DAN CHENG

School of Mathematical and Statistical Sciences
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EMPLOYMENT

Assistant/Associate Professor (with tenure) 2018–present
School of Mathematical and Statistical Sciences, Arizona State University

Assistant Professor Aug. 2016–Aug. 2018
Department of Mathematics and Statistics, Texas Tech University

Postdoc Jan. 2016–Aug. 2016
Division of Biostatistics, University of California San Diego
Supervisor: Armin Schwartzman

Postdoc Aug. 2013–Jan. 2016
Department of Statistics, North Carolina State University
Supervisor: Armin Schwartzman

EDUCATION

Ph.D. in Statistics 2008–2013
Department of Statistics and Probability, Michigan State University
Advisor: Yimin Xiao

Graduate Program in Probability 2005–2008
School of Mathematical Sciences, Beijing Normal University

B.S. in Mathematics 2001–2005
School of Mathematical Sciences, Beijing Normal University

RESEARCH INTERESTS

Statistics

Signal Detection; Change Point Detection; Spatial Statistics (Spatial Transcriptomics, Geospatial Models); Spatio-Temporal Data Analysis; Extreme Value Analysis.

Probability

Random Fields (Excursion Probabilities, Critical Points, Clusters); Extreme Value Theory; Random Matrices.

RESEARCH ARTICLES ("$*$" indicates supervised PhD students)

1. Shi, H.*, Wang, Y. and **Cheng, D.** (2025). Microbial correlation: a semi-parametric model for investigating microbial co-metabolism. *Submitted.* `arXiv:2504.05450`

2. Zhao, Y., **Cheng, D.**, Davenport, S. and Schwartzman, A. (2025). On the peak height distribution of non-stationary Gaussian random fields: 1D general covariance and scale space. *Submitted.* `arXiv:2502.12452`

3. He, Z.*, **Cheng, D.** and Zhao, Y. (2025). Multiple testing of local extrema for detection of structural breaks in piecewise linear models. *Statistica Sinica*. Major revision. `arXiv:2308.04368`

4. **Cheng, D.** (2025). On local maxima of smooth Gaussian nonstationary processes and stationary planar fields with trends. *Stochastic Processes and Their Applications*. **181**, 104560.

5. Liu, R.*, Wang, Y. and **Cheng, D.** (2024). Micro-DeMix: A mixture Beta-multinomial model for investigating the fecal microbiome compositions. *Bioinformatics*. **40**, btae667.

6. **Cheng, D.** and Xiao, Y. (2024). The expected Euler characteristic approximation to excursion probabilities of Gaussian vector fields. *Annals of Applied Probability*. **34**, 5664–5693.

7. Zhao, Y., **Cheng, D.** and Schwartzman, A. (2024). An approximation to peak detection power using Gaussian random field theory. *Journal of Multivariate Analysis*. **204**, 105346.

8. **Cheng, D.** (2024). The expected Euler characteristic approximation to excursion probabilities of smooth Gaussian random fields with general variance functions. *Electronic Journal of Probability*. **29**, 1–26.

9. He, Z.*, Zhao, Y., Bickel, P., Weko, C., **Cheng, D.** and Wang, J. (2024). Network inference using the hub model and variants. *Journal of the American Statistical Association*. **119**, 1264–1273.

10. **Cheng, D.** (2023). Smooth Matérn Gaussian random fields: Euler characteristic, expected number and height distribution of critical points. *Statistics and Probability Letters*. https://doi.org/10.1016/j.spl.2024.110116

11. Telschow, F., **Cheng, D.**, Pranav, P. and Schwartzman, A. (2023). Estimation of expected Euler characteristic curves of nonstationary smooth random fields. *Annals of Statistics*. **51**, 2272–2297.

12. **Cheng, D.**, He, Z.* and Schwartzman, A. (2020). Multiple testing of local extrema for detection of change points. *Electronic Journal of Statistics*. **14**, 3705–3729.

13. **Cheng, D.** and Schwartzman, A. (2020). On critical points of Gaussian random fields under diffeomorphic transformations. *Statistics and Probability Letters*. **158**, 108672.

14. **Cheng, D.**, Cammarota, V., Fantaye, Y., Marinucci, D. and Schwartzman, A. (2020). Multiple testing of local maxima for detection of peaks on the (celestial) sphere. *Bernoulli*. **26**, 31–60.

15. **Cheng, D.** and Liu, P. (2019). Extremes of fractional Brownian motion on spheres. *Extremes*. **22**, 433–457.

