

Charles C. Margossian

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Current position

Assistant Professor, *University of British Columbia*, Vancouver, BC. 2025–
Department of Statistics

Education

Ph.D. Statistics, *Columbia University*, New York, NY. 2017– 2022

Thesis: *Modernizing Markov Chains Monte Carlo for Scientific and Bayesian Modeling*

Advisor: Andrew Gelman

Committee: Aki Vehtari, Matt Hoffman, Sumit Mukherjee, David Blei

B.Sci. Physics, *Yale University*, New Haven, CT. 2011–2015

Experience

Postdoctoral Research Fellow, *Flatiron Institute*, New York, NY. 2022–2025
Center for Computational Mathematics

Research Intern, *Google Research*, New York, NY. Sum. 2021
TensorFlow Probability Team

Visiting Doctoral Student, *Aalto University*, Espoo, Finland. Sum. 2019
Department of Computer Science

Visiting Scientist, *Metrum Research Group*, Tariffville, CT and Cambridge, MA. 2015–2017
Pharmacometrics Bootcamp

Research Assistant, *Yale University*, New Haven, CT. 2013–2015
Department of Astronomy

Patent Law Intern, *Leinweber & Zimmermann*, Munich, Germany. Sum. 2014

Skills

Programming: Python (JAX, PyTorch), R, C++, Stan, \LaTeX , GitHub

Languages: English, French, German

Papers

Google Scholar: <https://scholar.google.com/citations?user=nPtLsvIAAAAJ&hl=en>

- [1] C. C. Margossian and L. K. Saul. **Variational Inference in Location-Scale Families: Exact Recovery of the Mean and Correlation Matrix.** *Best paper award*, *Artificial Intelligence and Statistics*, PMLR 258:3466–3474, 2025.
- [2] C. C. Margossian and L. K. Saul. **Generalized Guarantees for Variational Inference in the Presence of Even and Elliptical Symmetry.** *arXiv:2511.01064*, 2025.
- [3] C. C. Margossian, L. Pillaud-Vivien, and L. K. Saul. **Variational Inference for Uncertainty Quantification: an Analysis of Trade-Offs.** *Journal of Machine Learning Research*, 26:1–41, 2025.
- [4] N. Huang, R. Stiskalek, J. Lee, A. E. Bayer, C. C. Margossian, C. K. Jespersen, L. A. Perez, L. K. Saul, and F. Villaescusa-Navarro. **CosmoBench: A Multiscale, Multiview, Multitask Cosmology Benchmark for Geometric Deep Learning.** *Neural Information Processing Systems: Datasets & Benchmarks*, 2025.
- [5] C. C. Margossian, M. D. Hoffman, P. Sountsov, L. Riou-Durand, A. Vehtari, and A. Gelman. **Nested \widehat{R} : Assessing the convergence of Markov chain Monte Carlo when running many short chains.** *Bayesian Analysis*, 20:1587–1614, 2024.
- [6] C. C. Margossian and A. Gelman. **For how many iterations should we run Markov chain Monte Carlo?** In *Handbook of Markov chain Monte Carlo*. Chapman & Hall/CRC, (in press) 2nd edition, 2024.
- [7] C. C. Margossian and D. M. Blei. **Amortized Variational Inference: When and Why?** *Uncertainty in Artificial Intelligence*, PMLR 244:2434–2449, 2024.
- [8] F. Heurtel-Depeiges, C. C. Margossian, R. Ohana, and B. Régaldo-Saint Blancard. **Listening to the noise: Blind Denoising with Gibbs Diffusion.** *International Conference on Machine Learning*, PMLR 235:18284–18304, 2024.

