

# Brian L. Trippe

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## Education and Academic Positions

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- **Columbia University and the University of Washington** **New York, NY - USA**  
*Postdoctoral Research Fellow* *2022- Present*  
Advisors at Columbia Department of Statistics: David Blei and Simon Tavaré  
Advisor at Institute for Protein Design: David Baker
- **Massachusetts Institute of Technology** **Cambridge, MA - USA**  
*Ph.D., Computational and Systems Biology* *2017–2022*  
National Science Foundation - GRFP Fellow  
Advisor: Tamara Broderick
- **University of Cambridge** **Cambridge - UK**  
*M.Phil., Engineering* *2016–2017*  
Euretta J. Kellett Fellow  
Supervisors: Richard Turner and Máté Lengyel
- **Columbia College** **New York, NY - USA**  
*B.A., Biochemistry and Computer Science, Summa Cum Laude* *2012–2016*

## Experience

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- **David Baker Lab** **Institute for Protein Design**  
*Visiting Researcher* *August 2021 – December 2021*
- **Microsoft Research New England** **Microsoft Research**  
*Research Intern. Advisors: Lorin Crawford and Kevin Yang* *Summer 2021*
- **Google Accelerated Sciences** **Google Research**  
*Undergraduate Intern* *Summer 2014 & Summer 2015*
- **Martin Chalfie Lab** **Columbia University**  
*Undergraduate Researcher* *September 2012 – January 2015*

## Leadership and Teaching

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- **Bayesian Modeling and Inference (6.435)** **MIT - Computer Science**  
*Teaching Assistant* *Spring 2019*
- **High School Studies Program – “Networks Everywhere!”** **MIT - ESP**  
*Volunteer Teacher & Curriculum Developer* *Summer 2018*
- **Introduction to Neuroscience (Part IIA - 3G3)** **University of Cambridge - Engineering**  
*Supervision Leader* *Lent Term 2017*
- **Advanced Programming (COMS W3157)** **Columbia - Computer Science**  
*Teaching Assistant* *Fall 2014 & Spring 2015*
- **Discrete Mathematics (COMS W3203)** **Columbia - Computer Science**  
*Teaching Assistant* *Fall 2013 & Spring 2014*
- **Columbia Club Water Polo** **Columbia University**  
*Captain and Goalie* *2012 -2016*

## Selected Publications

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- **Trippe, B.L.\***; Yim, J.\*; Tischer, D.; Baker, D.; Broderick, T.; Barzilay, R.; Jaakkola, T. (2022) "Diffusion probabilistic modeling of protein backbones in 3D for the motif-scaffolding problem". Under review. arXiv:2206.04119 [q-bio.BM]. *\*equal contribution*.
- **Trippe, B.L.\***; Huang, B.; DeBenedictis, E.D.; Coventry, B.; Bhattacharya, N.; Yang, K.K.; Baker, D.A.; Crawford, L.\* (2022) "Randomized gates allow unbiased estimation in sort-seq assays". In Protein Science. *\*corresponding author*.
- Nguyen, T.D.; **Trippe, B.L.**; Broderick, T. (2022) "Many processors, little time: MCMC for partitions via optimal transport couplings". In *International Conference on Artificial Intelligence and Statistics*.
- **Trippe, B.L.**; Finucane, H.K.; Broderick, T. (2021) "For high-dimensional hierarchical models, consider exchangeability of effects across covariates instead of across datasets" In *Neural Information Processing Systems*.
- **Trippe, B.L.**; Deshpande, S.K.; Broderick, T. (2021) "Confidently Comparing Estimators with the c-value". In revision. arXiv:2102.09705 [stat.ME]
- **Trippe, B.L.\***; Nguyen, T.D.\*; Broderick, T. (2021) "Optimal Transport Couplings of Gibbs Samplers on Partitions for Unbiased Estimation" In *3rd Symposium on Advances in Approximate Bayesian Inference*. arXiv:2014.04514[stat.ME]. *\*equal contribution*.
- Weeks, E.M.; Ullrich, J.C.; Cheng, N.Y.; **Trippe, B.L.**; ...; Lander, E.S.; Engreitz, J.M.; Finucane, H.K. (2021) "Leveraging polygenic enrichments of gene features to predict genes underlying complex traits and diseases". Under review. doi.org/10.1101/2020.09.08.20190561
- Dimon, M.T.H.; Berndt, M.; Coram, M.A.; **Trippe, B.L.**; Riley, P.F.; Nelson, P.C. (2020). "Neural Network for Processing Aptamer Data" U.S. Patent No. 10,546,650. Washington, DC: U.S. Patent and Trademark Office.
- **Trippe, B.L.**; Huggins, J. H.; Agrawal, R.; Broderick, T. (2019) "LR-GLM: High-Dimensional Bayesian Inference Using Low-Rank Data Approximations" In *International Conference on Machine Learning*.
- Agrawal, R.; **Trippe, B.L.**; Huggins, J. H.; Broderick, T. (2019) "The Kernel Interaction Trick: Fast Bayesian Discovery of Pairwise Interactions in High Dimensions" In *International Conference on Machine Learning*.
- **Trippe, B.L.**; Turner, R.E. (2017) "Overpruning in Variational Bayesian Neural Networks" In *Neural Information Processing Systems 2017 Workshop on Advances in Approximate Bayesian Inference*. arXiv:1801.06230 [stat.ML]
- **Trippe, B.L.**; Turner, R.E. (2017) "Conditional Density Estimation with Bayesian Normalising Flows" In *Neural Information Processing Systems 2017 Workshop on Bayesian Deep Learning*. arXiv:1802.04908 [stat.ML]
- Zheng, C.; Jin, F.Q.; **Trippe, B.L.**; Wu, J.; Chalfie, M. (2018) "Inhibition of Cell Fate Repressors Secures the Differentiation of the Touch Receptor Neurons of *Caenorhabditis Elegans*" In *Development*.
- **Trippe, B.L.**; Prabhakaran, S.; Bussemaker, H.J. (2016) "The K-mer Motif Multinomial Mixture Model" *Neural Information Processing Systems 2016 Workshop on Computational Biology*. doi.org/10.1101/096735

