

# Runjing (Bryan) Liu

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## Education

UC Berkeley; Berkeley, CA  
PhD student, Statistics

*August 2016 to present*

Duke University; Durham, NC

*August 2012 to May 2016*

Major: Mathematics (BS), Minor: Biology

GPA: 3.99/4.00

*Summa cum laude*

*Graduation with high distinction*

## Awards and Fellowships:

NSF graduate research fellow 2017

Julia Dale Prize in mathematics 2016

Barry Goldwater Scholarship Honorable Mention 2015

Phi Beta Kappa Academic Honor Society

## Current Research:

I am a PhD student advised by Prof. Jon McAuliffe. I am interested in **approximate Bayesian inference** and am currently working on **variational methods**. Some projects include:

1. **Applications in astronomy:** I train deep generative models for the detection of dark matter in telescope images. I draw ideas from Bayesian probabilistic modeling and incorporate physical models from astronomy. My goal is to develop a fully unsupervised inference procedure for dark matter detection in large-scale astronomical surveys.
2. **Methods in Bayesian robustness:** Leveraging modern auto-differentiation tools, I am developing an efficient, automatic procedure to evaluate the sensitivity of posterior inferences to model assumptions, under the variational inference framework.
3. **Applications in genomics:** I work on the Berkeley Drosophila Genome project. I helped write an open-source Python package for *iterative Random Forest*, an extension of random forest developed for genomic data to detect stable high-order interactions that drive gene expressions.

## Publications and pre-prints:

**Liu R.**, Giordano R., Jordan M. I., Broderick T. "Evaluating Sensitivity to the Stick Breaking Prior in Bayesian Nonparametrics." *NIPS, All of Bayesian Nonparametrics workshop, in review*. December 2018.  
<https://arxiv.org/pdf/1810.06587.pdf>.

**Liu R.**, Regier J., Tripuraneni N., Jordan M. I., McAuliffe J. "Rao-Blackwellized Stochastic Gradients for Discrete Distributions." *Conference on Artificial Intelligence and Statistics, in review*. April 2019. <https://arxiv.org/pdf/1810.04777.pdf>.

Giordano R., Stephenson W., **Liu R.**, Jordan M. I., Broderick T. "Return of the Infinitesimal Jackknife." *Conference on Artificial Intelligence and Statistics, in review*. April 2019. <https://arxiv.org/pdf/1806.00550.pdf>.

Giordano R., **Liu, R.**, Varoquaux N., Jordan M. I., Broderick T. "Measuring Cluster Stability for Bayesian Nonparametrics Using the Linear Bootstrap." *NIPS, Advances in Approximate Bayesian Inference Workshop*. December 2017.  
<https://arxiv.org/pdf/1712.01435.pdf>.

**Liu, R.**, Layton, A. "Modeling the Effects of Positive and Negative Feedback in Kidney Blood Flow Control." *Mathematical Biosciences*. June 2016: Vol. 276, pp 8-18.

**Liu, R.**, Patel, M., Badal, J. "Encoding whisker deflection velocity within the rodent barrel cortex using phase-delayed inhibition." *Journal of Computational Neuroscience*. December 2014: Vol. 37, Issue 3, pp 387-401.

### **Teaching:**

Linear modeling: theory and applications. Graduate student instructor. *Fall 2018*

### **Skills:**

Proficient in Python and R.

### **Other:**

Berkeley **Statistics Graduate Student Association** co-president, *Fall 2018-Spring 2019*

Gave a student talk at the bi-annual **Berkeley Stanford Joint Statistics Colloquium**, *Fall 2017*

Middle school math tutor for **Bridging Berkeley**, *Fall 2017*

Chaired workshop for the NSF graduate fellowship application, *Fall 2017*

Co-organizer for **Berkeley Datafest**, *Spring 2017, 2018*

TA for **Duke TIP** in a number theory and cryptology course, *Summer 2015 and Summer 2016*



