

# Charles Margossian

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## Education

- 2017–present **Ph.D. Statistics**, *Columbia University*, New York, NY.  
Advisor: Andrew Gelman
- 2011–2015 **B.Sci. Physics**, *Yale University*, New Haven, CT.
- 2009–2011 **Baccalauréat Scientifique**, *Ecole Jeannine Manuel (High school)*, Paris, France,  
Mention *très bien*.

## Experience

- Summer 2021 **Research Intern**, *Google*, Bayesflow team, New York, NY.
- Summer 2019 **Visiting Doctoral Student**, *Aalto University*, Department of Computer Science,  
Probabilistic Machine Learning group, Espoo, Finland.
- 2016–present **Core Developer**, *Stan Development Team*.
- 2016–2017 **Visiting Scientist**, *Metrum Research Group LLC*, Cambridge, MA.
- 2015–2016 **Pharmacometrics Bootcamp**, *Metrum Research Group LLC*, Tariffville, CT.
- 2013–2015 **Researcher**, *Yale Department of Astronomy*, New Haven, CT.
- Summer 2014 **Patent Law, Technical Specialist**, *Leinweber und Zimmermann*, Munich,  
Germany.

## Awards

- 2017 **Dean's Fellowship**, *Columbia Department of Statistics*.
- 2010 **Yale Book Award**.

## Academic service

- Reviewer**, *Methods in ecology* (2021), *Journal of data science* (2021), *Neural information processing systems (NeurIPS)* (2020), *Journal of pharmacokinetics and pharmacodynamics* (2019).
- 2019 - 2020 **Student representative**, *PhD program in statistics at Columbia University*.

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## Papers

(\*: joint first authorship)

- [1] Charles C Margossian, Yi Zhang, and William R Gillespie. Flexible and efficient Bayesian pharmacometrics modeling using Stan and Torsten, Part I. *Preprint. arXiv:2109.10184*, September 2021.
- [2] Charles C Margossian and Sumit Mukherjee. Simulating Ising and Potts models at critical and cold temperatures using auxiliary Gaussian variables. *in preperation*, 2021+.
- [3] Charles C Margossian, Matthew D Hoffman, and Pavel Sountsov. Nested  $\hat{R}$ : assessing convergence for Markov chains Monte Carlo built on modern hardware. *in preperation*, 2021+.
- [4] Charles C Margossian\* and Michael Betancourt\*. A General Approach for the efficient implementation of implicit functions in automatic differentiation. *in preperation*, 2021+.
- [5] Léo Grinsztajn, Elizaveta Semenova, Charles C Margossian, and Julien Riou. Bayesian workflow for disease transmission modeling in Stan. *Statistics in Medicine*, September 2021.
- [6] Philip Greengard, Jeremy Hoskins, Charles C Margossian, Andrew Gelman, and Aki Vehtari. Fast methods for posterior inference of two-group normal-normal models. *Preprint. arXiv:2110.03055*, October 2021.
- [7] Charles C Margossian, Aki Vehtari, Daniel Simpson, and Raj Agrawal. Hamiltonian Monte Carlo using an adjoint-differentiated Laplace approximation: Bayesian inference for latent Gaussian models and beyond. *Advances in Neural Information Processing Systems (NeurIPS)*, 33, October 2020.
- [8] Anthony Hauser, Michel J Counotte, Charles C Margossian, Garyfallos Konstantinoudis, Nicola Low, Christian L Althaus, and Julien 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, July 2020.
- [9] Andrew Gelman, Aki Vehtari, Daniel Simpson, Charles C Margossian, Bob Carpenter, Yuling Yao, Lauren Kennedy, Jonah Gabry, Paul-Christian Bürkner, and Martin Modrák. Bayesian Workflow. *Preprint. arXiv:2011.01808*, October 2020.
- [10] Michael Betancourt, Charles C Margossian, and Vianey Leos-Barajas. The Discrete Adjoint Method: Efficient Derivatives for Functions of Discrete Sequences. *Preprint. arXiv:2002.00326*, February 2020.

- [11] Charles C Margossian. A Review of automatic differentiation and its efficient implementation. *Wiley interdisciplinary reviews: data mining and knowledge discovery*, 9, March 2019.
- [12] Joseph R Schmitt, Eric Agol, Katherine M Deck, Leslie A Rogers, J Zachary Gazak, Debra A Fischer, Ji Wang, Matthew J Holman, Kian J Jek, Charles Margossian, Mark R Omohundor, Troy Winarski, John M Brewer, Matthew J Giguere, Chris Lintott, Stuart Lynn, Michael Parrish, Kevin Schawinski, Megan E Schwamb, Robert Simpson, and Arfon 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), October 2014.