## Professional Activities

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- **Machine Learning for Protein Engineering Seminar Series**  
*Founding Co-organizer* *January 2022-Present*
- **Committee on Undergraduate Admissions and Financial Aid** **MIT**  
*Graduate Student Council Representative* *August 2020-May 2022*
- **Conference Reviewing**  
*Program Committee Member*

- International Conference on Learning Representations (ICLR)
- Neural Information Processing Systems (NeurIPS)
- International Conference on Machine Learning (ICML)
- Artificial Intelligence and Statistics (AISTATS)
- Uncertainty in Artificial Intelligence (UAI)
- Symposium on Advances in Approximate Bayesian Inference (AABI)
- NeurIPS workshop on Bayesian Nonparametrics
- NeurIPS workshop on Bayesian Deep Learning

## Invited Talks

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- **Valence Discovery — Molecular Modeling and Drug Discovery Series** October 2022  
*Diffusion probabilistic modeling of protein backbones in 3D for the motif-scaffolding problem*
- **Flatiron Institute — Center for Computational Mathematics, New York, NY** October 2022  
*For high-dimensional hierarchical models, consider exchangeability of effects across covariates instead of across datasets*
- **Machine Learning for Protein Engineering Seminar Series** September 2022  
*Diffusion probabilistic modeling of protein backbones in 3D for the motif-scaffolding problem*
- **Harvard CS 282r: Topics in Machine Learning, Guest Lecture** September 2022  
*The motif-scaffolding problem and protein design in the post-structure world*
- **Microsoft Research New England** February 2022  
*For high-dimensional hierarchical models, consider exchangeability of effects across covariates instead of across datasets*
- **Learning Meaningful Representations of Life 2021 (NeurIPS Workshop)** December 2021  
*For high-dimensional hierarchical models, consider exchangeability of effects across covariates instead of across datasets*
- **Broad Institute of MIT and Harvard, Models Inference and Algorithms** December 2021  
*For high-dimensional hierarchical models, consider exchangeability of effects across covariates instead of across datasets*
- **Microsoft Research New England – ML Seminar** March 2021  
*Confidently comparing estimators with the c-value*
- **Prowler.io, Cambridge, United Kingdom** December 2017  
*Conditional density estimation with Bayesian normalizing flows*

## Contributed Talks

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- **Conference on Bayesian Nonparametrics, Puerto Varas, Chile** July 2022  
*Many processors, little time: MCMC for partitions via optimal transport couplings*
- **Joint Statistical Meetings (JS), Washington, DC** August 2022  
*High-dimensional hierarchical modeling via exchangeability of effects across covariates*
- **International Society for Bayesian Analysis, Montreal, Canada** July 2022  
*Many processors, little time: MCMC for partitions via optimal transport couplings*
- **Bayesian Young Statisticians Meeting (BAYSM)** September 2021  
*High-dimensional hierarchical modeling via exchangeability of effects across covariates*
- **Joint Statistical Meetings (JSM)** August 2021  
*Confidently comparing estimators with the c-value*
- **Advances in Approximate Bayesian Inference – [youtu.be/0yFBWkOp4uc](https://youtu.be/0yFBWkOp4uc)** January 2021  
*Optimal transport couplings of gibbs samplers on partitions for unbiased estimation*
- **Joint Statistical Meetings (JSM) – [youtu.be/Ng2HN3zLW10](https://youtu.be/Ng2HN3zLW10)** August 2020  
*Bayes estimates for multiple related regressions under exchangeability among covariates*
- **International Conference on Machine Learning, Long Beach, CA** June 2019  
*LR-GLM: high-dimensional Bayesian inference using low-rank data approximations*

- Broad Institute of MIT and Harvard, Cambridge, MA
- *MIA series primer: Fast Bayesian inference with low-rank data approximations*

October 2018

## Fellowships and Awards

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- NSF Graduate Research Fellowship, 2018
- Euretta J. Kellett Fellowship (support for MPhil at Cambridge UK), Columbia College, 2016
- Barry Goldwater Scholarship, 2015
- Half Blue in Water Polo, University of Cambridge, 2017
- Hertz Foundation Fellowship Finalist, 2018
- Phi Beta Kappa, Columbia College, 2016
- Summa Cum Laude, Columbia College, 2016
- Departmental Honors in Biological Sciences, Columbia University, 2016
- Departmental Honors in Computer Science, Columbia University, 2016
- ISBA Travel Award, 2022
- ICML Travel Award, 2019