Nicholas Sale

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Citizenship: British

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Swansea University, Wales. SA1 8EN

Research interests	Topological Data Analysis, Data Science, Phase Transitions, Statistical Physics, Quantum Chromodynamics, Machine Learning

Education

Swansea University		Swansea, UK
PhD in Mathematics		Oct 2019 – Present
Supervisors: Prof. Jeff Giansiracusa, Prof. Biagio Lucini		
Current Title: Applications of Topological Data Analysis to Statistical Physics		
Expected Completion: Autumn 2022		
University of Oxford		New College, Oxford, UK
MMathCompsci Mathematics & Computer Science		Oct 2015 – Jul 2019
Parts A & B: First Class; Part C: First Class		

Honors and scholarships

Swansea University Research Excellence Scholarship	2019-2022
Undergradute Scholarship (New College, Oxford)	2016-2019
CyberFirst Bursary (UK Civil Service)	2015-2019
Arkwright Engineering Scholarship (Arkwright Foundation)	2013-2015

Prizes and awards

SIAM Student Travel Award (to attend SIAM AG21)	Aug 2021
Winner of TopFlavours Gongshow	Jun 2021
2nd place in Welsh Mathematics 3-Minute Thesis Competition	Mar 2021

Publications

Quantitative analysis of phase transitions in two-dimensional XY models using persistent homology

Nicholas Sale, Jeffrey Giansiracusa, Biagio Lucini.

Phys. Rev. E 105, 024121 – Published 14 February 2022

Invited Talks

Detecting Vortices with Persistent Homology	Feb 2022
UK Centre for TDA, University of Oxford (hybrid)	
Quantitative analysis of phase transitions in two-dimensional XY models using persistent homology	Sep 2021
Machine Learning for High Energy Physics, on and off the Lattice	
ECT* Trento (hybrid)	
Persistent Homology for Phase Transitions	Nov 2020
UK Centre for TDA, University of Oxford (online)	

Contributed Talks	**Quantitative analysis of phase transitions in two-dimensional XY models using persistent homology**	Aug 2021
	SIAM Conference on Applied Algebraic Geometry 2021	
	Persistent Homology and Phase Transitions	Jun 2021
	TopFlavours, University of Warwick (online), June 18, 2021	

Teaching experience	**Teaching assistant, Department of Mathematics (Swansea University)**	
	MA-282: Game Theory and Optimization	Lent Term 2022
	MA-006: Fundamental Mathematics	Michaelmas Term 2021
	MA-308: Machine Learning	Lent Term 2021
	MA-131: Geometry, Logic, and Communication	Michaelmas Term 2020
	MA-262: Numerical Methods	Lent Term 2020
	MA-121 Methods of Algebra and Calculus	Michaelmas Term 2019

Other Service	**Organiser of Swansea Maths PhD Seminar**	Jun 2021 - Present
	Co-organised minisymposium for SIAM AG21	Aug 2021
	Invited speakers for a 2-session minisymposium on Persistent Homology for Phase Transitions, co-organised with Quoc Hoan Tran.	
	Assisted with the LMS Undergraduate Summer School	Jul 2021
	Spoke to participants about my experience of doing a PhD during coffee breaks throughout the 2 week event hosted by Swansea University.	

Research experience	**Applied Research Summer Placement**	
	UK Civil Service	Jul 2018 – Sep 2018
	An 11-week placement researching how machine learning and other data science techniques could be applied to aid my team with data annotation.	
	Applied Research Summer Placement	
	UK Civil Service	Jul 2017 – Sep 2017
	An 11-week placement researching the feasibility of using data science techniques to identify certain types of network devices based on limited information about their traffic.	

Technical skills	**Programming**	
	Python (numpy, scipy, sci-kit learn, pandas), Java, $C^\sharp$, C(++), Javascript	
	Cluster Computing	

Non-academic positions	**New College Boat Club Committee**	New College, Oxford
	President	2018-2019
	Secretary	2017-2018
	Lower Boats Captain	2016-2017
	Women's 3rd Boat Coach	2018-2019