Dr. Miguel Amaral

Data & Simulation Specialist · PhD in Computational Biophysics · Researcher

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🇪🇺 Citizenship : Portugal | 🇬🇧 English C2   🇵🇹 Portuguese (Native)   🇫🇷 French C2 | 🏠 Vienna, Austria

Professional Summary

- **Computational scientist** with interdisciplinary training in **biophysics, computer science, and physics**.
- **Expertise in large-scale data analysis and HPC pipelines**, with strong background in numerical methods, algorithm design, and reproducible workflows.
- Experienced in **developing and maintaining scientific software** for simulation, analysis, and visualization, and in supporting diverse teams of researchers.

Core Skills

- **Mathematical Modeling** PDEs, stochastic processes, statistical mechanics | JAX, Mathematica, SymPy
- **Algorithm Development** Design, Optimization, Parallelization | Numba, Pybind11, C++, OpenMP, Fortran
- **Numerical Simulation & Scientific Computing** Python, NumPy, Scipy, LAMMPS
- **Data Analysis & Pipeline Development** duckdb, polars, dask, pandas, scikit-learn, netcdf
- **HPC & Cluster Computing** SLURM, MPI, Linux Systems, Bash
- **Data Visualization, Technical Writing, Collaboration** in Cross-Functional Teams | Blender, Ovito, LaTex

Professional Experience

Postdoctoral Researcher   Institute of Science and Technology Austria

RESEARCH, SUPERVISION   Jan 2025 — Jun 2025

- Extended, consolidated, and documented computational models of lipid membranes, and instutional knowledge into an internal wiki
- Supervised junior scientist on original research project
- Co-authored didactic review on mesoscale membrane simulations 🔗

PhD Researcher in Computational Biophysics   University College London & IST Austria

CLUSTER COMPUTING, BIG DATA SIMULATIONS & ANALYSIS, NUMERICAL COMPUTING   2020 — 2024

- Worked under the joint supervision of Prof. Dr. Andela Šarić and experimentalist Prof. Dr. Buzz Baum
- Conducted and published original research in an interdisciplinary field merging computing, physics and biology 🔗
- Developed simulation pipelines and tools for large-scale membrane dynamics on HPC
- Supervised and guided MSc students and interns
- Contributed talks and posters at 6 international conferences (Osaka, Berlin, Edinburgh)
- Collaborated with academic partners, resulting in two co-authored papers 🔗 & (in prep.)
- Succesfully defended thesis "Archaeal Membranes: in silico modelling and design" 🔗 in the group of Prof. Dr. Andela Šarić

Education

MSc in Computer Science   Faculty of Science, University of Porto

NETWORK SCIENCE, SUBGRAPH CENSUS, GRAPHLETS   2017 — 2019

- Thesis: Time-memory trade-off in graphlet counting & Orbit vertex frequency vs. degree in the expected degree model 🔗 in the group of Prof. Dr. Pedro Ribeiro

MSc & BSc in Physics   Faculty of Science, University of Porto

MICROFLUIDICS, MICROMAGNETICS, MICROFABRICATION, MICROSCOPY   2011 — 2017

- Thesis: Magnetic traps for bio analyte concentration 🔗 under the direction of Prof. Dr. João Araújo & Prof. Dr. Paulo Freitas, experimental work @ International Iberian Nanotechnology Laboratory, papers 🔗 🔗

References

(phone numbers by request)

- Prof. Dr. Andela Šarić — PhD Advisor, Tenured Professor @ Institute of Science and Technology Austria ✉
- Prof. Dr. Buzz Baum - Co-author, Tenured Professor @ MRC Laboratory of Molecular Biology, Cambridge ✉
- Prof. Dr. Oded Farago - External PhD thesis commitee member, Tenured Professor @ Ben Gurion University, Israel ✉

Recent Conferences & Talks

- Nov 2024: Think & Drink, IST Austria (talk)
- Nov 2024: Membrane Club, IMBA (talk)
- Sep 2023: ISMC2023, Osaka (poster)
- Nov 2022: "Status-Symposium on 'Life?'", Hanover (attended)
- Sep 2022: Biomembrane Days, Berlin (poster)
- Apr 2022: Physics of Life Summer School, Edinburgh (poster)

Scholarships & Awards

- 2011 — 2013: Gulbenkian Foundation "New Talents in Mathematics" scholarships
- 2012 : College Merit Scholarship for Excellency
- 2008 — 2011: Mathematical Olympiad Medals (National: Silver, Iberoamerican: Bronze)

Hobbies

- Narrative roleplaying games, both as player and organizer
- Avid reader and recent chorist
- Improving my german while integrating in Vienna
- Tinkering with software and hardware