16. **Cheng, D.** and Schwartzman, A. (2018). Expected number and height distribution of critical points of smooth isotropic Gaussian random fields. *Bernoulli*. **24**, 3422–3446.

17. **Cheng, D.** (2017). Excursion probabilities of isotropic and locally isotropic Gaussian random fields on manifolds. *Extremes*. **20**, 475–487.

18. **Cheng, D.** and Schwartzman, A. (2017). Multiple testing of local maxima for detection of peaks in random fields. *Annals of Statistics*. **45**, 529–556.

19. **Cheng, D.** (2016). Excursion probability of certain non-centered smooth Gaussian random fields. *Stochastic Processes and Their Applications*. **126**, 883–905.

20. **Cheng, D.** and Xiao, Y. (2016). Excursion probability of Gaussian random fields on spheres. *Bernoulli*. **22**, 1113–1130.

21. **Cheng, D.** and Xiao, Y. (2016). The mean Euler characteristic and excursion probability of Gaussian random fields with stationary increments. *Annals of Applied Probability*. **26**, 722–759.

22. **Cheng, D.** and Schwartzman, A. (2015). Distribution of the height of local maxima of Gaussian random fields. *Extremes*. **18**, 213–240.

23. **Cheng, D.** (2014). Double extreme on joint sets for Gaussian random fields. *Statistics and Probability Letters.* **92**, 79–82.

GRANTS

- NSF DMS–2220523 Algorithms for Threat Detection (ATD), 7/2023–6/2026: *Collaborative Research: A Geostatistical Framework for Spatiotemporal Extremes* (PI). $175,000.
- Simons Foundation – Collaboration Grants for Mathematicians (Award ID: 854127), 9/2021–8/2026: *Extremes of random fields: critical points, excursion components and their statistical applications* (PI). $42,000.
- NSF DMS–1811632, 7/2018–6/2022 (one year no-cost extension): *Critical points and excursion probability of random fields: theory and statistical applications* (PI). $100,000.
- NIH R01–EB026859, 2019–2023: *Spatial inference methods for image analysis* (Co-I). $92,000 sub-award to ASU.

TEACHING

School of Mathematical and Statistical Sciences at ASU

- *STP 502: Theory of Statistics II: Inference.* Spring 2021, Spring 2022, Spring 2023, Spring 2024, Spring 2025.
- *STP 527: Statistical Large Sample Theory.* Spring 2020, Spring 2022, Spring 2023, Spring 2024, Spring 2025.
- *STP 530: Applied Regression Analysis.* Spring 2019.
- *STP 551: Time Series Analysis.* Fall 2025.
- *STP 501: Theory of Statistics I: Distribution Theory.* Fall 2018, Fall 2019.
- *STP 421: Probability.* Fall 2021, Fall 2023.

Department of Mathematics and Statistics at Texas Tech University

- *STAT 5328: Mathematical Statistics I.* Spring 2018.
- *STAT 5329: Mathematical Statistics II.* Spring 2018.
- *MATH 5382: Advanced Probability I.* Fall 2017.
- *MATH 2300: Statistical Methods.* Spring 2017.
- *MATH 3342: Mathematical Statistics for Engineers and Scientists.* Fall 2016.

Department of Statistics and Probability at Michigan State University

- *STT 200: Statistical Methods.* Summer 2013.

SERVICES

Services at ASU

- Statistics Qualifying Exam Committee Chair, 2018–present.
- Data Science Qualifying Exam Committee Member, 2022-2023.
- Statistics Comprehensive Exam (Large Sample Theory) Committee Chair, 2020.

Services in the Statistical Society

- Organizer for the invited session "Random Fields and Their Statistical Applications" in the 7th International Conference on Econometrics and Statistics 2024.
- Organizer for the invited session "Advances in Detection of Change Points and Signals" in the 2021 ICSA Applied Statistics Symposium.
- Judge for ASA DataFest for Arizona, 2024.
- Committee Member for ASA DataFest for Arizona, 2021–2023.
- Invited Panel Reviewer for National Science Center, Poland, 2023.

