

# SIMONE ROMITI

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Computational scientist and software engineer with 6+ years of experience in high-performance computing, machine learning, and large-scale numerical simulations. 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 cross-institutional projects. Experienced in parallel computing and deep learning (PyTorch).

## TECHNICAL SKILLS

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

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

**ML & Data** - PyTorch, Physics-Informed Neural Networks (PINNs), VAEs, Diffusion Models, Bayesian Statistics, Monte Carlo

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

**DevOps & Tools** - Git, GitHub Actions, Docker, L<sup>A</sup>T<sub>E</sub>X, Quarto, Markdown

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

## WORK EXPERIENCE

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### University of Bern

*Postdoctoral Research Engineer*

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, unlocking simulations previously infeasible at scale
- **Achieved sub-permille numerical precision** as lead engineer for a high-accuracy scientific computation pipeline, coordinating analysis across a multi-institution research group
- **Improved algorithm scaling from  $O(N^6)$  to  $O(N \log N)$**  through a novel mathematical reformulation, cutting compute costs by orders of magnitude for large- $N$  workloads
- **Built and maintained open-source simulation libraries** (Python/C++) adopted by multiple research teams and directly enabling peer-reviewed publications
- **Mentored 3 PhD students** on software engineering practices, numerical methods, and project delivery

### University of Bonn

*Postdoctoral Research Engineer*

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 national supercomputing infrastructure, generating datasets used across a European research collaboration
- **Developed a novel numerical method** achieving machine-precision exactness for a class of operator algebra constraints, published in a peer-reviewed journal
- **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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- Built a full-stack **Streamlit** web application for a nutritionist practice to manage patient records, appointment history, and nutritional assessments — delivered solo from requirements to deployment

## EDUCATION

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*Roma Tre University*

Rome, Italy

**PhD in Physics** (defended April 2022)

Nov. 2018 – Oct. 2021

- Focus: numerical algorithms, Monte Carlo methods, HPC simulation
- Ranked **1st** in national competitive admission exam

*Roma Tre University*

Rome, Italy

**M.S. in Physics**

Oct. 2016 – Oct. 2018

- GPA: 29.85/30, graduated with highest honours

*Roma Tre University*

Rome, Italy

**B.S. in Physics**

Oct. 2013 – Jul. 2016

- GPA: 28.84/30, graduated with highest honours | Merit Scholarship recipient

## LEADERSHIP & ACHIEVEMENTS

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**Principal Investigator** – 240,000 GPU node-hours compute grant

[CSCS ALPS](#) | 2025

**Workshop Organizer** – International HPC & Quantum Computing workshop (30+ attendees)

[ECT\\*](#) | 2025

**Invited Speaker** – Technical seminars at CERN and ECT\*

2025 – 2026

**Visiting Research Grant** – competitive international grant

[TU Wien](#) | 2026