- [9] D. Cai, C. Modi, C. C. Margossian, R. M. Gower, D. M. Blei, and L. K. Saul. **EigenVI: score-based variational inference with orthogonal function expansions.** *Spotlight, Neural Information Processing Systems*, 2024.
- [10] D. Cai, C. Modi, L. Pillaud-Vivien, C. C. Margossian, R. M. Gower, D. M. Blei, and L. K. Saul. **Batch and match: black-box variational inference with a score-based divergence.** *Spotlight, International Conference on Machine Learning*, PMLR 235:5258–5297, 2024.
- [11] C. C. Margossian and L. K. Saul. **The Shrinkage-Delinkage Trade-off: An Analysis of Factorized Gaussian Approximations for Variational Inference.** *Oral, Uncertainty in Artificial Intelligence*, PMLR 216:1358–1367, 2023.
- [12] L. Riou-Durand, P. Sountsov, J. Vogrinc, C. C. Margossian, and S. Power. **Adaptive Tuning for Metropolis Adjusted Langevin Trajectories.** *Artificial Intelligence and Statistics*, PMLR 206:8102–8116, 2023.
- [13] C. Modi, C. C. Margossian, Y. Yao, R. M. Gower, D. M. Blei, and L. K. Saul. **Variational Inference with Gaussian Score Matching.** *Neural Information Processing Systems*, 37, 2023.
- [14] C. C. Margossian, Y. Zhang, and W. R. Gillespie. **Flexible and efficient Bayesian pharmacometrics modeling using Stan and Torsten, Part I. CPT: Pharmacometrics & Systems Pharmacology**, 11(9):1151–1169, 2022.
- [15] P. Greengard, J. Hoskins, C. C. Margossian, J. Gabry, A. Gelman, and A. Vehtari. **Fast methods for posterior inference of two-group normal-normal models.** *Bayesian Analysis*, 18(3):889–907, 2022.
- [16] L. L. Grinsztajn (*supervised student*), E. Semenova, C. C. Margossian, and J. Riou. **Bayesian workflow for disease transmission modeling in Stan.** *Statistics in Medicine*, 40(27):6209–6234, 2021.
- [17] C. C. Margossian, A. Vehtari, D. Simpson, and R. Agrawal. **Hamiltonian Monte Carlo using an adjoint-differentiated**

Laplace approximation: Bayesian inference for latent Gaussian models and beyond. *Neural Information Processing Systems*, 34, 2020.

- [18] A. Hauser, M. J. Counotte, C. C. Margossian, G. Konstantinoudis, N. Low, C. L. Althaus, and J. Riou. **Estimation of SARS-CoV-2 mortality during the early stages of an epidemic: a modeling study in Hubei, China and six regions in Europe.** *PLOS Medicine*, 17(7), 2020.
- [19] A. Gelman, A. Vehtari, D. Simpson, C. C. Margossian, B. Carpenter, Y. Yao, L. Kennedy, J. Gabry, P.-C. Bürkner, and M. Modrák. **Bayesian Workflow.** *arXiv:2011.01808*, 2020.
- [20] C. C. Margossian. **Review of automatic differentiation and its efficient implementation.** *Awarded “Top WIRES articles in 2022”*, *WIRES: Data Mining and Knowledge Discovery*, 9(4), 2019.
- [21] J. R. Schmitt, E. Agol, K. M. Deck, L. A. Rogers, Z. J. Gazak, D. A. Fischer, J. Wang, M. J. Holman, K. J. Jek, C. Margossian, M. R. Omohundor, T. Winarski, J. M. Brewer, M. J. Giguere, C. Lintott, S. Lynn, M. Parrish, K. Schawinski, M. E. Schwamb, R. Simpson, and A. M. Smith. **Planet Hunters. VII. Discovery of a new low-mass, low-density planet (PH3 C) orbiting KEPLER-289 with mass measurements of two additional Planets (PH3 B and D).** *Astrophysical Journal*, 795(2), 2014.

Posters and technical reports (selected)

*supervised student

- [1] E. Mokol* and C. C. Margossian. **Monitoring Nonstationary Variance to Assess Convergence of MCMC.** *Best poster award*, *International Society of Bayesian Analysis (ISBA) world meeting*, 2024.
- [2] C. C. Margossian. **General adjoint-differentiated Laplace approximation.** *arXiv:2306.14976*, 2023.
- [3] S. du Ché* and C. C. Margossian. **Parallelization for Markov chains Monte Carlo with heterogeneous runtimes.** *BayesComp*, 2023.

