Guanyang Wang

Curriculum Vitae

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Positions

2020–Present **Assistant Professor**, *Department of Statistics, Rutgers University*
- Affiliated Faculty: Theory of Computing Group, Rutgers Computer Science
- Elected Member: Command, Control, and Interoperability Center for Advanced Data Analysis (CCICADA)
- Member: the Center for Discrete Mathematics and Theoretical Computer Science (DIMACS)

Research Interest

Monte Carlo methods, data science, applied probability, generative AI, quantum computing

Education

2015–2020 **Ph.D.**, *Department of Mathematics, Stanford University*
- Advisor: Professor Persi Diaconis.
- Ph.D. Minor in Statistics.
- Thesis Topic: *Topics in Markov chain Monte Carlo Methods, with applications in statistics.*

2011–2015 **B.S.**, *School of Mathematical Sciences, University of Science and Technology of China*
- Summa Cum Laude.
- Guo Moruo Scholarship (Highest Honor for USTC students).

Awards and Honors

2023 Blackwell-Rosenbluth Award, *The junior section of the International Society for Bayesian Analysis (j-ISBA)* one of six recipients

2022 Adobe Data Science Research Award, *Adobe Research,* with Peng Zhang, one of four recipients

2022 Ralph E. Powe Junior Faculty Enhancement Award, *Oak Ridge Associated Universities,* one of 37 nationwide awards across multiple disciplines, one of the two awarded statisticians

2022 IMS New Researcher Travel Award, *Institute of Mathematical Statistics (IMS)*

2016 The Halsey L. Royden, Jr. Fellowship, *Stanford University*.

2014 Guo Moruo Scholarship, top 1%, *University of Science and Technology of China*.

2013 National Scholarship, top 1%, *University of Science and Technology of China*.

Grants Awarded

NSF National Science Foundation CCF-2403007 (2024-2027): Collaborative Research: FET: Medium: Quantum Monte Carlo Speed Ups for Multilevel Computations and Other Statistical Algorithms. Role: **Co-PI.** (PI: Dr. Mario Szegedy, the other Co-PI: Dr. Jose Blanchet) Total: $1,198,712, My share: $400,000

NSF National Science Foundation DMS-2210849 (2022-2025): Scalable Algorithm Design for Unbiased Estimation via Couplings of Markov Chain Monte Carlo Methods. Role: **PI.** Total: $200,000

Adobe Adobe Data Science Research Awards, with Peng Zhang. Role: **PI.** Total: $50,000

ORAU Ralph E. Powe Junior Faculty Enhancement Award (2022). Role: **PI.** Total: $10,000

Rutgers Provost's COVID Impact Faculty Grant (2021). Role: **PI.** Total: $5,000

Papers in Revision

($\star$ indicates alphabetical ordering authorship, † indicates equal contribution, $\star\star$ indicates student first author)

AoAP **A phase transition in sampling from Restricted Boltzmann Machines**

- Youngwoo Kwon, Qian Qin, Guanyang Wang*, Yuchen Wei.
- arxiv: 2410.08423
- Major revision, *the Annals of Applied Probability (AoAP)*

Accepted Papers

($\star$ indicates alphabetical ordering authorship, † indicates equal contribution, $\star\star$ indicates student first author)

AOS25$^+$ **Spectral gap bounds for reversible hybrid Gibbs chains**

- Qian Qin, Nianqiao Ju, Guanyang Wang.
- *Annals of Statistics, accepted.*

AISTAT25 **Differentially Private Range Queries with Correlated Input Perturbation**

- Prathamesh Dharangutte, Ruobin Gong, Jie Gao, Guanyang Wang*. *International Conference on Artificial Intelligence and Statistics 2025, accepted*

AoAP24 **Repeated Averages on Graphs**

- Ramis Movassagh, Mario Szegedy, Guanyang Wang*. *the Annals of Applied Probability 34 (4), 3781-3819.*

AoAP24 **Spectral Telescope: Convergence Rate Bounds for Random-Scan Gibbs Samplers Based on a Hierarchical Structure**

- Qian Qin, Guanyang Wang*. *the Annals of Applied Probability 34 (1B), 1319-1349.*

AIHP24 **Metropolis-Hastings transition kernel couplings**

- John O'Leary, Guanyang Wang*.Annales de l'Institut Henri Poincaré (B) Probabilités et Statistiques 60(2): 1101-1124.

