

# Joe Benton

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## EDUCATION

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**Department of Statistics, University of Oxford** 2021 – Present  
*DPhil in Statistics (Modern Statistics and Statistical Machine Learning CDT)*  
First project: *Denoising Diffusion Models on Arbitrary State Spaces*, supervised by Arnaud Doucet, George Deligiannidis  
Second project: *Infinite-width limits of neural networks*, supervised by François Caron

**Trinity College, University of Cambridge** 2017 – 2021  
*BA with MMath in Mathematics*  
Graduated with a Distinction (6th out of c. 250 in year)  
Thesis title: *Activated Random Walks*, supervised by Perla Sousi

## WORK EXPERIENCE

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**Research Assistant** | *Center for Human-Compatible Artificial Intelligence, UC Berkeley* Summer 2021  
Built on the PAIRED algorithm for unsupervised environment design to incorporate human feedback with the aim of speeding up and simplifying the training process. Supervised by Michael Dennis.

**Research Assistant** | *DPMMS, University of Cambridge* Summer 2020  
Adapted methods from algebraic geometry for the calculation of characteristic numbers to produce more direct computations of intersection numbers on the projective plane and torus. Supervised by Dhruv Ranganathan.

**Research Intern** | *Charity Entrepreneurship* Spring 2020  
Collaborated to research and write two reports on potential global health and development interventions

**Quantitative Trading Intern** | *Jane Street Capital* Summer 2019  
Developed models in Python and Excel for predicting the price of depository receipts

**Software Engineering Intern** | *Metaswitch* Summer 2018  
Designed and built new features for their instant messaging servers' software

## AWARDS

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**Senior Scholarship, Trinity College** 2018 – 2020  
For exceptional first year exam results, reawarded after second year

**International Mathematics Olympiad** 2014 – 2017  
Gold, placing 7th out of 615 competitors in 2017 | Silver in 2014, 2015, 2016

**International Olympiad in Informatics** 2015 – 2017  
Gold, placing 6th out of 304 competitors in 2017 | Silver in 2015 | Bronze in 2016

**Romanian Masters in Mathematics** 2015 – 2017  
Three gold medals (2015, 2016, 2017), the best record in the history of the competition

## PROJECT EXPERIENCE

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**AGI Safety Fundamentals Programme Lead** | *Effective Altruism Oxford* March 2022 – Present  
Organised and facilitated the OxAI Safety Hub's AGI Safety Fundamentals programme for 30+ participants.

**National Coordinator** | *Raise: A Celebration of Giving* June 2020 – Present  
Co-founder and national coordinator for a Raise, a student charity initiative that has raised over £380,000 for the Against Malaria Foundation. As of 2022, helping to coordinate 200+ student volunteers in seven universities across the UK.

**Chapter Founder** | *One for the World* July 2020 – July 2021  
Founded and led the Cambridge Chapter of the One for the World initiative, raising £5,000 in annual pledged donations.

## PUBLICATIONS

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*From Denoising Diffusions to Denoising Markov Models.* **Joe Benton**, Yuyang Shi, Valentin De Bortoli, George Deligiannidis, Arnaud Doucet. arXiv preprint, *arXiv:2211.03595*

*Alpha-divergence Variational Inference Meets Importance Weighted Auto-Encoders: Methodology and Asymptotics.* Kamélia Daudel, **Joe Benton\***, Yuyang Shi\*, Arnaud Doucet. *arXiv preprint, arXiv:2210.06226*

*Polysemanticity and Capacity in Neural Networks.* Adam Scherlis, Kshitij Sachan, Adam S. Jermyn, **Joe Benton**, Buck Shlegeris. *arXiv preprint, arXiv:2210.01892*

*A Continuous Time Framework for Discrete Denoising Models.* Andrew Campbell, **Joe Benton**, Valentin De Bortoli, Tom Rainforth, George Deligiannidis, Arnaud Doucet. *Advances in Neural Information Processing Systems, 2022*