

Rodrigo Voivodic

Physicist | Computational Scientist | Software Engineer

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EAD holder

Summary

Ph.D. Physicist and Researcher with 10+ years of experience in high-performance numerical modeling, statistical analysis, and algorithm development. Expert in C and Python for simulating complex systems and applying Machine Learning (PyTorch/JAX) to large-scale datasets. Proven track record of translating theoretical frameworks into optimized, scalable software solutions.

Technical Skills

Languages	C, C++, Python, Go, Zig, Shell (Nushell/Bash)
Data & ML	PyTorch, JAX, NumPy, SciPy, Pandas, Matplotlib
Tools/DevOps	Linux (NixOS), Git, Docker/Podman, HPC, GitHub Actions
Web Stack	Go, Templ, Alpine.js, Alpine AJAX, Tailwind CSS (Modern Web Development)
Modeling	Numerical Simulations, Bayesian Statistics, Neural Networks, Predictive Analytics

Experience

2021–2025 **Postdoctoral Researcher**, *Donostia International Physics Center*, Spain.

- Awarded the Juan de la Cierva and LACEGAL fellowships, ranking as a **top 2 applicant nationwide** for research excellence and technical leadership.
- Developed a **symmetry-aware generative neural network**, reducing model parameters by a **factor of 50** through custom architectural constraints without loss of performance.
- Collaborated within diverse, international cross-functional teams to deliver peer-reviewed research and manage shared, version-controlled codebases.

2019–2020 **Research Fellow**, *Max Planck Institute for Astrophysics*, Germany.

- Secured an international research fellowship (FAPESP BEPE) to lead independent research on large-scale spatial data structures as a visiting researcher.
- Engineered a unified mathematical framework to integrate disparate statistical models, streamlining the analysis of large-scale cosmological datasets.

2014–2021 **Graduate Researcher (M.Sc. and Ph.D.)**, *University of São Paulo*, Brazil.

- Awarded competitive FAPESP Master's and Doctorate fellowships to lead independent research in Modified Gravity and Cosmology; one of only 1,000 awarded nationwide.
- Engineered and optimized high-performance C and Python code, achieving a **10,000x speedup** in simulation while maintaining 95% statistical accuracy.
- Developed a novel analytical model that increased the predictive accuracy of cosmic void abundance by **100%**, enabling more precise analysis of large-scale datasets.

Selected Projects & Software

SCNF	Developed an E(3)-equivariant steerable continuous normalizing flow in JAX . Engineered the architecture to handle million-dimensional data while achieving a 100x reduction in parameter count compared to standard models.
ExSHalos	Created a high-performance C and Python library for accelerated simulation generation and large-scale data processing. Includes a suite of statistical tools optimized for terabyte-scale dataset analysis .
Personal Website	Architected a responsive site (rvoivodic.com) using a modern stack: Go, Templ, Alpine.js, and Tailwind CSS . Managed the full lifecycle from development to CI/CD deployment via GitHub Actions on an Oracle VPS with Caddy for reverse proxying.

Education

2016–2021 **Ph.D. in Physics**, *University of São Paulo*, Brazil.

Specialization: Computational Cosmology and Statistical Modeling

2014–2016 **M.Sc. in Physics**, *University of São Paulo*, Brazil.

2011–2014 **B.Sc. in Physics**, *University of São Paulo*, Brazil.