PLOSCS24 **Pattern detection in bipartite networks: a review of terminology, applications, and methods**

- with Zachary Neal, Giovanni Strona and 8 others. *PLOS Complex Systems 1(2): e0000010.*

JMLR23 **Unbiased Multilevel Monte Carlo estimators for intractable distributions: MLMC meets MCMC**

- Tianze Wang**, Guanyang Wang. *Journal of Machine Learning Research* 24(249):1–40.

ICML23 **Optimal randomized multilevel Monte Carlo for repeatedly nested expectations**

- Yasa Syed**, Guanyang Wang. *short version accepted by International Conference of Machine Learning* PMLR 202:33343-33364.

- journal version to be submitted.

PNAS23 **Prediction of Enzyme Specificity using Protein Graph Convolutional Neural Networks**

- Changpeng Lu, Joseph H. Lubin, Samuel Z. Stentz, Guanyang Wang, Sijian Wang, Sagar D. Khare. *Proceedings of the National Academy of Sciences*120 (39):e2303590120

RS&A22 **On the Minimax Spherical Designs**

- Weibo Fu, Guanyang Wang*, Jun Yan, *Random Structures & Algorithms* 62(1):131-154.

SPA22 **Unbiased Optimal Stopping via the MUSE**

- Zhengqing Zhou†, Guanyang Wang†, Jose Blanchet, Peter Glynn, to appear at *Stochastic Processes and their Applications*.

BEJ22 **Exact convergence rate analysis of the Independent Metropolis-Hastings algorithms**

- Guanyang Wang, *Bernoulli* 28(3):2012-2033.

BEJ22 **On the theoretical properties of the exchange algorithm**

- Guanyang Wang, *Bernoulli* 28(3):1935-1960..

JASA21 **Discussion of 'A Gibbs sampler for a class of random convex polytopes'**

(invited discussion) - Persi Diaconis, Guanyang Wang*, *Journal of American Statistical Association* 116(535):1193-1195..

Nat.Comm.21 **Integrated cooling (i-Cool) textile of heat conduction and sweat transportation for personal perspiration management**

- with Yucan Peng and 16 others, *Nature Communications* 12(1):6122.

AISTAT21 **Maximal couplings of the Metropolis-Hastings algorithm**

- Guanyang Wang†, John O'Leary†, Pierre Jacob,*International Conference on Artificial Intelligence and Statistics 2021 PMLR 130:1225-1233, (***Oral presentation***, top 3% of submissions)*.

EJS20 **A Fast MCMC algorithm for the uniform sampling of binary matrices with fixed margins**

- Guanyang Wang, *Electronic Journal of Statistics.* 14(1): 1690 - 1706

ECP19 **Expectation of the largest betting size in Labouchere system**

- Yanjun Han, Guanyang Wang*,*Electronic Communications in Probability* 24: 1-10.

AMSA18 **Bayesian Goodness of Fit Test: A Conversation for David Mumford**

- Persi Diaconis, Guanyang Wang*,*Annals of Mathematical Sciences and Applications (AMSA)* 3(1):287-308.

Submitted and to be submitted

- **Non-linear Quantum Monte Carlo**
  - Jose Blanchet, Yassine Hamoudi, Mario Szegedy, Guanyang Wang*.
  - arxiv: 2502.05094
  - Under review
- **Markov chain Monte Carlo without evaluating the target: an auxiliary variable approach**
  - Wei Yuan**, Guanyang Wang
  - arxiv:2406.05242

- Under review

- **When are Unbiased Monte Carlo Estimators More Preferable than Biased Ones?**
  - Guanyang Wang, Jose Blanchet, Peter Glynn.
  - arxiv:2404.01431
  - Under review
- **Putting all eggs in one basket: some insights from a correlation inequality**
  - Pradeep Dubey, Siddhartha Sahi, Guanyang Wang*.
  - arxiv: 2403.15957
  - Under review
- **Quantum Monte Carlo with quadratic speedup under infinite variance**
  - Jose Blanchet, Mario Szegedy, Guanyang Wang*.
  - arxiv: 2401.07497
  - Under review
- **On importance sampling and independent Metropolis-Hastings with an unbounded weight function**
  - George Deligiannidis, Pierre E. Jacob, El Mahdi Khribch, Guanyang Wang*.
  - arxiv: 2411.09514
  - To be submitted
- **Universality for extreme order statistics of random walk**
  - Guanyang Wang*, Jun Yan.
  - In preparation

Students Advising

2025–Present **Jing Jia**: Second year Ph.D. student at Rutgers computer science.

