

# Jonathan H. Huggins

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CONTACT INFORMATION	MCS 233E 111 Cummington Mall Boston, MA 02115 USA	✉ huggins -at- bu.edu 🌐 jhhuggins.org
ACADEMIC EXPERIENCE	<b>Boston University</b> , Boston, MA USA Assistant Professor, Department of Mathematics & Statistics Assistant Professor, Faculty of Computing & Data Sciences Affiliated Faculty, Bioinformatics Program Affiliated Faculty, Department of Computer Science	2020– 2020– 2020– 2021–
	<b>Harvard University, Department of Biostatistics</b> , Boston, MA USA Postdoctoral Research Fellow. Advisor: Jeffrey Miller	2018–2019
	<b>Microsoft Research New England</b> , Cambridge, MA USA Research Intern. Advisor: Lester Mackey	2017
EDUCATION	<b>Massachusetts Institute of Technology</b> , Cambridge, MA USA Ph.D., Computer Science. Advisor: Tamara Broderick S.M., Computer Science. Advisor: Joshua B. Tenenbaum	2014–2018 2012–2014
	<b>Columbia University, Columbia College</b> , New York, NY USA B.A., Mathematics. Advisors: Liam Paninski and Frank D. Wood	2008–2012
PROFESSIONAL EXPERIENCE	<b>Google Inc.</b> , New York, NY USA Summer Engineering Intern	2012
	<b>MITRE Corp.</b> , Bedford, MA USA Technical Co-op	2007–2009
FUNDING	National Institutes of Health / National Institute of General Medical Sciences, Award #1R01GM144963: <i>Robust, scalable, and accurate discovery of mutational signatures</i> . Role: <b>Principle Investigator</b> (with Joshua Campbell). (My direct costs: \$305,543. 08/01/2021–06/30/2024)	
	National Institutes of Health / National Cancer Institute, Award #1U01CA253500: <i>Utilizing Bayesian modeling to improve mutational signature inference in large-scale datasets</i> . Role: <b>Co-Investigator</b> (with Joshua Campbell, Masanao Yakima). (My direct costs: \$52,629, 09/17/2021–08/31/2024)	
	Hariri Institute Junior Faculty Fellow, Boston University (\$10,000, 2020–2023)	
	Data Science Faculty Fellow, Boston University (\$30,000 per year, 2020–)	
HONORS AND AWARDS	Bayes Comp travel award (2020) ISBA@NeurIPS travel award (2016) DoD National Defense Science and Engineering Graduate Fellowship (2013–2015) NSF Graduate Research Fellowship (2013) ( <i>declined for DoD NDSEG</i> ) Hertz Fellowship Finalist (2013) Summa Cum Laude, Columbia University (2012) Phi Beta Kappa (2011) Rabi Scholar, Columbia College (2008–2012) Intel Science Talent Search Finalist (2008)	

## PREPRINTS

- J. Negrea, J. Yang, H. Feng, D. M. Roy & **J. H. Huggins** (2022). Statistical Inference with Stochastic Gradient Algorithms. *arXiv:2207.12395 [stat.CO]*. [pdf]
- J. Li & **J. H. Huggins** (2022). Calibrated Model Criticism Using Split Predictive Checks. *arXiv:2203.15897 [stat.ME]*. [pdf]
- M. Welandawe, M. R. Andersen, A. Vehtari & **J. H. Huggins** (2022). Robust, Automated, and Accurate Black-box Variational Inference. *arXiv:2203.15945 [stat.ML]*. [pdf]
- T. D. Nguyen, **J. H. Huggins**, L. Masoero, L. Mackey & T. Broderick (2020). Independent finite approximations for Bayesian nonparametric inference. *arXiv:2009.10780 [stat.ME]*. [pdf]
- **J. H. Huggins** & Jeffrey W. Miller (2019). Robust Inference and Model Criticism Using Bagged Posteriors. *arXiv:1912.07104 [stat.ME]*. [pdf]

