

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 (Nature Communications Biology, PNAS, PRL). Interested in research environments where advanced machine learning methods intersect with challenging computational problems.

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.
- Specialised ML workflows and distributed training for large-scale AI systems.
- Designed end-to-end ML pipelines, including data preprocessing, model training, and deployment.
- 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.

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)

Technical Skills & Languages

Programming: Python, C++, C#, Fortran, Bash

Frameworks: JAX, PyTorch

Tools: Git, Docker, HPC, GPU/TPU

Languages: English (Fluent), Spanish (Native), Catalan (Native)

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