Alex Kazachek

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Education

University of Waterloo
Sep 2023 – Present
MSc in Applied Mathematics (4.00/4.00).

Joint with the Institute for Quantum Computing.

Western University
Sep 2019 – Apr 2023
BSc in Math & Data Science (3.91/4.00).

Awards

Canada Graduate Scholarship
2023 School Year
Awarded the largest and most competitive graduate scholarship, one of 48 recipients at Waterloo across all mathematical and physical sciences.

Mervin Wass Scholarship
2022 School Year
Selected by the Western math department as the most meritorious student.

RBC Data Science Scholarship
2021 School Year
Awarded by RBC Tech & Ops for accomplishments and potential in machine learning research.

Skills

Programming
Python (NumPy, SciPy, PyTorch, Pandas), MySQL, R, MATLAB, Java

Tools
Bloomberg, Jupyter, LaTeX, Git

Publications

T. Barron and A. Kazachek. "Coherent states and entropy." Proceedings of Geometric Science of Information, 2023.

T. Barron and A. Kazachek. "Entanglement of mixed states in Kähler quantization." Proceedings of Lie Theory and its Applications in Physics, 2021.

Interests

Beat Saber (top 10% in Canada).

Speedcubing (personal best of 17.25 seconds).

Scrabble.

Work

TD Securities | Summer Associate
May 2024 – Aug 2024
Matched with a single-name equity HFT desk (Automated Strategies within Global Equity Derivatives).

Ontario Teachers' Pension Plan | Quant Research Intern
May 2023 – Aug 2023
Developed a statistical procedure to detect dislocations between time series.

Incorporated implied volatility (IV) into existing asset volatility estimation to add forward-looking insight. Designed IV proxies for assets with illiquid options markets.

Developed a risk control system, reducing positions when high future volatility is projected. Implemented for 100+ assets, reducing overall drawdown with negligible impact on Sharpe and turnover.

Western University | Research Assistant
Sep 2022 – Apr 2023
Conducted mathematical physics research on coherent quantum states and their entanglement.

Led to two publications and one presentation at an international conference.

Projects

Algorithmic Trading
Oct 2023 – Jan 2024
Developed an algorithmic trading platform, handling all data processing and supporting multiple concurrent models with order netting.

Ran an intraday equity long-short model, measuring trends in returns based on signal processing techniques.

American Option Pricing Techniques
Aug 2022
Implemented a numerical method for pricing American call options from mathematical finance literature.

The optimal exercise strategy is parametrized and optimized. Monte-Carlo simulations then bootstrap low- and high-bias estimators of the option value.

Physics-Informed Neural Networks
Dec 2021 – May 2022
Conducted machine learning research on physics-informed neural networks under momentum-based optimizers.

Proved momentum diminishes spectral bias in such networks, resulting in a preprint live on arXiv.