(s) of study:** Natural sciences, mathematics and statistics: ● *Physics* ● *Chemistry*

[09/05/2023 – 11/05/2023] **Soft Skills Course: Preparing artwork for scientific papers**

Sapienza University of Rome

City: Online | **Field(s) of study:** Generic programmes and qualifications: ● *Personal skills and development*

[09/2020 – 09/2022] **M.Sc. in Physics**

University of Rome Sapienza

City: Rome | **Country:** Italy | **Field(s) of study:** Natural sciences, mathematics and statistics: ● *Physics* | **Final grade:** 110/110 cum laude | **Level in EQF:** EQF level 7 | **Thesis:** Vibrational dynamics of simulated glasses with different fictive temperatures

Supervised by Prof. Tullio Scopigno and Prof. Francesco Sciortino.

The aim of the project was to assess the correlation between supercooled liquid viscosity and glass vibrational properties for a prototype fragile glass former: the rigid model for ortho-terphenyl.

[09/2017 – 09/2020] **B.Sc. in Physics**

University of Rome Sapienza

City: Rome | **Country:** Italy | **Field(s) of study:** Natural sciences, mathematics and statistics: ● *Physics* | **Final grade:** 110/110 cum laude | **Level in EQF:** EQF level 6 | **Thesis:** Twitching motility in bacteria

Supervised by Prof. Roberto Di Leonardo.

The project consisted in reproducing a tug-of-war physical model for simulating the *twitching* dynamics of a bacterium on a surface, mediated by type-IV pili.

PUBLICATIONS

[2025] **Preprint: Liquid anomalies and Fragility of Supercooled Antimony**

Reference: F. Giuliani et al. (2025). Liquid anomalies and Fragility of Supercooled Antimony. Uploaded to arXiv cond-mat.mtrl-sci
Authors: Giuliani, F., Guidarelli Mattioli, F., Chen, Y., Dragoni, D., Bernasconi, M., Russo, J., Boeri, L., and Mazzarello, R. | **Journal Name**: arXiv cond-mat.mtrl-sci

Phase-Change Heterostructures Based on Antimony

Reference: S. Ritarossi et al. (2025). Phase-Change Heterostructures Based on Antimony. Phys. Status Solidi RRL, 19: 2500012.
Authors: Ritarossi, S., Piombo, R., Giuliani, F., Dragoni, D., Bernasconi, M. and Mazzarello, R. | **Journal Name**: Phys. Status Solidi RRL | **Volume, Issue and Pages**: 19: 2500012

PROJECTS

[05/2025 – 02/2026] **LIGAN: LIquid-liquid transition in Germanium-doped Antimony with a Neural-network interaction potential**

Proponent of a high performance computing project, ISCRA-C class, for the Leonardo supercomputer. Awarded 20k GPUh.

[09/2024 – 07/2025] **University call for Third Mission initiatives**

- **Funding**: Winner of a competitive grant of €11,000 by Sapienza University of Rome.
- **Title**: "Eutopie - Dialogues on the relationship between science and society for a research on human beings."
- **Role**: Proponent and Head of Organization. I oversaw the entire organizational cycle: format design, selection of interdisciplinary topics, research and involvement of 15+ high-profile experts, logistics management, communication, and feedback analysis through questionnaires.
- **Objective and implementation:** The project created an open space for multidisciplinary debate in the university to address major contemporary social challenges, promoting collective involvement through four public dialogues on: 1) Man, nature, and the climate crisis; 2) Science, women, and rights; 3) Human language and artificial intelligence; 4) Research and imagination in art and science.

Link: https://sites.google.com/view/eutopie

[04/2024 – 01/2025] **AntimoNN: Neural-Network interaction potential for Antimony-based phase-change materials**

Proponent of a high performance computing project, ISCRA-C class, for the Leonardo supercomputer. Awarded 20k GPUh.

[09/2023 – 08/2024] **DAGAN: First-principles DAtaset of Germanium-Antimony for a Neural-network interaction potential**

Proponent of a high performance computing project, ISCRA-C class, for the G100 supercomputer. Awarded 23333 CPUh.

HONOURS AND AWARDS

[2022] **Excellence program of M.Sc. Awarding institution:** Physics Department, University of Rome Sapienza

Awarded to top students based on exam marks. The scolarship value was equal to the university fee of the second year.

In the context of Physics of liquids, I studied the microscopic derivation of hydrodynamics equations from the formalism of projection operators, with a final report.

In the context of Advanced machine learning methods for physics, I studied Variational Diffusion Models and implemented a simple model for image generation in the final project.

[2020] **Excellence program of B.Sc. Awarding institution:** Physics Department, University of Rome Sapienza

Awarded to top students based on exam marks. The scolarship value was equal to the university fee of the second and third years.

I attended in-depth courses on selected topics: Electromagnetism, Partial Differential Equations in physics, Monte Carlo simulations (with a final project), Bayesian inference (with a final project).

TEACHING EXPERIENCE

[06/2024 – 11/2024] **Teaching assistant**

Mathematics and Statistics, 1st year course of the B.Sc. in Environmental Sciences. Interactive exercises and homework corrections (40h).