2021–Present **Yasa Syed**: Fifth year Ph.D. student at Rutgers statistics.

2021–Present **Tianze Wang**: Third year Ph.D. student at Rutgers statistics, joint advising with Linjun Zhang

2022–Present **Wei Yuan**: Fourth year Ph.D. student at Rutgers statistics.

2022–Present **Yuchen Wei**: Sixth year Ph.D. student at Rutgers math.

2023–Present **Budhaditya Halder**: Fourth year Ph.D. student at Rutgers statistics.

2022–Present **Qiru Pan**: Second year Master student at Rutgers statistics.

2022 **Yingshi Chen**: Undergraduate student at Rutgers statistics.

Ph.D. thesis committee

Zexi Song (statistics), **Ryumei Nakada** (statistics)

Ph.D. qualify exam committee

Zhe Zhang (statistics), **Yuze Zhou** (statistics), **Daniel Shidi Wu** (Plant Biology), **Ryumei Nakada** (statistics), **Xiangrui Kong** (statistics)

Invited Talks

2025.9 Conference " Fast and Curious II: MCMC in Action", University of Toronto, Toronto, Canada

2025.5 Reading group, Flatiron Institute, New York

2025.8 Conference "8th International Conference on Econometrics and Statistics", Waseda University, Tokyo

2025.7 INFORMS Applied Probability Society Conference, Georgia Tech, Atlanta

2025.1 Workshop "Computational Methods in Bayesian Statistics", University of Florida

2024.12 International Conference on Statistics and Data Science (ICSDS), Nice, France

2024.11 KU Probability and Statistics Conference on Stochastic Analysis and Related Areas, University of Kansas

2024.8 Joint Statistical Meeting (JSM), Portland

2024.7 Conference "7th International Conference on Econometrics and Statistics", Beijing

2024.6 Conference "EAC-ISBA", Hong Kong

2024.4 Mostly Monte Carlo and All About That Bayes joint seminar, PariSanté Campus, France

2024.4 Tutorial Talk, Diffusion Model Reading Group, Department of Electrical and Computer Engineering , University of Michigan

2024.2 Department Seminar, Department of Statistics, Rutgers University

2024.2 Econometrics and Statistics Colloquium, The University of Chicago Booth School of Business

2024.2 Department Seminar, Department of Statistical Science, Duke University

2024.1 Department Seminar, Department of Statistics, Rice University

2024.1 Department Seminar, Department of Statistics, University of Michigan

2023.12 Conference "IMS International Conference on Statistics and Data Science (ICSDS)", Lisbon

2023.11 Conference "The Bayesian Young Statisticians Meeting (BAYSM 2023)", Online

2023.10 Department Seminar, School of Management Sciences and Information Systems, Rutgers Business School.

2023.7 Conference "The 9th International Forum on Statistics", Beijing

2023.6 Lecture on Coupling methods for Markov chains, Department of Mathematical Sciences, University of Science and Technology of China

2023.6 New England Statistics Symposium (NESS)

2023.5 Conference "The Fast and the Curious: Modern Markov chain Monte Carlo", University of Minnesota

2023.5 Discussant, Conference "Recent Advances in Statistics and Data Science", Rutgers University

2023.3 Department Seminar, Department of Statistics, University of Iowa

2022.11 Department Seminar, Department of Statistics, Colorado State University.

2022.9 Hon Hai (Foxconn) Quantum Computing Research Center, Taipei.

2022.5 The Alan Turing Institute, U.K.

2022.5 New England Statistics Symposium (NESS)

2022.4 Department Seminar, Department of Statistics, Texas A&M University

2022.4 Discussant, Conference on Advances in Bayesian and Frequentist Statistics: Celebration of the 80th Birthday of Professor William E. Strawderman, Rutgers University

