

# SIMONE ROMITI

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Computational scientist and software engineer with 7+ experience in high-performance computing, large-scale numerical simulations and machine learning. Proven track record of designing algorithms that delivered order-of-magnitude performance gains, building open-source scientific software used in peer-reviewed research, and leading collaborative projects across international research institutions.

## TECHNICAL SKILLS

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**Languages** - C, C++, Python, Bash, R

**HPC & Systems** - CUDA, MPI, OpenMP, SLURM, EasyBuild, GNU/Linux

**ML & Data** - PINNs, VAEs, Diffusion Models, Bayesian Statistics, Markov Chain Monte Carlo, Nested Sampling

**Libraries & Frameworks** - Pytorch, NumPy, SciPy, Pandas, Matplotlib, Plotly, Streamlit, SymPy, Jupyter

**DevOps & Tools** - Git, GitHub Actions, Docker,  $\text{\LaTeX}$ , Quarto, RMarkdown, Markdown

**Languages** - Italian (native), English (fluent), German (basic)

## WORK EXPERIENCE

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### University of Bern

Postdoctoral Research Scientist

Apr 2024 – Present

Bern, Switzerland

- **Reduced memory complexity from exponential to polynomial** by designing a novel algorithm using Physics-Informed Neural Networks (PINNs) in PyTorch
- **Achieved sub-permille numerical precision** as lead engineer for a high-accuracy scientific computation pipeline
- **Improved algorithm scaling from  $O(N^6)$  to  $O(N \log N)$**  through a novel mathematical reformulation
- **Built and maintained open-source simulation libraries** (Python/C++) adopted for several peer-reviewed scientific publications
- **Mentored 3 PhD students** on software engineering practices, numerical methods, and project delivery

### University of Bonn

Postdoctoral Research Scientist

Nov 2021 – Mar 2024

Bonn, Germany

- **Optimized GPU kernels (CUDA)** achieving a  $\sim 1.5\times$  throughput improvement via auto-tuning of Multigrid solver parameters on HPC clusters
- **Designed and ran large-scale distributed simulations** (MPI/OpenMP) on international computing centers
- **Developed a novel numerical method** achieving machine-precision exactness for a class of operator algebra constraints
- **Integrated Monte Carlo simulations with quantum computing workflows**, delivering end-to-end prototype pipelines bridging classical HPC and quantum backends
- **Mentored 3 graduate students** and delivered tutorial sessions for undergraduate computing courses

## SELECTED PROJECTS

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### Patient Management Web App

2026

- Built a full-stack **Streamlit** web application for a nutritionist's practice to manage patient records, appointment history, and nutritional assessments. Delivered solo from requirements to deployment

EDUCATION

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<i>Roma Tre University</i> <b>PhD in Physics</b> (defended April 2022) <ul style="list-style-type: none"><li>• Focus: numerical algorithms, Monte Carlo methods, HPC simulation</li><li>• Ranked <b>1st</b> in national competitive admission exam</li></ul>	Rome, Italy Nov. 2018 – Oct. 2021
<i>Roma Tre University</i> <b>M.S. in Physics</b> <ul style="list-style-type: none"><li>• GPA: 29.85/30, graduated with highest honours</li></ul>	Rome, Italy Oct. 2016 – Oct. 2018
<i>Roma Tre University</i> <b>B.S. in Physics</b> <ul style="list-style-type: none"><li>• GPA: 28.84/30, graduated with highest honours   Merit Scholarship recipient</li></ul>	Rome, Italy Oct. 2013 – Jul. 2016

LEADERSHIP & ACHIEVEMENTS

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<b>Principal Investigator</b> – 0.24M GPU node-hours compute grant	<a href="#">CSCS ALPS</a>   2025
<b>Workshop Organizer</b> – HPC & Quantum Computing workshop	<a href="#">ECT*</a>   2025
<b>Invited Speaker</b> – Scientific seminars at <a href="#">CERN</a> and <a href="#">ECT*</a>	2025 – 2026
<b>Visiting Research Grant</b> – competitive international grant	<a href="#">TU Wien</a>   2026
<b>5+ peer-reviewed publications</b> – <a href="#">full list on ORCID</a>	2021 – Present