Enrico Frausin

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Digital portfolio
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Education

Master's Degree in Theoretical Physics	Oct 2023 – Present
University of Trieste	*Trieste, Italy*

Expected to graduate with highest honors (110/110 cum laude)

- Specialization in Statistical Physics, Critical Phenomena and Phase Transitions
- Advanced coursework in High‑Energy Theoretical Physics and mathematical methods
- Thesis: Statistical Learning and Inference via Renormalization Group techniques

Bachelor's Degree in Physics	Oct 2019 – Dec 2022
University of Trieste	*Trieste, Italy*

Research Experience

Master's Thesis Project	Jun 2025 – Current
ICTP - Abdus Salam, University of Trieste	*Trieste, Italy*

Investigated how abstraction emerges in learning systems through the interplay between network depth and data diversity, leveraging statistical physics and information theory. Developed and executed computational analyses examining neural representation evolution toward universal structures. Collaborated closely with Prof. Matteo Marsili's research group, contributing original insights that directly influenced the publication listed below. This interdisciplinary project strengthened my ability to synthesize concepts across physics, cognitive science, and artificial intelligence, while reinforcing teamwork and collaborative research practices.

Preprints

C. O. Caputo, E. Seiffert, **E. Frausin***, M. Marsili. *Absolute abstraction: a renormalization group approach.* arXiv:2407.01656v4 (2025) (*co‑author).

Research Presentations & Activities

Conference Co‑Organizer	April 2024
University of Trieste	*Trieste, Italy*

"As for the cat... Models and Interpretations of Quantum Mechanics" - Co‑organized an academic conference featuring leading experts in quantum foundations, coordinating logistics and facilitating engagement among over 100 participants. Developed organizational and communication skills while managing multiple stakeholders.

Technical Skills

- **Programming Languages:**

  - **Python:** Robust intermediate proficiency with demonstrated expertise in scientific programming. Experienced with NumPy, SciPy, PyTorch, Pandas, and advanced standard libraries (itertools, functools).

  - **Julia:** Intermediate proficiency with solid understanding of language philosophy; hands‑on experience with Agents.jl, DifferentialEquations.jl, and Makie.jl for scientific computing and visualization.

- **Fortran:** Strong proficiency for academic contexts; experienced in developing efficient subroutines and computationally intensive simulations.
- **C++:** Foundational knowledge focused on core programming concepts and performance optimization paradigms.

- **Scientific Computing Tools:**

  - Jupyter Notebooks
  - Mathematica
  - LaTeX
  - Git

- **Computational Methods:**

  - Familiar in Monte Carlo simulations and Agent‑Based Models for complex systems analysis.

Languages

- **Italian:** Native speaker

- **English:** Fluent, particularly in academic and scientific contexts

- **Spanish:** Conversational proficiency across diverse topics; proficient reading comprehension including scientific literature

- **Chinese:** Basic proficiency; HSK 4 Ji certification (equivalent to B2) obtained in 2017

International Experiences

Exchange Student – AFS Scholarship Recipient   Jun 2016 – Aug 2017
Changzhou, China

- Achieved full cultural immersion in a radically different environment, developing exceptional adaptability and cross‑cultural fluency
- Navigated complex social dynamics and language barriers independently, strengthening resilience and intercultural communication
- Established lasting international connections, broadening perspectives on global collaboration

Independent Living Experience   Jan 2023 – Oct 2023
Valencia, Spain

- Undertook self‑funded international experience to challenge personal capabilities
- Demonstrated financial independence and self‑reliance by managing all aspects of daily life without external support
- Reinforced adaptability in unfamiliar contexts while gaining renewed clarity and determination for professional advancement

Interests and Activities

- **Swimming and Sport Climbing:** Regular swimmer since childhood with a deep connection to water and its meditative balance; passionate about mountains and outdoor life. These sports cultivated consistency, focus, and a methodical approach to overcoming challenges.

- **Violin and Orchestra:** Played violin for many years as member of a local orchestra. This experience taught me the importance of listening, synchronization, and collective harmony—understanding how individual contributions integrate into a cohesive whole and appreciating group dynamics in achieving shared objectives.

- **University Theatre Centre:** Active member where theatre enhanced my understanding of collaboration as a profoundly human endeavor. Developed authentic communication skills and learned the value of collective creation, sincerity, and interpersonal dynamics in artistic and professional contexts.