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## Conference posters and notebooks

- [1] Charles C Margossian, Lu Zhang, Sebastian Weber, and Andrew Gelman. Solving ODEs in a Bayesian context: challenges and opportunities. In *Population Approach Group in Europe 29*, September 2021.
- [2] Aurélien Marc, Marion Kerioui, Charles Margossian, Julie Bertrand, Pauline Maisonnasse, Yoan Aldon, Rogier W Sanders, Marit Van Gils, Roger Le Grand, and Jérémie Guedj. Developping a model of SARS-CoV-2 viral dynamics under monoclonal antibody treatment. In *Population Approach Group in Europe 29*, September 2021.
- [3] Charles C Margossian, Aki Vehtari, Daniel Simpson, and Raj Agrawal. Approximate Bayesian inference for latent Gaussian models in Stan. In *StanCon 2020*, August 2020.
- [4] Charles C Margossian. Computing Steady States with Stan’s Nonlinear Algebraic Solver. In *StanCon 2018*, January 2018.
- [5] Charles C Margossian and William R Gillespie. Gaining Efficiency by Combining Analytical and Numerical Methods to Solve ODEs: Implementation in Stan and Application to Bayesian PK/PD. *Journal of Pharmacokinetics and Pharmacodynamics*, 44, October 2017.
- [6] Charles C Margossian and William R Gillespie. Differential Equation Based Models in Stan. In *StanCon 2017*, January 2017.
- [7] Charles C Margossian and William R Gillespie. Stan Functions for Pharmacometrics Modeling. *Journal of Pharmacokinetics and Pharmacodynamics*, 43, October 2016.

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## Softwares

- [1] Stan Development Team. *Stan: A Probabilistic Programming Language*. mc-stan.org.
- [2] Charles C Margossian, William R Gillespie, and Yi Zhang. *Torsten: A Bayesian Pharmacometrics Model Library for Stan*. Metrum Research Group, <https://github.com/metrumrg/example-models>.
- [3] Kyle T Baron, Alan C Hindmarsh, Linda R Petzold, William R Gillespie, Charles C Margossian, and Devin Pastoor. *mrgsolve: Simulation from ODE-Based Population PK/PD and System Pharmacology Models*. Metrum Research Group, <https://mrgsolve.github.io/>.

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## Skills

**Programming:** R, Python, C++, Stan, TensorFlow Probability, L<sup>A</sup>T<sub>E</sub>X, GitHub  
**Languages:** English, French, German

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## Teaching experience (selected)

- 2019, 2020, **Lecturer**, *Probability and Bayes*, lecture for PHC 506: Biometry in Pharmaceutics, 2021 University of Buffalo, School of Pharmacy, Buffalo, NY.
- 2019, 2020, **Instructor**, *Building, fitting, and criticizing Bayesian PK/PD models*, (one day 2021 workshop), University of Buffalo, School of Pharmacy, Buffalo, NY.
- 2019, 2020 **Instructor**, *Stan for the people: two days introductory workshop on Bayesian modeling*, (two days workshop), McGill University, Montreal, Canada.
- August 2019 **Co-instructor**, *Population and ODE-based models using Stan and Torsten*, (two days workshop), Stan Conference 2019, Cambridge, UK.
- January 2018 **Instructor**, *How to Develop for the Stan C++ Core Language*, Stan Conference 2018, Pacific Grove, CA.
- April 2017 **Invited Lecturer**, *Introduction to Bayesian Data Analysis with Stan*, Harvard University, STAT 220: Bayesian Statistics, Cambridge, MA.
- Spring 2021 **Teacher Assistant**, *Applied Statistics II, STAT 6102 (PhD level)*, Columbia University, New York, NY.
- 2019, 2020 **Teacher Assistant**, *Foundation of Graphical Models, STAT 6701 (PhD level)*, Columbia University, New York, NY.
- Spring 2019 **Teacher Assistant**, *Statistical inference, STAT 5204 (Master level)*, Columbia University, New York, NY.

- Fall 2018 **Teacher Assistant**, *Statistical Computing and Introduction to Data Science (Undergrad level)*, STAT 4206, Columbia University, New York, NY
- September 2017 **Teacher Assistant**, *Stan for Physics*, Massachusetts Institute of Technology, Cambridge, MA.
- June 2017 **Teacher Assistant**, *Getting Started with Bayesian PKPD Modeling using Stan and Torsten*, Population Approach Group in Europe 26, Budapest, Hungary.

## Presentations (selected)

- March 2021 **Bayesian inference for latent Gaussian models: MCMC, approximate methods, and hybrids**, Minghui Yu memorial conference, Columbia University.
- November 2020 **Developing a Bayesian modeling workflow for population PBPK**, American Conference on Pharmacometrics, virtual.
- August 2020 **Approximate Bayesian inference for latent Gaussian models in Stan**, Stan Conference 2020, virtual.
- June 2020 **Developing a Bayesian workflow to model the Covid-19 outbreak**, 12<sup>th</sup> Covid-19 symposium, Columbia University, New York, NY.
- July 2018 **Understanding automatic differentiation to improve performance**, Stan for Pharmacometrics Day 2018, Université Paris Diderot, School of Medicine, Paris, France.
- November 2016 **Differential equations based models in Stan**, *Stan Meetup in Boston*, Harvard University, Cambridge, MA.
- February 2016 **Practice (and malpractices!) of Bayesian analysis**, *Metrum Journal Minute*, Tariffville, CT.
- March 2015 **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.

*Modified October 2021*