

# Charles C. Margossian

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## Current position

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

## Education

**Ph.D. Statistics**, Columbia University, New York, NY. 2017– 2022  
o Thesis: *Modernizing Markov chains Monte Carlo for scientific and Bayesian modeling*  
o Advisor: Andrew Gelman  
o Dissertation Committee: Aki Vehtari, Matt Hoffman, Sumit Mukherjee and David Blei

**B.Sci. Physics**, Yale University, New Haven, CT. 2011–2015  
**Baccalauréat Scientifique**, Ecole Jeannine Manuel (High school), Paris, France. 2009–2011

## 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, L<sup>A</sup>T<sub>E</sub>X, GitHub  
**Languages:** English, French, German

## Papers

Google Scholar: <https://scholar.google.com/citations?user=nPtLsvIAAAJ&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*, (in press), 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.** *Advances in Neural Information Processing Systems: Datasets & Benchmarks*, (accepted), 2025.
- [5] C. C. Margossian, M. D. Hoffman, P. Sountsov, L. Riou-Durand, A. Vehtari, and A. Gelman. **Nested  $\hat{R}$ : Assessing the convergence of Markov chain Monte Carlo when running many short chains.** *Bayesian Analysis*, Advance Publication:1–28, 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 Blanchard. **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.** *Selected for spotlight, Advances in 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.** *Selected for 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.** *Selected for oral presentation, 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.** *Advances in 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.** *Advances in 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. Schwinski, 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. Mokel\* 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. Kerou, 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 Nonlinear 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

**Core developer**, Stan: a probabilistic programming language, [mc-stan.org](http://mc-stan.org).

**Co-creator**, Torsten: an extension of Stan for pharmacometrics modeling, [GitHub](https://github.com/crmargossian/torsten).

**Contributor**, mrgSolve: Simulation from ODE-Based Population PK/PD and System Pharmacology Models, [GitHub](https://github.com/crmargossian/mrgSolve).

**Contributor**, bayesplot: Plotting for Bayesian Models in R, [Cran](https://cran.r-project.org/package=bayesplot).

## Awards and recognitions

<b>AISTATS best paper award</b> , For <i>Variational Inference in Location-Scale Families: exact recovery of the mean and correlation matrix</i> , best paper out of 583 accepted papers and 1,861 submitted papers at the International Conference on Artificial Intelligence and Statistics.	2025
<b>ISBA best poster award</b> , For <i>Monitoring Nonstationary Variance to Assess Convergence of MCMC</i> , presented at the International Society of Bayesian Analysis (ISBA): World Meeting.	2024
<b>WIREs top article</b> , For <i>A Review of Automatic Differentiation and its Efficient Implementation</i> , which was amongst the top 10 most cited articles in the <a href="#">2021 Journal Citation Report</a> for <i>WIREs: Data Mining and Knowledge Discovery</i> .	2022
<b>Minghui Yu teaching assistant award</b> , Department of Statistics, Columbia University, Awarded by the Director of Graduated Studies based on student feedback.	2022
<b>AISTATS top reviewer</b> , The top reviewers were selected based on the feedback received from the Area Chairs and comprise the top-10% of AISTATS reviewers.	2022
<b>Dean's fellowship</b> , Department of Statistics, Columbia University, 5 years funding for PhD degree.	2017
<b>Yale book award</b> , For "character and intellectual promise".	2010

## Academic services

Reviewer.

- *Journal of Computational and Graphical Statistics* (2025)
- *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)
- *Transactions of Machine Learning* (2025, 2024)
- *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)

**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

## Supervised students

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

**Stanislas Du Ché (master 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 student)**, *Bayesian Workflow for disease transmission models*, Columbia University, New York, NY. 2020

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

## Teaching

**Instructor**, *Bayesian Statistics: a practical introduction*, 4-hour lecture, Summer School on Cryptography, Statistics and Machine Learning, Tsaghkadzor, Armenia. 2025

<b>Instructor</b> , <i>Monte Carlo Methods</i> , Half-a-day course, Nordic Summer School on Probabilistic AI, Copenhagen, Denmark.	2024
<b>Instructor</b> , <i>Bayesian Workflow for hierarchical and ODE-based models</i> , Three day workshop, Summer School on Advanced Bayesian Methods, Leuven, Belgium.	2023
<b>Instructor</b> , <i>Fundamentals of Stan</i> , Half-day workshop, StanCon 2023, Washington University in St Louis, St Louis, MO.	2023
<b>Instructor</b> , <i>Building, fitting, and criticizing Bayesian PK/PD models</i> , One day workshop, University of Buffalo, Buffalo, NY.	2019–2023
<b>Lecturer</b> , <i>Probability and Bayes</i> , Lecture for PHC 506: Biometry in Pharmaceutics, University of Buffalo, Buffalo, NY.	2019–2023
<b>Instructor</b> , <i>Stan for the people: an introductory workshop to Bayesian modeling</i> , Two day workshop, McGill University, Montreal, Canada.	2019, 2020
<b>Instructor</b> , <i>Population and ODE-based models using Stan and Torsten</i> , Two day workshop, StanCon 2019, Cambridge University, Cambridge, UK.	2019
<b>Guest Lecturer</b> , <i>Introduction to Bayesian Data Analysis with Stan</i> , Lecture for STAT 2020: Bayesian Statistics, Harvard University, Cambridge, MA.	2017
<b>Teaching Assistant</b> , Recipient of the Minghui Yu Teaching Assistant Award, Courses at all levels (undergrad, masters and PhD), Columbia University, New York, NY.	2017–2022
<b>Peer Tutor</b> , Science, Technology, and Research Scholars (STARS) program, Yale University, New Haven, CT.	2013–2015

