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, $\dagger$ 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

($\star$ = alphabetical order, $\dagger$ = equal contribution, $\diamond$ = corresponding author, $\star\star$ = student first author)

NeurIPS25 **Quantum speedup of non-linear Monte Carlo problems**

- Jose Blanchet, Yassine Hamoudi, Mario Szegedy, Guanyang Wang*, Neural Information Processing Systems 2025, accepted
- selected as **spotlight presentation**

NeurIPS25 **CCS: Controllable and Constrained Sampling with Diffusion Models via Initial Noise Perturbation**

- Bowen Song, Zecheng Zhang, Zhaoxu Luo, Jason Hu, Wei Yuan, Jing Jia, Zhengxu Tang, Guanyang Wang$^\diamond$, Liyue Shen$^\diamond$, Neural Information Processing Systems 2025, accepted

AoS25 **Spectral gap bounds for reversible hybrid Gibbs chains**

- Qian Qin, Nianqiao Ju, Guanyang Wang. *Annals of Statistics 53(4): 1613-1638.*

WSC25 **Connecting Quantum Computing with Classical Stochastic Simulation**

- Jose Blanchet, Mark S. Squillante, Mario Szegedy, Guanyang Wang*. *Winter Simulation Conference 2025, 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$^\diamond$. *Journal of Machine Learning Research* 24(249):1–40.

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

- Yasa Syed**, Guanyang Wang$^\diamond$. *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

SPA23 **Unbiased Optimal Stopping via the MUSE**

- Zhengqing Zhou†, Guanyang Wang†, Jose Blanchet, Peter Glynn, *Stochastic Processes and their Applications* 166 (2023): 104088.

RS&A23 **On the Minimax Spherical Designs**

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

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

- **Antithetic Noise in Diffusion Models**
  - Jing Jia **, Sifan Liu $^\diamond$, Bowen Song, Wei Yuan, Liyue Shen $^\diamond$, Guanyang Wang $^\diamond$.
  - arxiv: 2506.06185
  - Under review

- **Markov chain Monte Carlo without evaluating the target: an auxiliary variable approach**
  - Wei Yuan**, Guanyang Wang$^\diamond$
  - 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
  - Under review

- **Universality for extreme order statistics of random walk**
  - Guanyang Wang*, Jun Yan.
  - In preparation

Mentoring

Ph.D. advisor

2021–2025 **Yasa Syed**: Ph.D. at Rutgers statistics.

- Thesis title: *Bias and Risk in Modern Stochastic Algorithms: From Multilevel Monte Carlo to Robust Accelerated Optimization*
- First job: Quantitative Researcher at Venerable

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

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

Supervising research projects

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

2022–2025	**Yuchen Wei**: Ph.D. at Rutgers math.

Advisor to undergraduate and master's students

2022–2023	**Qiru Pan**: Master student at Rutgers statistics.
2022	**Yingshi Chen**: Undergraduate student at Rutgers statistics.

Ph.D. thesis committee

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

2025.12	Conference " Winter Simulation Conference", Seattle
2025.12	Conference " CMStatistics", virtual talk
2025.10	Conference " SIAM New York-New Jersey-Pennsylvania Section Conference", Pennsylvania State University, Pennsylvania
2025.9	Conference " Fast and Curious II: MCMC in Action", University of Toronto, Toronto, Canada
2025.8	Conference "8th International Conference on Econometrics and Statistics", virtual talk
2025.7	Joint Conference on Statistics and Data Science, Hangzhou, China
2025.7	INFORMS Applied Probability Society Conference, Georgia Tech, Atlanta
2025.6	Bayes Comp, Singapore
2025.6	Institute of Industrial and Systems Engineers (IISE) Annual Conference, Atlanta
2025.5	Department Seminar, Department of Quantitative Theory & Methods, Emory University
2025.5	Reading group, Flatiron Institute, New York
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", virtual talk
2024.6	Conference "EAC-ISBA", virtual talk
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)", virtual talk
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	New England Statistics Symposium (NESS), virtual talk
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	Best Student Paper Competition selection committee (The Applied Probability Society of Institute for Operations Research and the Management Sciences (INFORMS))
2023	Student Poster Competition committee (Conference "Recent Advances in Statistics and Data Science", Piscataway, New Jersey, U.S.)
2022	Student Poster Selection committee (New England Statistics Symposium, Storrs, Connecticut, U.S.)

Department and University Service at Rutgers

2025-ongoing	Seminar Chair, Department of Statistics
2025-ongoing	Ph.D. exam committee, Department of Statistics
2025-ongoing	Data Science advisors committee, Department of Statistics
2023-ongoing	Graduate curriculum committee, Department of Statistics
2023-2025	Department website committee, Department of Statistics
2023-2024	Undergraduate Studies committee, Department of Statistics
2020-2024	Ph.D. admission committee, Department of Statistics
2020-2023	Ph.D. exam committee, Department of Statistics
2020-2023	Master's exam committee, Department of Statistics
2020-2023	Social and Retreat committee, Department of Statistics
2022	Internal Reviewer for Powe Jr. Faculty Enhancement Awards (2023), Rutgers University
2021-2022	Conference organization committee, Department of Statistics

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 (3), Journal of Machine Learning Research, Nature Communications, the Bernoulli Journal (2), Mathematics of Operations Research (2), SIAM Journal on Scientific Computing, SIAM Journal on Uncertainty Quantification, Journal of Computational Physics, Random Structures and Algorithms, Electronic Journal of Probability (3), Electronic Journal of Statistics, 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:	NeurIPS 2025 (5), 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 592   Theory of Probability (Fall 2025).

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).