Sebastian Holtedahl Castedo

Paris, France | **UK / US / Norwegian Citizen**

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EDUCATION

Ecole Normale Supérieure, FR   Oct 2023 – Sept 2026

PhD in Statistical Physics under the supervision of Rémi Monasson.

- Investigating the trade-offs between performance and energy consumption in natural and artificial neural networks to uncover principles of computational efficiency and resource adaptation.
- Developing statistical models and inference methods to analyze high-dimensional neural data, using theoretical tools (e.g., replica theory, random matrix theory) to interpret numerical results.
- Conferences attended:
  - Eresfjord School in Mathematical Methods for Computational Neuroscience: Poster and talk.
  - PSL Qlife winter school - Learning and Plasticity in Neuronal Networks: Poster
  - Cargese - Maturation and plasticity in biological and artificial networks: Poster and talk
  - Paris IdF Neural Theory Symposium: Poster

The University of Manchester, UK   Sept 2019 – June 2023

MPhys Theoretical Physics with Study in Europe.

- First Class Honours (82%). Third year exchange programme at *Sorbonne Université* in Paris.

SKILLS

Language: Fluent in English, Spanish, Norwegian and French.

Technical: Python (incl. PyTorch), C++, Fortran. MCMC and Optimisation methods.

WORK EXPERIENCE

The University of Manchester, UK   Sept 2022 – June 2023

Master Thesis in Statistical Physics under the supervision of Tobias Galla

- Analysed the impact of structured correlations on the dynamics of disordered systems using mean-field theory, with applications to theoretical ecology. Results published in *Phys. Rev. E* arXiv:2409.12751.

Institute for Cross-Disciplinary Physics and Complex Systems, Palma ES   Jul 2022 - Aug 2022

Summer Undergraduate Research Fellowship (SURF)

- Applied Variational Autoencoders (VAEs) to microbiota data for childhood obesity prediction.

Laboratoire de Physique Théorique et Hautes Energies, Paris FR   Apr 2022 - Jun 2022

Internship studying the Landau-Lifshitz-Gilbert equation under the supervision of Leticia Cugliandolo

- Theoretical analysis of a stochastic system using the Langevin and Fokker-Planck formalisms. Results published in *Phys. Rev. B* arXiv:2205.10418.

Fermi National Accelerator Laboratory, Chicago US   Jul 2021

Quantum Computing Internship for Physics Undergraduates

- Implemented quantum algorithms (QFT, Grover's, QPE) using Python & Qiskit and covered theoretical foundations of quantum information theory.

ADDITIONAL EXPERIENCE & INTERESTS

- **Accenture Horizons Internship (Sept 2018 – May 2019):** Developed optimisation tools for a government technology delivery project.
- **Environmental Advocacy:** Contributed to a publication on open-source solutions to combat deforestation ahead of COP26.