## Invited talks (selected)

<b>Invited Talk</b> , <i>Variational Inference in the Presence of Symmetry</i> , Seminar, Department of Statistical Sciences, University of Toronto, Toronto, ON.	2025
<b>Invited Talk</b> , <i>Variational Inference in the Presence of Symmetry</i> , Seminar, Department of Statistics and Actuarial Sciences, University of Waterloo, Waterloo, ON.	2025
<b>Proposed talk</b> , <i>Assessing the Convergence of MCMC when running many (short) chains</i> , Fast and Curious 2: MCMC in action, Toronto, ON.	2025
<b>Proposed talk</b> , <i>Assessing the Convergence of MCMC when running many (short) chains</i> , CANSSI Monte Carlo workshop, Vancouver, BC.	2025
<b>Invited talk</b> , <i>Matching symmetries with variational inference</i> , ASA/IMS Spring Research Conference, New York, NY.	2025
<b>Chaired Session</b> , Parallel Computations for Markov Chain Monte Carlo, BayesComp, Singapore.	2025
<b>Invited talk</b> , <i>Matching Symmetries with Variational Inference</i> , BayesComp, Singapore.	2025
<b>Invited talk (best paper award)</b> , <i>Variational Inference in Location-Scale Families: Exact recovery of the mean and correlation matrix</i> , International Conference on Artificial Intelligence, Phuket, Thailand.	2025

<b>Invited talk</b> , <i>Markov Chain Monte Carlo and Variational Inference in the Age of Parallel Computation</i> , Manchester Center for AI Fundamentals, Manchester, UK.	2025
<b>Chaired session</b> , <i>Monte Carlo methods using modern hardware</i> , International Society of Bayesian Analysis (ISBA): World Meeting, Venice, Italy.	2024
<b>Invited talk</b> , <i>Variational Inference for Uncertainty Quantification: An Analysis of Trade-offs</i> , International Society of Bayesian Analysis (ISBA): World Meeting, Venice, Italy.	2024
<b>Invited talk</b> , <i>The Wisdom of Automatic Differentiation</i> , Applied and Computational Math Group Meeting, Courant Institute, New York University, New York, NY.	2023
<b>Oral Presentation</b> , <i>The Shrinkage-Delinkage Trade-off: An Analysis of Factorized Gaussian Approximations for Variational Inference</i> , Conference on Uncertainty in Artificial Intelligence, Pittsburgh, PA.	2023
<b>Invited talk</b> , <i>Making Bayesian Pharmacometrics modeling simpler (but not too simple) with Torsten</i> , Stan for Pharmacometrics Day, INSERM, Paris, France.	2023
<b>Invited talk</b> , <i>Amortized Variational Inference: when and why?</i> , Flatiron-wide Meeting on Machine Learning, Flatiron Institute, New York, NY.	2023
<b>Lecture</b> , <i>Solving ODEs in a Bayesian model</i> , Flatiron-Wide Algorithms and Mathematics ( $F_\omega(\alpha + m)!$ ), Flatiron Institute, New York, NY.	2022
<b>Invited talk</b> , <i>Nested <math>\widehat{R}</math>: Assessing convergence for Markov chains Monte Carlo when running many short chains</i> , Center for Research in Economics and Statistics (CREST), École Polytechnique, Paris, France.	2022
<b>Talk</b> , <i>Bayesian inference for latent Gaussian models: MCMC, approximate methods, and hybrids</i> , Minghui Yu memorial conference, Columbia University, New York, NY.	2021
<b>Invited talk</b> , <i>Developing a Bayesian modeling workflow for population PBPK</i> , American Conference on Pharmacometrics, Online.	2020
<b>Invited talk</b> , <i>Developing a Bayesian workflow to model the Covid-19 outbreak</i> , 12 <sup>th</sup> Covid-19 symposium, Columbia University, New York, NY.	2020
<b>Proposed talk</b> , <i>Computing steady states with Stan's nonlinear algebraic solver</i> , StanCon, Pacific Grove, CA.	2018
<b>Proposed talk</b> , <i>Differential equations based models in Stan</i> , StanCon, Columbia University, New York, NY.	2017
<b>Invited talk</b> , <i>Differential equations based models in Stan</i> , Stan Meetup in Boston, Harvard University, Cambridge, MA.	2016
<b>Lecture</b> , <i>Practice (and malpractices!) of Bayesian analysis</i> , Metrum Journal Minute, Tariffville, CT.	2016
<b>Talk</b> , <i>How stars and planets interact: testing the effects of close-in giant planets on stellar magnetic activity</i> , Davenport Mellon Forum, Yale University, New Haven, CT.	2015

Modified November 2025