- [4] C. C. Margossian and M. Betancourt. **Efficient Automatic Differentiation of Implicit Functions**. *arXiv:2112.14217*, 2022.
- [5] C. C. Margossian, L. Zhang, S. Weber, and A. Gelman. **Solving ODEs in a Bayesian context: challenges and opportunities**. *Population Approach Group in Europe*, 2021.
- [6] A. Marc, M. Keriou, C. Margossian, J. Bertrand, P. Maisonnasse, Y. Aldon, R. W. Sanders, M. Van Gils, R. Le Grand, and J. Guedj. **Developing a model of SARS-CoV-2 viral dynamics under monoclonal antibody treatment**. *Population Approach Group in Europe*, 2021.
- [7] J. D. Gaebler* and C. C. Margossian. **Propagating Derivatives through Implicit Functions in Reverse Mode Autodiff**. *Stanford Institute for Computational & Mathematical Engineering*, 2021.
- [8] C. C. Margossian and A. Gelman. **Bayesian model of planetary motion: exploring ideas for a modeling workflow when dealing with ordinary differential equations and multimodality**. In *Stan Case Studies*, volume 7, 2020.
- [9] M. Betancourt, C. C. Margossian, and V. Leos-Barajas. **The Discrete Adjoint Method: Efficient Derivatives for Functions of Discrete Sequences**. *arXiv:2002.00326*, 2020.
- [10] C. C. Margossian. **Computing Steady States with Stan’s Non-linear Algebraic Solver**. *StanCon*, 2018.
- [11] C. C. Margossian and W. R. Gillespie. **Gaining Efficiency by Combining Analytical and Numerical Methods to Solve ODEs: Implementation in Stan and Application to Bayesian PK/PD**. *American Conference on Pharmacometrics*, 2017.
- [12] C. C. Margossian and W. R. Gillespie. **Differential Equation Based Models in Stan**. *StanCon*, 2017.
- [13] C. C. Margossian and W. R. Gillespie. **Stan Functions for Pharmacometrics Modeling**. *American Conference on Pharmacometrics*, 2016.

Software

STAN: a probabilistic programming language, Core developer, mc-stan.org.

TORSTEN: an extension of Stan for pharmacometrics modeling, Co-creator, [GitHub](#).

MRGSOLVE: Simulation from ODE-Based Population PK/PD and System Pharmacology Models, Contributor, [GitHub](#).

BAYESPLOT: Plotting for Bayesian Models in R, Contributor, [Cran](#).

Awards and recognitions

AISTATS best paper award, For *Variational Inference in Location-Scale Families: exact recovery of the mean and correlation matrix*, best paper out of 583 accepted papers and 1,861 submitted papers at the International Conference on Artificial Intelligence and Statistics. 2025

ISBA best poster award, For *Monitoring Nonstationary Variance to Assess Convergence of MCMC*, presented at the International Society of Bayesian Analysis (ISBA): World Meeting. 2024

WIRES top article, For *A Review of Automatic Differentiation and its Efficient Implementation*, which was amongst the top 10 most cited articles in the [2021 Journal Citation Report](#) for *WIRES: Data Mining and Knowledge Discovery*. 2022

Minghui Yu teaching assistant award, Department of Statistics, Columbia University, Awarded by the Director of Graduated Studies based on student feedback. 2022

AISTATS top reviewer, The top reviewers were selected based on the feedback received from the Area Chairs and comprise the top-10% of AISTATS reviewers. 2022

Dean's fellowship, Department of Statistics, Columbia University, 5 years funding for PhD degree. 2017

Yale book award, For “character and intellectual promise”. 2010

Supervised students

Internships

Manny Mokel (undergraduate student), *Monitoring Nonstationary Variance to Assess Convergence of MCMC*, Flatiron Institute, New York, NY. 2023

Stanislas Du Ché (master's student), *Parallelization for Markov chain Monte Carlo with heterogeneous runtimes*, Columbia University, New York, NY. 2022

Johann Gaebker (PhD student), *Propagating Derivatives through implicit functions in reverse mode automatic differentiation*, Columbia University, New York, NY. 2020

Léo Grinsztajn (master's student), *Bayesian Workflow for disease transmission models*, Columbia University, New York, NY. 2020

Summer internship

Hyunji (Angie) Moon (undergraduate student), *Simulation-based Calibration for the embedded Laplace approximation*, Columbia University, New York, NY. 2020

Academic services

Elected Member, *Stan Governing Body*, Two year term. 2022-2024

Organizer, *StanCon 2024*, Oxford, UK. 2024

Organizer, *StanCon 2023*, St Louis, MO. 2023

Student representative, *PhD program in statistics at Columbia University*. 2019 - 2020

Reviewer.