## PUBLICATIONS

24. **J. H. Huggins** & Jeffrey W. Miller (2023). Reproducible Model Selection Using Bagged Posteriors. *Bayesian Analysis* 18(1): 79–104. [pdf]
23. A. Chevalier, S. Yang, Z. Khurshid, N. Sahelijo, T. Tong, **J. H. Huggins**, M. Yajima, J. D. Campbell (2021). The Mutational Signature Comprehensive Analysis Toolkit (musicatk) for the Discovery, Prediction, and Exploration of Mutational Signatures. *Cancer Research* 81(23): 5813–5817. [pdf]
22. A. K. Dhaka\*, A. Catalina\*, M. Welandawe, M. R. Andersen, **J. H. Huggins**, A. Vehtari (2021). Challenges and Opportunities in High-dimensional Variational Inference. In *Proc. of the 35th Annual Conference on Neural Information Processing Systems (NeurIPS)*. [pdf]
21. W. J. Bradshaw, E. C. Alley, **J. H. Huggins**, A. L. Lloyd & K. M. Esvelt (2021). Bidirectional contact tracing could dramatically improve COVID-19 control. *Nature Communications* 12(232). [pdf]
20. A. K. Dhaka, A. Catalina, M. R. Andersen, M. Magnusson, **J. H. Huggins**, A. Vehtari (2020). Robust, Accurate Stochastic Optimization for Variational Inference. In *Proc. of the 34th Annual Conference on Neural Information Processing Systems (NeurIPS)*. [pdf]
19. **J. H. Huggins**, M. Kasprzak, T. C. Campbell & T. Broderick (2020). Validated Variational Inference via Practical Posterior Error Bounds. In *Proc. of the 22nd International Conference on Artificial Intelligence and Statistics (AISTATS)*. [pdf]
18. B. Trippe, **J. H. Huggins**, R. Agrawal & T. Broderick (2019). LR-GLM: High-Dimensional Bayesian Inference Using Low-Rank Data Approximations. In *Proc. of the 36th International Conference on Machine Learning (ICML)*. [pdf]
17. R. Agrawal, **J. H. Huggins**, B. Trippe & T. Broderick (2019). The kernel interaction trick: fast Bayesian discovery of pairwise interactions in high dimensions. In *Proc. of the 36th International Conference on Machine Learning (ICML)*. [pdf]
16. **J. H. Huggins**, T. C. Campbell, M. Kasprzak & T. Broderick (2019). Scalable Gaussian process inference with finite-data mean and variance guarantees. In *Proc. of the 21st International Conference on Artificial Intelligence and Statistics (AISTATS)*. [pdf]
15. R. Agrawal, T. C. Campbell, **J. H. Huggins** & T. Broderick (2019). Data-dependent compression of random features for large-scale kernel approximation. In *Proc. of the 21st International Conference on Artificial Intelligence and Statistics (AISTATS)*. [pdf]

14. T. C. Campbell\*, **J. H. Huggins\***, J. P. How & T. Broderick (2019). Truncated Random Measures. *Bernoulli* 25(2), 1256–1288. [pdf]
13. **J. H. Huggins\*** & D. M. Roy\* (2019). Sequential Monte Carlo as approximate sampling: bounds, adaptive resampling via  $\infty$ -ESS, and an application to particle Gibbs. *Bernoulli* 25(1), 584–622. [pdf]
12. **J. H. Huggins\*** & L. Mackey\* (2018). Random feature Stein discrepancies. In *Proc. of the 32nd Annual Conference on Neural Information Processing Systems (NeurIPS)*. [pdf]
11. **J. H. Huggins**, R. P. Adams & T. Broderick (2017). PASS-GLM: polynomial approximate sufficient statistics for scalable Bayesian GLM inference. In *Proc. of the 31st Annual Conference on Neural Information Processing Systems (NeurIPS)*. [pdf]  
 ▷ Selected for spotlight presentation (top 22% of accepted papers)
10. **J. H. Huggins\*** & J. Zou\* (2017). Quantifying the Accuracy of Approximate Diffusions and Markov Chains. In *Proc. of the 20th International Conference on Artificial Intelligence and Statistics (AISTATS)*. [pdf]
9. **J. H. Huggins**, T. C. Campbell & T. Broderick (2016). Coresets for Scalable Bayesian Logistic Regression. In *Proc. of the 30th Annual Conference on Neural Information Processing Systems (NeurIPS)*. [pdf]
8. **J. H. Huggins** & J. B. Tenenbaum (2015). Risk and Regret of Hierarchical Bayesian Learners. In *Proc. of the 32nd International Conference on Machine Learning (ICML)*. [pdf]
7. **J. H. Huggins\***, A. Saeedi\*, K. Narasimhan\* & V. K. Mansinghka (2015). JUMP-Means: Small-Variance Asymptotics for Markov Jump Processes. In *Proc. of the 32nd International Conference on Machine Learning*. [pdf]
6. **J. H. Huggins** & C. Rudin (2014). A statistical learning theory framework for supervised pattern discovery. In *Proc. of SIAM International Conference on Data Mining (SDM)*. [pdf]
5. A. Pakman, **J. H. Huggins**, C. Smith & L. Paninski (2014). Fast state-space methods for inferring dendritic synaptic connectivity. *Journal of Computational Neuroscience* 36(3), 415–443. [pdf]
4. E. Pnevmatikakis, K. Rahnama Rad, **J. H. Huggins** & L. Paninski (2014). Fast low-SNR Kalman filtering and forward-backward smoothing via a low-rank perturbative approach. *Journal of Computational and Graphical Statistics* 23(2), 316–339. [pdf]
3. **J. H. Huggins** & L. Paninski (2012). Optimal experimental design for sampling voltage on dendritic trees in the low-SNR regime. *Journal of Computational Neuroscience* 32(2), 347–66. [pdf]
2. M. Vilain, **J. H. Huggins** & B. Wellner (2009). Sources of performance in CRF transfer training: a business name-tagging case study. In *Proc. of Recent Advances in Natural Language Processing (RANLP)*. [pdf]
1. M. Vilain, **J. H. Huggins** & B. Wellner (2009). A simple feature-copying approach to long-distance dependencies. In *Proc. of the 13th Conference on Computational Natural Language Learning (CONLL)*. [pdf]

