

Research Interests

Using probability, geometry, and physics to develop theory and methodology for Bayesian inference.

Education

University of Oxford Department of Statistics

Postdoctoral Research Fellow (CoSInES project), Supervised by Dr. Arnaud Doucet

Oxfordshire, UK

2022 – Present

University of British Columbia Department of Statistics

PhD in Statistics, Supervised by Dr. Alexandre Bouchard-Côté

Vancouver, Canada

2017 – 2022

- **Thesis:** “Non-reversible parallel tempering on optimized paths”

University of British Columbia Department of Mathematics

MSc in Mathematics, Supervised by Dr. Ed Perkins

Vancouver, Canada

2014 – 2016

- **Thesis:** “Spatial diffusions with singular drifts: The construction of Super Brownian motion with immigration at unoccupied sites”

University of Waterloo

BMath Honours Pure Mathematics & Honours Applied Mathematics

Waterloo, Canada

2010 – 2014

- Graduated with distinction on the Dean’s honours list.

Publications

- [1] **Saifuddin Syed**, Vittorio Romaniello, Trevor Campbell, and Alexandre Bouchard-Côté. “Parallel Tempering on optimized paths” (2021), arXiv: 1905.02939.
Proceedings of the 38th International Conference on Machine Learning, PMLR 139:10033-10042, 2021.
- [2] **Saifuddin Syed**, Alexandre Bouchard-Côté, George Deligiannidis, and Arnaud Doucet. “Non-Reversible Parallel Tempering: a Scalable Highly Parallel MCMC Scheme” (2019), arXiv:1905.02939.
Journal of the Royal Statistical Society (Series B)
- [3] Trevor Campbell, **Saifuddin Syed**, Chiao-Yu Yang, Michael I. Jordan, and Tamara Broderick. “Local Exchangeability.” (2019), arXiv:1906.09507. (*In review*).

Recent Notable Talks

(Seminar) University of British Columbia Department of Statistics, <i>Vancouver, Canada.</i>	Feb 2021
(Seminar) The Queensland University of Technology Statistics Seminar, <i>Remote.</i>	Jan 2021
(Contributed) Monte Carlo Methods and Applications Conference (MCM 2021), <i>Remote.</i>	Aug 2021
(Contributed) ISBA 2021 World Meeting, <i>Remote.</i>	Jun 2021
(Seminar) Riskfuel Analytics Inc, <i>Remote.</i>	Mar 2021
(Seminar) Multidisciplinary University Research Initiative (MURI), <i>Remote.</i>	Apr 2020
(Seminar) University of Oxford Department of Statistics, <i>Oxford, UK.</i>	Dec 2019
(Seminar) University of Bristol Department of Mathematics, <i>Bristol, UK.</i>	Dec 2019
(Invited) Computational and Methodological Statistics Conference (CMStatistics), <i>London, UK.</i>	Dec 2019
(Guest Lecture) STAT 547C: Topics in Probability, <i>Vancouver, Canada.</i>	Oct 2019
(Invited) Monte Carlo Methods and Applications Conference (MCM 2019), <i>Sydney, Australia.</i>	Jul 2019

(Seminar) 1QBit Information Technologies Inc., *Vancouver, Canada.*

Apr 2019

(Seminar) Microsoft Research, *Redmond, USA.*

Jan 2019

Notable Awards and Scholarships

Marshall Prize	2021
UBC Four Year Fellowships (FYF) For PhD Students	2017 – 2021
President's Academic Excellence Initiative PhD Award	2020
NSERC Canada Graduate Scholarship Doctorate Award (CGS-D)	2017 – 2020
Faculty of Science Graduate Award	2017 – 2020
Anona Thorne and Takao Tanabe Graduate Entrance Scholarship in Statistics	2017
NSERC Alexander Graham Bell Canada Graduate Scholarship (CGS-M)	2015 – 2016
Queen Elizabeth II Aiming for the Top Scholarship	2010 – 2014
University of Waterloo Math Faculty Deans Honours List	2010 – 2014
NSERC Undergraduate Student Research Award (USRA)	2013
University of Waterloo Research Award	2011
University of Waterloo President's Scholarship	2010

