

Zee Fryer

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TL;DR	Mathematician turned ML practitioner, 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 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	<p>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.</p> <p>Experienced coder and problem solver: Excels at breaking down a problem into solvable components, then learning (or creating!) the tools required to solve them.</p> <p>Cutting-edge NLP: Recent work includes exploring the use of prompting techniques with Large Language Models for counterfactual fairness applications.</p> <p>Excellent communication skills: Has successfully explained math 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.</p>	
EXPERIENCE	<p>AI Resident, Google October 2020 to April 2022</p> <ul style="list-style-type: none">• Worked on multiple projects, ranging from practical (matrix compression for translation models) to pure research (exploring potential causes for simplicity bias in deep learning models) to fairness-focused (counterfactual text generation using LaMDA LLM).• First author on paper accepted to the Workshop on Online Abuse and Harms at NAACL2022.• Contributed code to Google Research's open source repository, implementing a new method of matrix compression for use in training Tensorflow/lingvo models.• Experience with editing large codebases (e.g. lingvo), and working with large datasets (e.g. YouTube video database) and large models (LaMDA, Google Translate models). <p>Visiting Assistant Professor, University of California at Santa Barbara September 2016 to June 2019</p> <ul style="list-style-type: none">• Research in algebra and combinatorics, focusing on totally nonnegative matrices and their applications to quantum algebra and mathematical physics.• Wrote Python code to test conjectures, find counterexamples, and implement algorithms from research papers; this produced results that formed the backbone of one published journal paper and contributed to at least two others.• Taught classes in undergraduate calculus (single- and multi-variable), linear algebra, differential equations, proof writing, and abstract algebra. <p>EPSRC Doctoral Prize Fellow, University of Leeds September 2014 to September 2016</p> <ul style="list-style-type: none">• Postdoctoral research in noncommutative algebra and representation theory.• Presented research seminars in math departments across the UK and at an international mathematics conference in Porto, Portugal.• Served as the postdoc representative on the department's Athena Swan committee, which worked to address the department's gender imbalance.	
EDUCATION	<p>PhD in Mathematics University of Manchester, UK; September 2010 to June 2014</p> <p>MMath in Mathematics (MMath: combined BSc and MSc) University of Nottingham, UK; September 2005 to June 2009</p>	

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*

Mathematics papers were published as **S. Fryer**; author names are listed alphabetically by surname.

2. S. Agarwala, **S. 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, **S. 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, **S. 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, **S. Fryer**; An algorithm to construct the Le diagram associated to a Grassmann necklace. *Glasg. Math. J. (2019) 1-7*
6. **S. 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. **S. 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, **S. Fryer**; From Grassmann necklaces to Restricted Permtuations and Back Again. *Algebr. Represent. Theory 20 (2017), no. 4, 895-921*
9. **S. 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. **S. Fryer**; The q -Division Ring and its Fixed Rings. *J. Algebra 402 (2014), 358-378*