

Zakhar Shumaylov

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Last update on December 2, 2022

[LinkedIn](#)
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Education

University of Cambridge	CAMBRIDGE, UK
PhD in Mathematics of Information	2022 – 2026
Thesis: "Structure preserving physics informed neural networks for inverse problems"	
Supervised by: Prof Carola-Bibiane Schönlieb	
Awarded the <i>Trinity Henry Barlow Scholarship</i> (£81,000) at Christs College.	
Funded by Christs College Bursary (£15,000) and CCIMI (£50,000).	
University of Cambridge	CAMBRIDGE, UK
Mathematics BA/MMath (1st Class/Distinction)	2018 – 2022
Awarded the <i>Cambridge Trust Scholarship</i> (£40,000) to read Mathematics at Churchill College.	
Courses included: Quantum Field Theory, General Relativity, Statistical Field Theory, Black Holes, Cosmology.	
Brighton College	BRIGHTON, UK
A-Level(5A*) STEP 2,3 (S,S)	2016 – 2018
Governor's Physics and Mathematics Lyceum 30	ST-PETERSBURG, RUSSIA
Year 9 - Year 11 (4.53/5)	2013 – 2016

Publications and Preprints

M. Letey, **Z. Shumaylov**, F. Agocs, W. Handley, M. Hobson, A. Lasenby (2022).
Quantum Initial Conditions for Curved Inflating Universes
Under review; arxiv

Z. Shumaylov, W. Handley (2021).
Primordial power spectra from k -inflation with curvature.
Accepted to Physical Review D (2022); arxiv

I. Shumailov, **Z. Shumaylov**, D. Kazhdan, Y. Zhao, N. Papernot, M. A. Erdogdu, R. Anderson (2021).
Manipulating SGD with data ordering attacks.
Accepted to NeurIPS (2021); arxiv

S. Mukherjee, S. Dittmer, **Z. Shumaylov**, S. Lunz, O. Öktem, C. Schönlieb (2020).
Learned convex regularizers for inverse problems.
Under review; arxiv

Work Experience

University of Cambridge	CAMBRIDGE, UK
Supervisor for University of Cambridge Undergraduates	Oct 2022 - Now
Supervising undergraduate students in a variety of courses. (2022/2023): Part IA Vectors and Matrices (45h)	
Ryff AI	CAMBRIDGE, UK
Summer Research Intern	July 2022 - Sept 2022
Work under supervision of Dr Mike Roberts. During the internship I worked on the problem of unsupervised video motion segmentation. During the project, I used variational and learned methods from the optical flow literature for foreground-background separation using motion signals.	
University of Cambridge: Institute of Astronomy	CAMBRIDGE, UK
Summer Internship Programme	August 2021 - Sept 2021
Work under supervision of Dr Amy Bonsor (IoA): "Gas disk imaging around white dwarves" During the internship I investigated gas disk light curve imaging around white dwarves, by modelling gas geometry. Funded by the Institute of Astronomy.	
University of Cambridge: Kavli Institute for Cosmology	CAMBRIDGE, UK
Summer Research Intern	June 2021 - August 2021
Work under supervision of Dr Will Handley (KICC): "Primordial power spectra from k -inflation with curvature" During the internship I investigated the problem of interplay between inflationary sound speed and primordial curvature using analytical approximations. Funded by the CMP.	
University of Cambridge: Department of Applied Mathematics and Theoretical Physics	CAMBRIDGE, UK
Summer Research Assistant	June 2020 - Sept 2020
Work under supervision of Prof Carola Schönlieb (DAMTP), Prof Ozan Öktem (KTH) and Prof Par Kurlberg (KTH): "3DEM: Representation of atomic models" During the internship I investigated the problem of protein fitting inside of atomic volumes acquired via cryo electron microscopy. During the project I used learned techniques and variational methods to obtain protein reconstructions. Funded by the CSRM.	