2022.3 Department Seminar, Department of Statistics, the Wharton School, University of Pennsylvania

2022.2 Department Seminar, Department of Mathematics, Rutgers University-Camden Campus

2021.10 Department Seminar, Department of Statistics, University of Minnesota

2021.8 Discussant on paper 'A Gibbs sampler for a class of random convex polytopes', Joint Statistical Meeting

2021.8 Session: Advances in MCMC Theory and Practice, Joint Statistical Meeting

2021.4 The 23rd International Conference on Artificial Intelligence and Statistics 2021

2020.7 Mozi Forum, Department of Computer Science, University of Science and Technology of China

2020.1 Department Seminar, Department of Statistics, Rutgers University

2020.1 Department Seminar, Department of Statistics, University of Florida

2019.5 Guest Lecture for Modern Markov Chains, Stanford University

2018.9 Probability Research Seminar, Department of Mathematics, University of Science and Technology of China

Professional Activities

Organizer

2024 - Co-organizer of the International Seminar on Monte Carlo Methods, a weekly online seminar on Monte Carlo methods.

2021 JSM invited session "Inference, optimization, and computation on discrete structures".

Session Chair

2023 EAC-ISBA invited session "Recent Developments in Markov Chain Monte Carlo".

2023 Conference "The Fast and the Curious: Modern Markov chain Monte Carlo"

2021 JSM invited session "Inference, optimization, and computation on discrete structures".

Committee Member outside Rutgers

2024 American Statistical Association student paper competition (Section on Bayesian Statistical Science)

2024 Scientific committee for the Blackwell-Rosenbluth Award (International Society for Bayesian Analysis)

2023-2024 Applied Probability Society (APS) Best Student Paper competition (Informs)

2023 Student Poster Competition committee (Conference "Recent Advances in Statistics and Data Science")

2022 Student Poster Selection committee (New England Statistics Symposium)

Committee Member at Rutgers

2022 Internal Reviewer for Powe Jr. Faculty Enhancement Awards (2023)

2020-2023 Ph.D. admission committee.

2020-2023 Ph.D. qualifying exam committee.

2020-2023 Master's exam committee.

2022 Conference organization committee

Reviewing for the research community:

Journal: Referee for Annals of Applied Probability, Journal of the Royal Statistical Society: Series B (4), Journal of the American Statistical Association (2), Journal of Machine Learning Research, Nature Communications, the Bernoulli Journal (2), Mathematics of Operations Research (2), Annals of Applied Statistics, SIAM Journal on Scientific Computing, SIAM Journal on Uncertainty Quantification, Journal of Computational Physics, Random Structures and Algorithms, Electronic Journal of Probability (3), Statistics and Computing (4), Journal of Computational and Graphical Statistics (3), Stochastic Processes and their Applications, Proceedings of the Royal Society A, Statistica Sinica, Advances in Applied Probability (2), Statistics and Probability Letters, Environmental and Ecological Statistics.

Conference: COLT 2025 (2), UAI 2025, STOC 2024 (2), Theory of Quantum Computation (TQC) 2024 , AISTATS 2021 (4), Pacific Symposium on Biocomputing 2022.

- Reviewer for MathSciNet

Teaching Experience

At Rutgers (as instructor)

Stat 486 Applied Statistical Learning (Fall 2023, Fall 2024).

Stat 681 Advanced Probability Theory II (Spring 2023).

Stat 680 Advanced Probability Theory I (Fall 2021, Fall 2022).

Stat 654 Stochastic Processes (Spring 2021, Spring 2022).

Stat 582 Introduction to Methods and Theory of Probability (Fall 2020).

At Stanford (as teaching assistant).

Math 21 Calculus (multiple times).

Math 51 Linear Algebra and Multivariate Calculus (multiple times).

Math 52 Multivariate Integral and Calculus (Spring 2016).

Math 104 Applied Matrix Theory (Spring 2019).

Math 113 Linear Algebra and Matrix Theory (multiple times).

Math 131P Partial Differential Equations (Winter 2017).

At University of Science and Technology of China (as teaching assistant)

- Probability Theory and Applications (Spring 2014).