[2021 – 2022] **Student-collaboration scholarship**

Lab assistant and notes-writer for the course of scientific programming in C, 1st year of B.Sc. in Physics (75h in 2021, 75h in 2022).

CONFERENCES AND SEMINARS

[22/09/2024 – 25/09/2024] **Conference: European Phase-Change and Ovonics Symposium (E\PCOS2024)**

Leibniz Institute of Surface Engineering (IOM), Leipzig

- **Role**: Attendant.
- **Topics**: Experimental and theoretical/computational advances in Phase-Change materials and Ovonic materials.

Link: https://epcos2024.iom-leipzig.de/

[28/08/2024 – 30/08/2024] **Conference: CMT@BRIXEN '24: The Meeting of the Condensed Matter Theory Italian Community**

Brixen

- **Role**: Poster presentation.
- **Poster title**: *Ab initio* study of supercooled antimony alloys through a machine learning interatomic potential.

Link: https://cmtconference.it/

[22/02/2024 – 23/02/2024] **Workshop: ICSC Spoke 6 "Multiscale Modeling and Engineering Applications"** Sapienza University of Rome

First workshop of the ICSC - (Italian) National Research Center in HPC, Big Data and Quantum Computing.

- **Role**: 10' talk, within the Flagship Project FP1 - Advanced Materials and New Devices.
- **Title**: Neural-network interatomic potential for antimony-based phase-change materials.

[17/09/2023 – 20/09/2023] **Conference: European Phase-Change and Ovonic Symposium (E\PCOS2023)**

Sapienza University of Rome

- **Role**: Techincal staff (management of microphones and slides) and attendant.
- **Topics**: Experimental and theoretical/computational advances in Phase-Change materials and Ovonic materials.

Link: http://epcos2023.artov.imm.cnr.it/

[06/06/2022 – 08/06/2022] **Workshop: From Water to Colloidal Water - Celebrating the contributions of Francesco Sciortino to Soft Matter**

Three half-days conference in Sapienza University of Rome

- **Role**: Attendant.
- **Topics**: a) Anomalous properties of Water and amorphous ices; b) Self-assembly and DNA nanotechnology; c) Computational methods and Machine Learning for Soft Matter; d) Glasses and disordered systems; e) Soft Matter of colloids and polymers.

Link: https://fromwatertocolloidalwater.wordpress.com/

[05/09/2021 – 10/09/2021] **XXVII INC Summer School: Ultrastable Glasses - New perspectives for an old problem**

Seminars week in "La Cristalera", Miraflores de la Sierra, Madrid

Organized by Instituto Nicolás Cabrera, Universidad Autónoma de Madrid

- **Role**: Attendant.
- **Topics**: Frontiers of the experimental and theoretical/computational research on ultrastable structural glasses.

Link: https://www.inc.uam.es/summer-school-2021-ultrastable-glases-new-perspectives-old-problem/

[15/06/2020 – 03/08/2020] **Summer School: Physics of Life** Online webinars on a weekly basis

Organized by the Center for the Physics of Biological Function, Princeton University.

- **Role**: Attendant.
- **Topics**: Active research fields in biophysics and physics of biological systems.

Link: https://youtube.com/playlist?list=PLcnlf7iLBn4PVOSEVvMgPHWLjaWNX20a6

SCIENTIFIC COMMUNICATION FOR A BROAD AUDIENCE

[14/09/2025] **Book presentation: "L'atomica e le responsabilità della scienza"**

Organized by L'Asino d'oro Edizioni at Libreria Spazio Sette, Rome.

VOLUNTEERING

[2019 – 2020] **Co-founder of ST.ORM** Italy-Kenya-Tanzania

STudy to transfORM (ST.ORM) is a nonprofit organization whose educational projects currently span across Italy, Kenya and Tanzania.

I am a founding member and I was active as the Treasurer for the first year.

Link: https://www.instagram.com/stormprojectonlus

[2019 – 2020] **Math teacher for Refugees with Baobab Experience** Rome

For about one year, I taught math and sciences to refugees, within the activities of the non-profit organization "Baobab Experience".

Link: https://www.baobabexperience.org/services/scuola-di-ali/

LANGUAGE SKILLS

Mother tongue(s): Italian

Other language(s):

English

LISTENING B2 **READING** B2 **WRITING** B2

SPOKEN PRODUCTION B2 **SPOKEN INTERACTION** B2

Spanish

LISTENING A2 **READING** A2 **WRITING** A2

SPOKEN PRODUCTION A2 **SPOKEN INTERACTION** A2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

SKILLS

use presentation software | use presentation software | interact through digital technologies | use microsoft office | use online tools to collaborate | follow work schedule | develop strategy to solve problems | teamwork principles | accept own accountability | create solutions to problems | work in an international environment | prepare presentation material | give constructive feedback | establish collaborative relations | present reports | cooperate with colleagues | use different communication channels | think analytically | work in teams

DRIVING LICENCE

Cars: B