University of Cambridge: Department of Applied Mathematics and Theoretical Physics	CAMBRIDGE, UK
Summer Research Assistant	<i>June 2019 – Sept 2019</i>
Work under supervision of Prof Carola Schonlieb (DAMTP).	
During the internship I worked primarily in the field of inverse problems. In particular, I researched how Deep Learning can be used to help solve physics-based inverse imaging problems. This led to a joint work "Learned convex regularizers for inverse problems". Funded by the CSRIM and the Tizard Fund .	
Cambridge Coding Academy	CAMBRIDGE, UK
Teaching Assistant	<i>July 2018</i>
Supporting and leading coding sessions of the 'Coding++' course, covering the basics of AI using python and the pygame library.	
Brighton College	BRIGHTON, UK
After-school Teaching Assistant	<i>Sept 2017 – June 2018</i>
Tutoring Year 9 - Year 13 students during after-school Mathematics classes.	
University Of Sussex	UK
Research Assistant to Professor Madzvamuse	<i>July 2017 - August 2017</i>
I reviewed and extended the one-dimensional cell model of Shenoy(2016) by modelling cell contractility and strain with partial differential equations in Matlab.	

Subject Olympiads

British Physics Olympiad Round 2	UK, 2018
Gold Award (Top 15).	
Invited to the University of Oxford Training Camp to compete for a spot on the UK IPhO team.	
British Astronomy and Astrophysics Olympiad	UK, 2018
Gold Award.	
British Physics Olympiad Round I	UK, 2017
Gold Award (Top 50).	
British Mathematics Olympiad Round I	UK, 2017
Certificate of Distinction.	
AS Physics Challenge	UK, 2017
Gold Award.	
British Physics Olympiad Round I	UK, 2016
Gold Award.	
Senior Mathematics Challenge	UK, 2016
Gold Award (100%).	
School Mathematics Olympiad	RUSSIA, 2016
Winner of the inter-school team challenge.	
Russian Computer Science Olympiad	RUSSIA, 2015
Winner of the district challenge.	
Russian Physics Olympiad	RUSSIA, 2015
Winner of the district challenge.	
Russian Computer Science Olympiad	RUSSIA, 2014
Winner of the district challenge.	

Positions of Responsibility

Cambridge AI Safety Fellowship	CAMBRIDGE AI SAFETY HUB
8-week reading and discussion group on fundamentals of AI safety.	
Treasurer and Membership officer	CAMBRIDGE UNIVERSITY ASTRONOMICAL SOCIETY
Keeping proper accounts of the income and expenditure of the Society.	
Deputy Head of School House	BRIGHTON COLLEGE
Coordinating and overseeing the House Prefects, attending and ensuring smooth running of House events.	
Founder and President of Brighton College STEM Society	BRIGHTON COLLEGE
Promoting an active interest in natural sciences, technology, engineering and mathematics at Brighton College.	
Leader of the House Chess Team	BRIGHTON COLLEGE
I have been practicing chess for 7 years and became a part of the House Chess Team.	

Awards

Trinity Henry Barlow Scholarship	UK, 2022
Awarded £81,000 scholarship to pursue PhD in Mathematics of Information at University of Cambridge.	
Cambridge Christs Bursary	UK, 2022
Awarded £15,000 to pursue PhD in Mathematics of Information at University of Cambridge.	

CCIMI	UK, 2022
Awarded £50,000 to pursue PhD in Mathematics of Information at University of Cambridge.	
Churchill College Prize Scholarship	UK, 2021
Awarded £120 in recognition of excellent academic performance.	
Churchill College Honorary Scholarship	UK, 2020
Awarded £100 in recognition of excellent academic performance.	
Churchill College Prize Scholarship	UK, 2019
Awarded £120 in recognition of excellent academic performance.	
Cambridge Trust Scholarship	UK, 2018
Awarded £40,000 to read Mathematics at University of Cambridge.	
Brighton College Governors Award for Independent Study	UK, 2018
Awarded £500 for a piece of work outside of the A-Level curriculum.	
Brighton College Physics Prize: Bayliss-Smith prize	UK, 2018
Prize to recognise sustained excellence and scientific endeavor.	
Brighton College Science Essay Competition 2018	UK, 2018
Winning essay: "The Tale of Cell Modelling".	
Brighton College Science Prize: Newton's Cup	UK, 2017
Prize to recognise sustained excellence and scientific endeavor.	
Brighton College Science Essay Competition 2017	UK, 2017
Winning essay: "Brief History of Exoplanets".	

Skills

Programming languages: Python . C

Software packages: pyTorch . odl . Matlab . Maple . Mathematica . LaTeX

OS & computing: Linux, MacOS, unix, bash, slurm, HPC, vim

Languages: Russian (*native*), English (*full professional proficiency*)