- *Transactions of Machine Learning* (2026, 2025, 2024)
- *Journal of Computational and Graphical Statistics* (2025 (2))
- *Annals of Statistics* (2025)
- *Journal of Pharmacokinetics and Pharmacodynamics* (2025, 2023, 2019)
- *Statistics and Computing* (2025)
- *Bayesian Analysis* (2025, 2024)
- *Philosophical Transactions of the Royal Society A* (2025)
- *Statistical Science* (2025)
- *SIAM review* (2025)
- *Handbook of Markov chain Monte Carlo*, 2nd edition (2024 (2)),
- *Advances in Neural Information Processing Systems* (2024, 2020)
- *CPT: Pharmacometrics and Systems Pharmacology* (2024)
- *PeerJ* (2023)
- *Journal of Machine Learning Research* (2023 (2))
- *PMLR: Artificial Intelligence and Statistics* (2023, **Top Reviewer Award** 2021)
- *Computational Statistics* (2022)
- *Nature Geoscience* (2021)
- *Methods in ecology* (2021)
- *Journal of data science* (2021)

Teaching (selected)

Courses at the University of British Columbia

Instructor, *Bayesian Workflow*, STAT 547: Topics course for graduate students, 1/2 semester, Vancouver, BC. 2026

Tutorials, summer schools, and guest lectures

- Instructor**, *Bayesian Statistics: a practical introduction*, 4-hour lecture, Summer School on Cryptography, Statistics and Machine Learning, Tsaghkadzor, Armenia. 2025
- Instructor**, *Monte Carlo Methods*, 1/2-day course, Nordic Summer School on Probabilistic AI, Copenhagen, Denmark. 2024
- Instructor**, *Bayesian Workflow for hierarchical and ODE-based models*, 3-day workshop, Summer School on Advanced Bayesian Methods, Leuven, Belgium. 2023
- Instructor**, *Fundamentals of Stan*, 1/2-day workshop, StanCon 2023, Washington University in St Louis, St Louis, MO. 2023
- Instructor**, *Building, fitting, and criticizing Bayesian PK/PD models*, 1-day workshop, University of Buffalo, Buffalo, NY. 2019–2023
- Guest Lecturer**, *Probability and Bayes*, Lecture for PHC 506: Biometry in Pharmaceutics, University of Buffalo, Buffalo, NY. 2019–2023
- Instructor**, *Stan for the people: an introductory workshop to Bayesian modeling*, Two day workshop, McGill University, Montreal, Canada. 2019, 2020
- Instructor**, *Population and ODE-based models using Stan and Torsten*, 2-day workshop, StanCon 2019, Cambridge University, Cambridge, UK. 2019
- Guest Lecturer**, *Introduction to Bayesian Data Analysis with Stan*, Lecture for STAT 2020: Bayesian Statistics, Harvard University, Cambridge, MA. 2017

Teaching Assistant

- Teaching Assistant**, *Minghui Yu Teaching Assistant Award*, Courses at all levels (undergrad, masters and PhD), Columbia University, New York, NY. 2017–2022

Talks (selected)

2025

- **Invited talk.** *Matching Symmetry with Variational Inference*
International Conference on Statistics and Data Science, Sevilla, Spain
- **Seminar.** *Variational Inference in the Presence of Symmetry*
Department of Statistical Sciences, University of Toronto, Toronto, ON
- **Seminar.** *Variational Inference in the Presence of Symmetry*
Department of Statistics and Actuarial Sciences, University of Waterloo, Waterloo, ON
- **Contributed talk.** *Assessing the Convergence of MCMC when running many (short) chains* Fast and Curious 2: MCMC in action, Toronto, ON

