Emil Ryd

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Education

University of Oxford *Oct 2023 – Jun 2026*
BA in Physics

- Grade: Distinction, ranked 35 out of 171 students in most recent exams.

UWC Red Cross Nordic *Aug 2021 – May 2023*
International Baccalaureate (High school)

- Grade: 42/45

Research

Machine learning for flood forecasting *Sep 2024 – present*
Supervised by Grey Nearing, Google Research

- Working with Grey Nearing from Google Research, investigating how machine learning models for flood forecasting trained on global datasets can be fine-tuned on local basins (still ongoing)
- Trained and fine-tuned models on the Oxford compute cluster. Paper submitted to ICLR Climate Change AI 2025 workshop (under review).

Flood forecasting in Rwanda *Kigali, Rwanda*
Carnegie Mellon University Africa (CMU-Africa) *Jul 2024 – Oct 2024*

- Worked in Kigali, Rwanda as a full-time research intern under Prof. Moise Busogi, as part of a newly started research initiative on improving flood forecasting together with Microsoft Research Africa and Rwanda Water Resources Board
- Curated Rwandan data on river streamflow and submitted to the European Commission's global flood forecasting model, GloFAS, for calibration. Increased the number of basins covered in Rwanda.

Nonlinear climate dynamics *Jun 2022 – Sep 2024*
Supervised by Prof. Holger Kantz, Max Planck Institute for the Physics of Complex Systems

- Investigated possible mechanisms behind the infamous 100,000-year problem in the Earth's ice age history
- Found new regimes in which vibrational and nonlinear resonance can occur in dynamical systems, suggesting new hypotheses for the 100,000-year problem. Paper published in Phys Rev E.

Agent-based modeling of COVID-19 *Aug 2023 – Feb 2024*
Collaboration with Dr. Leila Hedayatifar, New England Complex Systems Institute

- Helped as a research volunteer on creating agent-based models for simulating the spread of COVID-19 in closed spaces.
- Converted the research group's model from NetLogo to Python using Mesa and ran some experiments on the model to find characteristic behaviors in the transmission.

Modeling airplane boarding in multi-aisle aircraft *Jun 2022 – Nov 2023*
Supervised by Prof. Jason Steffen, University of Nevada, Las Vegas

- Based on the initial work we did as part of the 2022 IMMC competition, we investigated the possibilities of parallelizing boarding procedure in planes with multiple aisles.
- I wrote a full agent-based model in Repast Simphony (Java) to simulate airplane boarding. Preprint available on arXiv.

Publications & preprints

Analysis of parallel boarding methods in a multi-aisle aircraft (preprint) *Oct 2024*
Emil Ryd, Vihaan Khandelwal, Hayden So, Jason H. Steffen
arXiv:2410.17870

Nonlinear resonance as a model for paleoclimate oscillations *Sep 2024*

Emil Ryd, Holger Kantz

10.1103/PhysRevE.110.034213

Projects

Vaccess *vaccess*

- Developed and launched an app on the App Store in Sweden, which enables users to catalogue vaccinations they've taken and be notified about future vaccinations. 1000+ downloads. (Discontinued).
- Tools Used: Swift, Xcode

Water Supply Forecast *water-supply-forecast*

- Part of a team from my university participating in the Water Supply Forecast Rodeo, a competition hosted by the U.S. Bureau of Reclamation to help develop their forecasting models. We developed an LSTM model for prediction, making use of both geospatial and temporal data.
- Tools Used: Python, Pandas, Pytorch

Scholarships & grants

New College (Oxford) Scholar: Scholarship awarded for excellent academic performance in first year of university. *2024*

Nick Roth Travel Award: Travel award for my stay in Rwanda doing research. *2024*

United World College Scholar: Full scholarship to study at this international residential high school in Norway with 90+ nationalities, aimed at promoting inter-cultural understanding and world peace. *2021*

Honours & awards

Silver medal at the International Physics Olympiad (IPhO) *2023*

Bronze medal at the European Physics Olympiad (EuPhO) *2023*

5th place in the Norwegian Mathematics Olympiad (Abelkonkurransen) *2023*

Winner (1st place) of the Norwegian Physics Olympiad *2022*

Meritorious distinction in the International Mathematical Modeling Challenge *2022*

Other things I've done that I think are cool

Physics olympiad club in Rwanda *Aug 2024 - present*

- Started this club teaching olympiad physics to high school grads and university students in Rwanda.
- The German development agency (GIZ) are supporting us by letting us use their maker space for our meetings. I was in Rwanda when we started, and I currently lead sessions online from the UK.
- Currently working with the members of the club on setting up a small physics competition in Rwanda, which we hope to then grow into a national olympiad.

Renovating school in Ghana *Aug 2022 - Feb 2023*

- Raised money by organizing workshops on environmental challenges and world development for young kids.
- Coordinated with people on the ground. had a water pump and storage facility successfully installed, providing more easily accessible drinking water at the school.

ARBOx *Apr 2022 - Mar 2023*

- Participated in a 2-week ML alignment research accelerator, organized at Oxford University, a mini-version of the ARENA program.
- Learned the basics of mechanistic interpretability and made a small project on feature visualization.