

Zee Fryer

CONTACT

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Location: Bay Area, CA

TL;DR

Mathematician and AI researcher, with 5 years of postdoctoral academic experience in math followed by an 18 month AI Residency at Google Mountain View. Works primarily in **Python** with a sprinkling of **SQL**; has experience in multiple deep learning libraries (**Tensorflow**, **PyTorch**, **JAX/Flax**) as well as other common data science libraries such as **numpy**, **pandas**, and **scikit-learn**.

SKILLS

Strong theoretical foundation: A decade of experience with graduate-level mathematics provides fluency in the language underlying AI research, and enables rapid learning of new techniques.

Experienced coder and problem solver: Excels at breaking down a problem into solvable components, then learning (or creating!) the tools required to solve them.

Cutting-edge NLP: Recent work includes exploring the use of prompting techniques with Large Language Models for counterfactual fairness applications.

Excellent communication skills: Has successfully explained their research to people of all levels of expertise, from colleagues to undergraduates to UK Members of Parliament; once built a 5-bit binary adder out of dominoes to illustrate how computers perform addition.

EXPERIENCE

AI Resident, Google

October 2020 to April 2022

- Worked with product teams to develop, implement, and evaluate new algorithms in text-based counterfactual fairness, synthetic dataset creation, and model compression.
- Experience with Large Language Models and with writing training loops from scratch for both GPUs and TPUs.
- First author paper accepted to the Workshop on Online Abuse and Harms at NAACL 2022.
- Contributed code to Google Research's open source repository, implementing a new method of matrix compression for Transformer models.

Visiting Assistant Professor, University of California at Santa Barbara

September 2016 to June 2019

- Performed research in algebra and combinatorics, focusing on totally nonnegative matrices and their applications to quantum algebra and mathematical physics.
- Created Python tools that contributed crucial results to at least 3 peer-reviewed papers and are still in use today.
- Taught classes in undergraduate calculus, linear algebra, differential equations, proof writing, and abstract algebra, with consistently outstanding teaching evaluations from students.

EPSRC Doctoral Prize Fellow, University of Leeds

September 2014 to September 2016

- Published 3 research papers in peer-reviewed journals.
- Presented research seminars in math departments across the UK and at an international mathematics conference in Porto, Portugal.

EDUCATION

PhD in Mathematics

University of Manchester, UK; September 2010 to June 2014

BS and MS in Mathematics

University of Nottingham, UK; September 2005 to June 2009

PUBLICATIONS

1. **Z. Fryer**, V. Axelrod, B. Packer, A. Beutel, J. Chen, K. Webster; Flexible text generation for counterfactual fairness probing. *Proceedings of the Sixth Workshop on Online Abuse and Harms (WOAH), NAACL 2022*

By convention, authors on mathematics publications are listed alphabetically by surname.

2. S. Agarwala, **Z. Fryer**; A study in $\mathbb{G}_{\mathbb{R}, \geq 0}$: from the geometric case book of Wilson loop diagrams and SYM $N = 4$. *Annals IHP D - Comb., Phys. and their Interactions (2021)*
3. S. Agarwala, **Z. Fryer**, K. Yeats; Combinatorics of the geometry of Wilson loop diagrams II: Grassmann necklaces, dimensions, and denominators. *Canadian Journal of Mathematics (2021)*
4. S. Agarwala, **Z. Fryer**, K. Yeats; Combinatorics of the geometry of Wilson loop diagrams I: equivalence classes via matroids and polytopes. *Canadian Journal of Mathematics (2021)*
5. S. Agarwala, **Z. Fryer**; An algorithm to construct the Le diagram associated to a Grassmann necklace. *Glasg. Math. J. (2019) 1-7*
6. **Z. Fryer**, T. Kanstrup, E. Kirkman, A. Shepler, S. Witherspoon; Color Lie Rings and PBW Deformations of Skew Group Algebras. *J. Algebra 518 (2019), 211-236*
7. **Z. Fryer**, M. Yakimov; Separating Ore sets for Prime Ideals of Quantum Algebras. *Bull. Lond. Math. Soc. 49 (2017), no. 2, 202-215*
8. K. Casteels, **Z. Fryer**; From Grassmann necklaces to Restricted Permutations and Back Again. *Algebr. Represent. Theory 20 (2017), no. 4, 895-921*
9. **Z. Fryer**; The Prime Spectrum of Quantum SL_3 and the Poisson-prime Spectrum of its Semi-classical Limit. *Trans. London Math. Soc. 4 (2017), no. 1, 1-29*
10. **Z. Fryer**; The q -Division Ring and its Fixed Rings. *J. Algebra 402 (2014), 358-378*