Albert Alonso

ML Researcher | PhD in Physics

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ML researcher with a PhD in Biophysics, specializing in deep learning, high-performance computing, and scalable AI solutions. Developed state-of-the-art AI models for scientific computing, biophysical modeling, and computer vision, resulting in publications in top journals. Looking for research-driven environments where cutting-edge ML meets complex computational challenges and real-world impact.

Skills

Programming	Core Strengths	Tools & Frameworks	Languages
Python	Rapid prototyping	JAX, PyTorch	English (Fluent)
Bash / Shell	Scientific computing	Git, Docker	Spanish (Native)
Fortran	Data visualization	HPC, Cluster computing	Catalan (Native)
C++	End-to-end ML pipelines	GPU / TPU acceleration	Danish (Beginner)

Experience

Researcher (Ph.D. Student & Postdoc) — 12/2021 – Present
University of Copenhagen, Denmark

- Developed & optimised deep learning models for computer vision & reinforcement learning, focusing on scalability & efficiency.
- Designed end-to-end ML pipelines, including data preprocessing, model training, and deployment.
- Thrived in a fast-paced research setting, combining quick iteration on new ideas with the execution of complete projects.
- Published multiple peer-reviewed papers in top AI and Physics conferences/journals.
- Conducted a 3-month research stay at *Imperial College London*, focusing on computational modeling and fundamental theory of biological systems.
- Experienced in interdisciplinary research, bridging gaps between scientific, and applied domains.

Teaching Assistant — 2020 – 2023
University of Copenhagen, Denmark

- NDAB20001U: High Performance Programming & Systems
- NDAB18003U: Elements of Machine Learning
- NFYB14002U: Numerical Methods in Physics

Software Developer — 06/2018 – 08/2019
Nucleids Applied Science, Barcelona

- Developed WPF C# applications for scientific computing in research laboratories and nuclear stations.
- Designed real-time monitoring and data analysis tools for particle detection systems.

Education

Niels Bohr Institute, University of Copenhagen, Denmark — 12/2021 – 12/2024
PhD in Biophysics
Topic: *Differentiable Programming Approaches to Biophysical Questions*

Niels Bohr Institute, University of Copenhagen, Denmark — 09/2019 – 06/2021
MSc in Computational Physics
Thesis: *Use of Tensor Processing Units (TPUs) in Physics Simulations*

University of Barcelona, Spain — 09/2014 – 01/2019
BSc in Physics (Minor in Theoretical Physics)

Highlighted Projects

- **De(ep)tangle**: High-density overlapping worm tracking (SOTA in slender body tracking).
- **Bayex**: Bayesian optimization Framework in JAX.
- **ChemoXRL**: PPO (Deep reinforcement learning) implementation on high-noise environments.
- **PCAx**: Minimal differentiable PCA implementation.
- **t-SNEx**: t-SNE implementation in JAX.
- **boundVor**: Efficient Voronoi Tessalation in Bounded Domains.

Publications

- Alonso and Kirkegaard (2023). Fast detection of slender bodies, Nature Communications Biology.
- Alonso and Kirkegaard. (2024). Optimal integration in chemotaxis, PNAS Nexus.
- Alonso et al. (2024) Pseudopod splitting is an effective chemotaxis strategy, PNAS.
- Alonso et al. (2024). Local clustering but global spreading of receptors for optimal sensing, PRL.
- Alonso et al. (2024). Adaptive node positioning in transport networks, Preprint.
- Pham et al. (2025) Irreversibility in Non-reciprocal Chaotic Systems, New Journal of Physics
- Zdyb et al. (2025) Spline refinement with differentiable rendering, Preprint