Research and Relevant Work Experience

PhD Student <i>University of British Columbia, Department of Statistics</i>	Supervisor: Dr. Alexandre Bouchard-Côté 2017 – Present
<ul style="list-style-type: none">• Building the theory and optimal tuning of parallel tempering, a family of methods that exploits parallel computing to speed mixing times of Markov chain Monte Carlo algorithms.• Developing the notion of “local exchangeability” to build Bayesian models for a class of datasets approximately invariant to the order of the observations.	
Graduate Research Assistant, Stochastic Analysis <i>University of British Columbia, Department of Mathematics</i>	Supervisor: Dr. Edwin Perkins 2014 – 2016
<ul style="list-style-type: none">• Analysed the stochastic processes that arise when studying the scaling limits of evolutionary systems.• Constructed a super-process modelling an evolutionary system undergoing random motion and critical reproduction under the immigration of a new species at locations of zero occupancy.• Showed that the super-process can be characterized as a solution to a stochastic PDE.	
Undergraduate Research Assistant <i>University of Waterloo, Department of Pure Mathematics</i>	Supervisor: Dr. Spiro Karigiannis 2013
<ul style="list-style-type: none">• Analysed extrinsic properties of minimal surfaces embedded in G_2 manifolds, a particular class of Riemannian manifolds that arises in the area of mirror symmetry and string theory.	
General Manager & Co-editor-in-chief <i>Waterloo Math Review (WMR)</i>	Supervisor: Dr. Frank Zorzitto 2012 – 2014
<ul style="list-style-type: none">• The WMR was a peer reviewed undergraduate research journal for undergraduate mathematicians, by undergraduates mathematicians.• Assessed the quality of submissions, finding reviewers, marketing, production of issue, distribution, and securing funding and publishing the issue.	
Actuarial Analyst, Automotive Pricing <i>Desjardins General Insurance Group</i>	Supervisor: Carl Lussier 2012
<ul style="list-style-type: none">• Analysed large amounts of online data using GLM to determine regions of high fraud and profitability in Ontario. My results were used to implement marketing strategies across Ontario.	

- Determined Hausdorff dimension for variants of the Sierpinski Triangle, and researched applications of fractal geometry in the natural sciences.

Teaching Experience

- Teaching Assistant**, UBC Department of Statistics 2018 – 2020
- Teaching assistant and guest lecturer for STAT 547C (graduate probability)
- Instructor**, UBC Vantage College 2015 – 2016
- Instructor for the full year course Math 100V/Math 101V (differential/integral calculus) for the Vantage College program at UBC through the department of Mathematics
- Instructor**, UBC Department of Mathematics 2015
- Instructor for Math 105 (integral calculus for commerce and social sciences).
- Teaching Assistant**, UBC Department of Mathematics 2014
- Teaching assistant for Math 220 (introduction to proofs).
 - Student tutor at the Math Learning Centre.
- Instructor**, Beat Your Course 2015
- Responsible for teaching large scale review sessions for differential calculus, vector calculus, and ordinary differential equations.
- Private Tutor**, Brain Boost 2014 – 2015
- Private high school math and physics tutor for children with learning disabilities.
- Senior Tutor**, Grade Up 2013 – 2014
- Lead math tutor for the University of Waterloo chapter of Grade Up.

Relevant Skills

Notable Advanced Machine Learning/Statistics/Probability Courses:

Machine Learning, Graphical Models, Statistical Inference, Advanced Monte Carlo Methods, Statistical Consulting, Linear Models, High Dimensional Probability (audit), Graduate Probability Theory I/II, Advanced Stochastic Analysis, Stochastic Processes in the Physical Sciences, Topics in Probability: Entropy and Ergodic Theory, High Dimensional Percolation Theory.

Notable Advanced Math Courses:

Advanced Linear Algebra, Real Analysis, Complex Analysis, Measure Theory, Fourier Analysis, Functional Analysis, Ordinary Differential Equations, Partial Differential Equations, Differential Geometry, Riemannian Geometry, Algebraic Topology, Topics in Geometry: Atiyah-Singer Index Theorems, Advanced Algebra, Representation Theory, Quantum Theory, Open Quantum Systems, General Relativity and Cosmic Inflation.

Programming: Julia, Python, R, Matlab