- **Contributed talk.** *Assessing the Convergence of MCMC when running many (short) chains* CANSSI Monte Carlo workshop, Vancouver, BC
- **Invited talk.** *Matching symmetries with variational inference* ASA/IMS Spring Research Conference, New York, NY
- **Chaired session.** *Parallel Computation for Markov Chain Monte Carlo* BayesComp, Singapore
- **Invited talk.** *Matching Symmetries with Variational Inference* BayesComp, Singapore
- **Invited talk (best paper award).** *Variational Inference in Location-Scale Families: Exact recovery of the mean and correlation matrix* International Conference on Artificial Intelligence, Phuket, Thailand
- **Invited talk.** *Markov Chain Monte Carlo and Variational Inference in the Age of Parallel Computation* Manchester Center for AI Fundamentals, Manchester, UK

2024

- **Chaired session.** *Monte Carlo methods using modern hardware* International Society of Bayesian Analysis (ISBA) World Meeting, Venice, Italy
- **Invited talk.** *Variational Inference for Uncertainty Quantification: An Analysis of Trade-offs* International Society of Bayesian Analysis (ISBA) World Meeting, Venice, Italy

2023

- **Invited talk.** *The Wisdom of Automatic Differentiation* Applied and Computational Math Group Meeting, Courant Institute, New York University, New York, NY
- **Oral presentation.** *The Shrinkage-Delinkage Trade-off: An Analysis of Factorized Gaussian Approximations for Variational Inference* Conference on Uncertainty in Artificial Intelligence, Pittsburgh, PA
- **Invited talk.** *Making Bayesian Pharmacometrics modeling simpler (but not too simple) with Torsten Stan* for Pharmacometrics Day, INSERM, Paris, France
- **Invited talk.** *Amortized Variational Inference: when and why?* Flatiron-wide Meeting on Machine Learning, Flatiron Institute, New York, NY

2022

- **Lecture.** *Solving ODEs in a Bayesian model* Flatiron-Wide Algorithms and Mathematics Meeting, Flatiron Institute, New York, NY
- **Invited talk.** *Nested \widehat{R} : Assessing convergence for Markov chains Monte Carlo when running many short chains* Center for Research in Economics and Statistics (CREST),

École Polytechnique, Paris, France

2021

- **Talk.** *Bayesian inference for latent Gaussian models: MCMC, approximate methods, and hybrids* Minghui Yu memorial conference, Columbia University, New York, NY

2020

- **Invited talk.** *Developing a Bayesian modeling workflow for population PBPK* American Conference on Pharmacometrics, Online
- **Invited talk.** *Developing a Bayesian workflow to model the Covid-19 outbreak* 12th Covid-19 symposium, Columbia University, New York, NY

2018

- **Contributed talk.** *Computing steady states with Stan's nonlinear algebraic solver* StanCon, Pacific Grove, CA

2017

- **Contributed talk.** *Differential equations based models in Stan* StanCon, Columbia University, New York, NY

2016

- **Invited talk.** *Differential equations based models in Stan* Stan Meetup in Boston, Harvard University, Cambridge, MA
- **Lecture.** *Practice (and malpractices!) of Bayesian analysis* Metrum Journal Minute, Tariffville, CT

2015

- **Talk.** *How stars and planets interact: testing the effects of close-in giant planets on stellar magnetic activity* Davenport Mellon Forum, Yale University, New Haven, CT

Public outreach

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| Featured interview, <i>Vancouver's World Cup plans face political and security questions</i> , CBC News, video . | 2026 |
| Podcast guest, <i>Bayesian Workflow</i> , MetrumRG Podcast, video . | 2024 |
| Podcast guest, <i>Exploring the Future of Stan</i> , Learning Bayesian Statistics, video . | 2024 |
| Podcast guest, <i>Demystifying MCMC and Variational Inference</i> , Learning Bayesian Statistics, audio . | 2024 |

Interview, *Between Knowing Nothing and Knowing for Sure: the Science of Uncertainty*, Flatiron Scientist Spotlight, [article](#). 2023

Interview, *Some Outstanding Challenges when Solving ODEs in a Bayesian context*, Bayes. Uncertainty. Explained, [video](#). 2021

Modified February 2026