Justin Ko

Department of Statistics and Actuarial Science — University of Waterloo
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Research High-dimensional probability, spin glasses, random matrices.

Employment

University of Waterloo 2023
- Postdoctoral Researcher
- Supervisors: Aukosh Jagannath

École Normale Supérieure de Lyon 2020 - 2023
- Postdoctoral Researcher
- Supervisors: Alice Guionnet, Florent Krzakala, and Lenka Zdeborová

Education

University of Toronto 2015 - 2020
- PhD Mathematics
- Thesis: The Free Energy of Spherical Vector Spin Glasses
- Advisor: Dmitry Panchenko

University of Toronto 2014 - 2015
- MSc Mathematics
- Research Project: Diluted spin glass models

University of British Columbia 2009 - 2014
- Bachelor of Commerce, Finance Co-op, Minor Mathematics

Papers

1. A multiscale cavity method for sublinear-rank symmetric matrix factorization. (with Jean Barbier and Anas Rahman) arXiv:2403.07189 (2024) *IZS 2024*
2. Fundamental limits of Non-Linear Low-Rank Matrix Estimation. (with Florent Krzakala, Pierre Mergny and Lenka Zdeborová) arXiv:2403.04234 (2024) *COLT 2024.*
3. Spectral Phase Transition and Optimal PCA in Block-Structured Spiked models. (with Florent Krzakala and Pierre Mergny) arXiv:2403.03695 (2024) *ICML 2024.*
4. Spectral Phase Transitions in Non-Linear Wigner Spiked Models. (with Alice Guionnet, Florent Krzakala, Pierre Mergny and Lenka Zdeborová) arXiv:2310.14055 (2023)
5. Estimating rank-one matrices with mismatched prior and noise: universality and large deviations. (with Alice Guionnet, Florent Krzakala and Lenka Zdeborová) arXiv:2306.09283 (2023) *Submitted.*
6. TAP variational principle for the constrained multiple spherical SK model. (with David Belius and Leon Fröber) arXiv:2304.04031 (2023) *Submitted.*
7. Optimal Algorithms for the Inhomogeneous Spiked Wigner Model (with Aleksandr Pak, and Florent Krzakala) arXiv:2302.06665 (2023) *NeurIPS 2023.*
8. Low-rank Matrix Estimation with Inhomogeneous Noise (with Alice Guionnet, Florent Krzakala and Lenka Zdeborová) arXiv:2208.05918 (2022) *Submitted.*
9. Spherical Integrals of Sublinear Rank (with Jonathan Husson) arXiv:2208.03642 (2022) *Submitted.*
10. The Crisanti–Sommers Formula for Spherical Spin Glasses with Vector Spins, arXiv:1911.04355 (2019) *Submitted.*

11. Free Energy of Multiple Systems of Spherical Spin Glasses with Constrained Overlaps, Electron. J. Probab. 2020, Vol. 25, No. 28, 1-34
12. MAX κ-CUT and the inhomogeneous Potts spin glass (with Aukosh Jagannath and Subhabrata Sen), Ann. Appl. Probab. 2018, Vol. 28, No. 3, 1536-1572

Invited Talks

1.	Northwestern University Probability Seminar	Oct 2023
2.	Waterloo Probability Seminar	Oct 2023
3.	Cargese Summer School: Statistical physics and machine learning	August 2023
4.	ICTP Learning and Inference from Structured Data	July 2023
5.	LN-UMN Joint Probability Seminar	February 2023
6.	LPSM Probability Seminar	February 2023
7.	Grenoble-Lyon-Geneva Probability Meeting	November 2022
8.	Les Diablerets Spin Glass Workshop	October 2022
9.	St Flour Probability School	July 2022
10.	ICTP Youth In High Dimensions	June 2022
11.	University of Toulouse III Probability Seminar	June 2021
12.	University of Waterloo Probability Seminar	March 2021
13.	University of Basel Probability Seminar	March 2020

Teaching

Course Instructor Positions

• MAT186, APM346	2019 - 2020
• MAT186, MAT136	2018 - 2019

Teaching Assistant Positions

• MAT377, MAT1600, APM346	2019 - 2020
• MAT377, APM346	2018 - 2019
• MAT1600, MAT1601, MAT133, MAT223, APM346	2017 - 2018
• MAT457, MAT236, MAT267, MAT244, MAT232, APM346	2016 - 2017
• MAT133, MAT237, MATA35, STAB52, STA256	2015 - 2016
• MAT135, MAT136, MAT133	2014 - 2015

Awards

1.	Ida Bulat Teaching Award for Graduate Students, UofT	2020
2.	Queen Elizabeth II Graduate Scholarship, UofT	2019 - 2020
3.	Scotiabank Scholarship, UBC	2009 - 2013
4.	Sauder School of Business Dean's Scholarship, UBC	2010

Conferences & Seminars Organized

1. Waterloo Probability Seminar (Co-organizer) 2023
   - Waterloo, Canada
2. High Dimensional Statistics and Random Matrices (Co-organizer) 2023
   - Porquerolles, France
3. Large Deviations and Random Matrices Working Group 2022-2023
   - Lyon, France

Work Experience

Economist (SmartWay Program) 2013 - 2014
- Natural Resources Canada, Ottawa, On