

Branton DeMoss

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Education	<i>DPhil Candidate in Machine Learning</i> University of Oxford	2021-25 (expected)
	<i>BA Mathematics and Physics</i> University of Colorado Boulder	2018
	<i>Visitor Mathematical and Theoretical Physics</i> University of Oxford	2016-17
Experience	Mathematical Institute, University of Oxford <i>Postdoctoral Research Associate</i> <ul style="list-style-type: none">Research on the mathematical and computational foundations of AI.	2025-
	Oxford Robotics Institute <i>Graduate Student Researcher</i> <ul style="list-style-type: none">Research in complexity, generalization, reinforcement learning, world models.	2021-25
	The Collaboratory <i>Co-founder; Chief Science Officer</i> <ul style="list-style-type: none">Deep learning on language and graphs for knowledge curation.Led product strategy, design, and ML R&D.	2020-23
	Comma.ai <i>ML Research Intern</i> <ul style="list-style-type: none">Reinforcement learning for self-driving cars.	2020
	Front Range Geosciences <i>Machine Learning Engineer</i> <ul style="list-style-type: none">Sole dev on ML system for seismic data, sold to multinational co.	2017-20
	Center for Theory of Quantum Matter <i>Research Assistant</i> <ul style="list-style-type: none">Research on quantum many-body localization.	2017
	Mathematics Department, CU Boulder <i>Research Assistant</i> <ul style="list-style-type: none">Knot theory and topological quantum field theory.	2016
	High Energy Particle Physics Group, Physics Department, CU Boulder <i>Research Assistant</i> <ul style="list-style-type: none">High performance Monte Carlo simulations (C++) for DUNE experiment.	2014-15
Publications	<i>The Complexity Dynamics of Grokking</i> Physica D: Nonlinear Phenomena	2025

	<i>The Complexity Dynamics of Double Descent</i> Work in progress. I explain double descent in neural networks from a complexity perspective.	2025
	<i>LUMOS: Language-Conditioned Imitation Learning with World Models</i> ICRA 2025	2024
	<i>DITTO: Offline Imitation Learning with World Models</i> Under submission to NeurIPS arXiv:2302.03086	2023
	<i>Combining physics and deep learning to automatically pick first breaks in the Permian Basin</i> First International Meeting for Applied Geoscience & Energy	2021
	<i>Ein Liebesbrief an KataGo</i> Deutsche Go Zeitung, Ausgabe 4/2020	2020
	<i>Love Letter to KataGo, or: Go AI Past, Present, and Future</i> American Go E-Journal	2020
	<i>DeepTrace: A breakthrough application of deep learning to automate first break picking</i> SEG 2019 Lenovo Thought Leadership Series	2019
	<i>Topology and Knot Theory</i> Course notes for CU Boulder special topics course: “ <i>Topology, Knot Theory, and their applications in Physics and Chemistry</i> ”	2016
	<i>Secondary Particle Showers from Hadron Absorber Interactions</i> Deep Underground Neutrino Experiment (DUNE) Collaboration Documents	2016
Teaching	<i>Physics of Information and Complexity</i> Received highest possible marks for teaching performance. Oxford, HT 24	2024
	<i>Philosophy of Emergence</i> Received highest possible marks for teaching performance. Oxford, HT 24	2024
	<i>Topics in Reinforcement Learning</i> Received highest possible marks for teaching performance. Oxford, MT 23	2023
	<i>Rocket League Behaviour Cloning from Unlabelled Data</i> Supervised Master’s Thesis, Oxford Student obtained highest marks, and secured funded DPhil position in Oxford.	2023
Talks	<i>2nd Symposium on Algorithmic Information Theory and Machine Learning</i> Talk on my discovery of complexity phase transitions in learning systems. Link .	2025
	<i>ICRA 2025, Robot Foundation Models Session</i>	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	<i>AWS Lighthouse Scholarship (fully funded PhD)</i>	Oxford, 2021
	<i>Stribic-Martin Scholarship (\$10k for top mathematics undergrad)</i>	Boulder, 2017
	<i>UROP Fellowship (\$3k summer research grant)</i>	Boulder, 2017
	<i>Dawkins Fund Award (Exeter College)</i>	Oxford, 2016
	<i>Gilman Scholarship (\$5k US Dept of State)</i>	Oxford, 2016
	<i>Esteemed Scholar Award (\$7k/yr for top enrolling undergrads)</i>	Boulder, 2014

References	<i>Prof. Nick Hawes</i> Professor of AI and Robotics, Oxford Director, Oxford Robotics Institute nickh@robots.ox.ac.uk
	<i>Prof. Ingmar Posner</i> Professor of Applied AI, Oxford Deputy Director, Oxford Robotics Institute ingmar@robots.ox.ac.uk
	<i>Prof. Jakob Foerster</i> Associate Professor, Oxford jakob@robots.ox.ac.uk
	<i>Prof. Jared Tanner</i> Professor of the Mathematics of Information, Oxford tanner@maths.ox.ac.uk