★ = contributed equally

WORKSHOP  
PAPERS

3. B. Trippe, **J. H. Huggins** & T. Broderick (2018). Fast Bayesian Inference in GLMs with Low Rank Data Approximations. In *Symposium on Advances in Approximate Bayesian Inference*.
2. **J. H. Huggins**, L. Masoero, L. Mackey & T. Broderick (2017). Generic finite approximations for practical Bayesian nonparametrics. In *NeurIPS 2017 Workshop on Advances in Approximate Bayesian Inference*.
1. M. Shiffman, W. Stephenson, G. Schiebinger, T. C. Campbell, **J. H. Huggins**, A. Regev & T. Broderick (2017). Probabilistic reconstruction of cellular differentiation trees from single-cell RNA-seq data. In *NeurIPS 2017 Workshop on Machine Learning in Computational Biology*.

MISCELLANEA

5. W. J. Bradshaw, **J. H. Huggins**, A. L. Lloyd & K. M. Esvelt (2021). The feasibility of targeted test-trace-isolate for the control of SARS-CoV-2 variants. *F1000Research* **10**:291. [pdf]
4. M. Shiffman, W. Stephenson, G. Schiebinger, **J. H. Huggins**, T. C. Campbell, A. Regev & T. Broderick (2018). Reconstructing probabilistic trees of cellular differentiation from single-cell RNA-seq data. *arXiv:1811.11790 [q-bio.QM]*. [pdf]
3. **J. H. Huggins**, M. Kasprzak, T. C. Campbell & T. Broderick (2018). Practical bounds on the error of Bayesian posterior approximations: A nonasymptotic approach. *arXiv:1809.09505 [stat.TH]*. [pdf]
2. **J. H. Huggins**, A. Saeedi & M. J. Johnson (2014). Detailed Derivations of Small-variance Asymptotics for some Hierarchical Bayesian Nonparametric Models. *arXiv:1501.00052 [stat.ML]*. [pdf]
1. **J. H. Huggins** & F. Wood (2014). Infinite structured hidden semi-Markov models. *arXiv:1407.0044 [stat.ME]*. [pdf]

INVITED TALKS

**Upcoming**

*A Generalized Bayesian Approach to Robustly Discovering Mutational Signatures in Human Cancer*  
Boston University, Boston, MA May 2023  
Biostatistics Seminar

*Using Stochastic Gradient Algorithms for Scalable and Statistically Robust Generalized Bayesian Inference*  
Bayes Comp, Levi, Finland March 2023

*Trustworthy Variational Inference*  
Texas A&M University, College Station, TX October 2022  
Conference on Advances in Data Science

**Previous**

*Calibrated Model Criticism Using Split Predictive Checks*  
ISBA World Meeting, Montreal, Canada June 2022

*Robust Inference using Stochastic Gradients*  
SIAM Conference on Uncertainty Quantification (UQ22), Atlanta, GA / Virtual April 2022  
Minisymposium on “Variational Inference Bridging Application and Theory”

