Branton DeMoss

Contact

bdemoss@robots.ox.ac.uk
www.brantondemoss.com
+44 (0)7926 576225

St Edmund Hall
Queen's Lane, Oxford
OX1 4AR, UK

Education

DPhil Candidate in Machine Learning — 2021-25 (expected)
University of Oxford

BA Mathematics and Physics — 2018
University of Colorado Boulder

Visitor Mathematical and Theoretical Physics — 2016-17
University of Oxford

Experience

Mathematical Institute, University of Oxford — 2025-
Postdoctoral Research Associate
- Research on the mathematical and computational foundations of AI.

Oxford Robotics Institute — 2021-25
Graduate Student Researcher
- Research in complexity, generalization, reinforcement learning, world models.

The Collaboratory — 2020-23
Co-founder; Chief Science Officer
- Deep learning on language and graphs for knowledge curation.
- Raised $2M, led product strategy, design, and ML R&D.

Comma.ai — 2020
ML Research Intern
- Reinforcement learning for self-driving cars.

Front Range Geosciences — 2017-20
Machine Learning Engineer
- Sole dev on ML system for seismic data, sold to multinational co.

Center for Theory of Quantum Matter — 2017
Research Assistant
- Research on quantum many-body localization.

Mathematics Department, CU Boulder — 2016
Research Assistant
- Knot theory and topological quantum field theory.

High Enery Particle Physics Group, Physics Department, CU Boulder — 2014-15
Research Assistant
- High performance Monte Carlo simulations (C++) for DUNE experiment.

Publications

The Complexity Dynamics of Grokking — 2025
Physica D: Nonlinear Phenomena

The Complexity Dynamics of Double Descent 2025
Work in progress.
I explain double descent in neural networks from a complexity perspective.

LUMOS: Language-Conditioned Imitation Learning with World Models 2024
ICRA 2025

DITTO: Offline Imitation Learning with World Models 2023
Under submission to NeurIPS
arχiv:2302.03086

Combining physics and deep learning to automatically pick first breaks in the Permian Basin 2021
First International Meeting for Applied Geoscience & Energy

Ein Liebesbrief an KataGo 2020
Deutsche Go Zeitung, Ausgabe 4/2020

Love Letter to KataGo, or: Go AI Past, Present, and Future 2020
American Go E-Journal

DeepTrace: A breakthrough application of deep learning to automate first break picking 2019
SEG 2019 Lenovo Thought Leadership Series

Topology and Knot Theory 2016
Course notes for CU Boulder special topics course:
"Topology, Knot Theory, and their applications in Physics and Chemistry"

Secondary Particle Showers from Hadron Absorber Interactions 2016
Deep Underground Neutrino Experiment (DUNE) Collaboration Documents

Teaching

Physics of Information and Complexity 2024
Received highest possible marks for teaching performance.
Oxford, HT 24

Philosophy of Emergence 2024
Received highest possible marks for teaching performance.
Oxford, HT 24

Topics in Reinforcement Learning 2023
Received highest possible marks for teaching performance.
Oxford, MT 23

Rocket League Behaviour Cloning from Unlabelled Data 2023
Supervised Master's Thesis, Oxford
Student obtained highest marks, and secured funded DPhil position in Oxford.

Talks

2nd Symposium on Algorithmic Information Theory and Machine Learning 2025
Talk on my discovery of complexity phase transitions in learning systems. Link.

ICRA 2025, Robot Foundation Models Session 2025

Talk on our work LUMOS, addressing reinforcement learning in world models.

Harvard/Tufts, Levin Group 2025
Invited talk on complexity dynamics to Michael Levin's computational biology group. Link.

Oxford, Department of Physics 2024
Invited talk on complexity dynamics to Ard Louis's research group.

Oxford, Department of Statistics 2024
Invited talk on complexity and generalization to the RainML group.

Awards

AWS Lighthouse Scholarship (fully funded PhD)	Oxford, 2021
Stribic-Martin Scholarship	Boulder, 2017
UROP Fellowship	Boulder, 2017
Dawkins Fund Award	Oxford, 2016
Gilman Scholarship	Oxford, 2016
Esteemed Scholar Award	Boulder, 2014

References

Prof. Nick Hawes
Professor of AI and Robotics, Oxford
Director, Oxford Robotics Institute
nickh@robots.ox.ac.uk

Prof. Ingmar Posner
Professor of Applied AI, Oxford
Deputy Director, Oxford Robotics Institute
ingmar@robots.ox.ac.uk

Prof. Jakob Foerster
Associate Professor, Oxford
jakob@robots.ox.ac.uk

Prof. Jared Tanner (supervisor from Oct 2025)
Professor of the Mathematics of Information, Oxford
tanner@maths.ox.ac.uk