DANIEL HOLMBERG

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EDUCATION

University of Helsinki *May 2022*
M.Sc. in Data Science
Thesis: *Jet Energy Corrections with Graph Neural Network Regression*
Grade: 5/5

University of Helsinki *Dec 2019*
B.Sc. in Physics
Thesis: *Interatomic Potentials for Simulating Fe–Cr*
Grade: 4/5

EXPERIENCE

University of Helsinki Aug 2022 – Present
PhD Candidate *Helsinki, Finland*

- Part of the Complex Systems Computation group led by Prof. Teemu Roos, where I research structured deep learning.
- Active collaborations with the Vlasiator team on speeding up ion-kinetic space weather simulations, as well as with the Institute for Atmospheric and Earth System Research on extrapolating in-situ aerosol measurements to a global scale.

Euro-Mediterranean Center on Climate Change Oct 2024 – Apr 2025
Visiting Researcher *Bologna and Lecce, Italy*

- Building a machine learning based alternative to the operational numerical Mediterranean forecasting system.

South African Radio Astronomy Observatory Jan 2024 – Apr 2024
Visiting Researcher *Cape Town, South Africa*

- Developed computer vision techniques to deconvolve radio interferometric images from the MeerKAT telescope.

European Organization for Nuclear Research Jul 2021 – Jun 2022
Technical Student *Geneva, Switzerland*

- Interned in the IT cloud infrastructure team under CNCF Research User Group lead Ricardo Rocha.
- Gained expertise on the Kubeflow cloud platform able to facilitate the complete machine learning lifecycle.
- Implemented an end-to-end pipeline to run a novel machine learning based calibration technique for particle jets.

Helsinki Institute of Physics Nov 2020 – May 2021
Research Assistant *Helsinki, Finland*

- Began my research on calibrating particle jets arising in highly energetic collisions at the Large Hadron Collider under guidance by Dr. Henning Kirschenmann and Prof. Mikko Voutilainen.
- Participated in Fermilab's data analysis school for students at the Compact Muon Solenoid experiment.

Fjuul Vision Mar 2020 – Mar 2021
Software Engineer *Helsinki, Finland*

- Contributed to the development and maintenance of the company's health tracking mobile application.
- Successfully integrated Withings tracker functionality, demonstrating versatile full-stack development skills.

ORGANIZATIONS

Spektrum rf Jan 2021 – Dec 2021
Managing Editor *Helsinki, Finland*

- Oversaw the writing and publication process of our student letter.

Nyland Brigade Conscript Committee Aug 2018 – Mar 2018
Vice-Chair *Ekenäs, Finland*

- The Conscript Committee acts as a link between conscripts and officers/staff at the brigade.
- Hosted meetings, visited other brigades in southern Finland, coordinated transports, arranged worklife events, etc.

OUTREACH

CMS ML Hackathon Nov 2021
Instructor *Geneva, Switzerland*

- Showcased usage of cloud platforms for machine learning to attending physicists.

CodeRefinery May 2020 – Jun 2020
Instructor *Helsinki, Finland*

- Helped people taking part in coding workshops with new concepts such as version control or modularity.

PUBLICATIONS

D. Holmberg, E. Clementi and T. Roos. *Regional Ocean Forecasting with Hierarchical Graph Neural Networks*. In NeurIPS 2024 Workshop on Tackling Climate Change with Machine Learning (2024).

D. Holmberg, D. Golubovic and H. Kirschenmann. *Jet Energy Calibration with Deep Learning as a Kubeflow Pipeline*. Computing and Software for Big Science vol. 7 (2023).

P. Kuopanportti, M. Ropo, D. Holmberg, et al. *Interatomic Fe–Cr potential for modeling kinetics on Fe surfaces*, Computational Materials Science vol. 203 (2022).

PRESENTATIONS

D. Holmberg. *Regional Ocean Forecasting with Hierarchical Graph Neural Networks*. CMCC (2024). Bologna, Italy.

D. Holmberg and D. Golubovic. *Jet Energy Corrections with GNN Regression using Kubeflow at CERN*. Kubecon + CloudNativeCon Europe (2022). Valencia, Spain.

D. Holmberg. *Jet Energy Corrections with GNN Regression*. Learning to Discover at Institut Pascal (2022). Paris, France.