NeurIPS 2021 Workshop: Your Model is Wrong, Virtual	December 2021
ISBA World Meeting, Virtual	July 2021
<i>Algorithmically Robust, General-purpose Variational Inference</i>	
Harvard University, Boston, MA B3D Seminar Series	April 2021
University of Haifa, Haifa, Israel / Virtual Statistics Seminar	March 2021
Monash University, Melbourne, Australia / Virtual Econometrics and Business Statistics Seminar	March 2021
<i>Using Bagged Posteriors for Robust Inference</i>	
SIAM Conference on Computational Science and Engineering (CSE21), Virtual Minisymposium on “Model error in statistical inverse problems”	March 2021
Northeastern University, Boston, MA SPIRAL Seminar Series	February 2020
Oxford University, Oxford, UK Statistics Seminar	October 2019
Bristol University, Bristol, UK Data Science Seminar Statistics Seminar	October 2019
Massachusetts Institute of Technology, Cambridge, MA Doctoral Seminar in Statistics	November 2019
Broad Institute of MIT and Harvard, Cambridge, MA Models, Inference, and Algorithms	December 2019
<i>Scalable, Reliably Accurate Bayesian Inference via Approximate Likelihoods and Random Features</i>	
Google AI, Cambridge, MA	February 2019
Broad Institute of MIT and Harvard, Cambridge, MA	February 2019
Northeastern University, Boston, MA	February 2019
Boston University, Boston, MA	January 2019
<i>Finite-dimensional Approximations of Completely Random Measures</i>	
Stochastic Processes and Applications (SPA), Gothenburg, Sweden	June 2018
<i>Scaling Bayesian Inference by Constructing Approximating Exponential Families</i>	
Boston Bayesian Meetup, Boston, MA	April 2018
Schlumberger Doll Research, Cambridge, MA	April 2018
Raytheon BBN Technologies, Cambridge, MA	February 2018
CONTRIBUTED TALKS	<b>Previous</b>
<i>Statistical Inference with Stochastic Gradient Algorithms</i>	
Joint Statistical Meeting (JSM), Seattle, WA	August 2021
<i>Using Bagged Posteriors for Robust Inference</i>	
Bayes Comp, Gainesville, FL	January 2020
<i>Robustness and scalability of Bayesian nonnegative matrix factorization</i>	

Joint Statistical Meeting (JSM), Denver, CO July 2019

*Scaling Bayesian Inference by Constructing Approximating Exponential Families*  
ISBA World Meeting, Edinburgh, Scotland June 2018

*Truncated Random Measures*  
11th Conference on Bayesian Nonparametrics (BNP11), Paris, France June 2017

PROFESSIONAL  
SERVICE

**Senior Program Committee**

- Area Chair, International Conference on Artificial Intelligence and Statistics (AISTATS), 2021–2022
- Area Chair, Advances in Neural Information Processing Systems (NeurIPS), 2019
- Senior Program Committee, Uncertainty in Artificial Intelligence (UAI), 2019
- Senior Program Committee, AAAI Conference on Artificial Intelligence (AAAI), 2022

**Journal Reviewing**

- Annals of Statistics (1)
- Journal of Machine Learning Research (6)
- PLoS One (2)
- Technometrics (2)
- Journal of the Royal Statistical Society, Series B (1)
- Journal of the American Statistical Association (2)

**Conference Program Committee**

- Advances in Neural Information Processing Systems (NeurIPS), 2013–2018, 2020–2021
- International Conference on Machine Learning (ICML), 2015–2016, 2020, 2021 (Expert Reviewer)
- International Conference on Artificial Intelligence and Statistics (AISTATS), 2017–2018
- International Conference on Learning Representations (ICLR), 2021

TEACHING

*Boston University*

- Lab Instructor, CAS MA 213, Basic Statistics and Probability Fall 2022
- Instructor, CAS MA 500, Special Topics: Stochastic Processes for the Design and Analysis of Algorithms Spring 2022
- Instructor, CAS MA 214, Applied Statistics Fall 2020, Fall 2021
- Lab Instructor, CAS MA 214, Applied Statistics Spring 2020

*Massachusetts Institute of Technology*

- Teaching Assistant, 6.862, Applied Machine Learning (Graduate-level) 2017
- Guest Lecturer, 6.438, Fundamentals of Probability 2016
- Teaching Assistant, 6.867, Machine Learning (Graduate-level) 2016

*Columbia University*

- Teaching Assistant, Data Structures 2011
- Guest Lecturer, Statistical Analysis of Neural Data (Graduate-level) 2011

*last updated: December 15, 2022*