CONFERENCE/SEMINAR TALKS

1. *ICSA 2025 China Conference.* Zhuhai, China. June 28 – 30, 2025.
2. *The 7th International Conference on Econometrics and Statistics.* Beijing, China. July 17–19, 2024.
3. *ICSA 2024 China Conference.* Wuhan, China. June 28 – 30, 2024.
4. *Statistics Seminar, Washington State University.* April 10, 2024.
5. *Statistics and Data Science Colloquium, University of Arizona.* April 1, 2024.
6. *International Workshop on Statistical Analysis of Random Fields in Cosmology.* KEK, Tsukuba, Japan. March 4–6, 2024.
7. *Bridge to Research Seminar, Arizona State University.* August 21, 2023.
8. *Workshop on Stochastic Analysis, Random Fields and Applications.* Michigan State University, East Lansing, MI. August. 15, 2023.
9. *6th International Conference on Econometrics and Statistics.* Waseda University, Kyoto, Japan. August 2, 2023.
10. *5th International Conference on Econometrics and Statistics.* Kyoto, Japan. June 5, 2022.
11. *Biostatistics Seminar, Division of Biostatistics and Bioinformatics, University of California San Diego.* April 20, 2022.
12. *Stochastic Modeling Seminar, School of Mathematical and Statistical Sciences, Arizona State University.* April 8, 2022.
13. *Probability Seminar, Department of Statistics and Actuarial Science, University of Waterloo.* Ontario, Canada. November 17, 2021.
14. *The 2021 ICSA Applied Statistics Symposium.* Houston, Texas. September 12–15, 2021.
15. *Conference on "Set Estimation: a Bridge between Spatial Statistics and Stochastic Geometry".* France. May, 2021.
16. *IMS-China International Conference on Statistics and Probability.* Dalian, China. July 6–10, 2019.
17. *Statistics Seminar, School of Statistics, University of Minnesota.* April 11, 2019.
18. *Statistics Seminar, School of Mathematical Sciences, Xiamen University.* Xiamen, China, March 4, 2019
19. *RTG Seminar, School of Mathematical and Statistical Sciences, Arizona State University.* January 28, 2019.
20. *Statistics Seminar, School of Mathematical and Statistical Sciences, Arizona State University.* October 26, 2018.
21. *Department of Computer Science, Texas Tech University.* March 6, 2018.
22. *Joint Mathematics Meetings.* San Diego, January 10–13, 2018.

23. *Department of Statistics, George Mason University.* November 17, 2017.

24. *IMS-China International Conference on Statistics and Probability.* Nanning, China, June 28–July 2, 2017.

25. *AMS Spring Central Sectional Meeting.* Indiana University, Bloomington, IN, April 1–2, 2017.

26. *The Conference of Texas Statisticians.* Southern Methodist University, Dallas, TX, March 24–25, 2017.

27. *The 10th ICSA International Conference on Global Growth of Modern Statistics in the 21st Century.* Shanghai Jiao Tong University, Shanghai, China, December 20, 2016.

28. *SIAM Mini-Symposium.* Texas Tech University, October 13, 2016.

29. *Image Analysis Seminar.* Texas Tech University, September 12, 2016.

30. *Joint Statistical Meeting.* Chicago, July 30–August 4, 2016.

31. *Department of Mathematics, Wichita State University.* November 20, 2015.

32. *The 9th International Extreme Value Analysis Conference.* University of Michigan at Ann Arbor, June 15–19, 2015.

33. *Department of Mathematics, University of Rome "Tor Vergata".* Italy, March 25, 2015.

34. *AMS Central Spring Sectional Meeting.* Michigan State University, March 14–15, 2015.

35. *Joint Statistical Meeting.* Boston, August 2–7, 2014.

36. *Zhejiang Gongshang University.* May 29, 2014.

37. *SIAM Conference on Image Science.* Hong Kong Baptist University, May 12–14, 2014.

38. *AMS Spring Central Sectional Meeting.* Texas Tech University, April 11–13, 2014.

39. *AMS Special Session on Stochastic Processes and Applications.* University of Akron, October 20–21, 2012.

40. *Small Deviation Probabilities: Theory and Applications (2012 NSF-CBMS Conference).* University of Alabama in Huntsville, June 4–8, 2012.

41. *The 6th Annual Graduate Student Probability Conference.* Georgia Tech, April 27–29, 2012.

42. *The 5th Annual Graduate Student Probability Conference.* Georgia Tech, April 29–May 1, 2011.

STUDENT SUPERVISION (ASU)

PhD Students (Chair/Co-chair)

- *Current:* John Ginos. Arizona State University.
- Haoran Shi, Ruoqian Liu (Graduated in 2025)
- Henrique Cheng (Graduated in 2024).
- Shuang Gu (Graduated in 2023).
- Zhibing He (Graduated in 2022).

PhD Students (Committee Member)

- *Current:* Antonio Campbell, David Tobin, John Stockton, Adam Leighton.
- *Graduated:* Yaliang Zhang (2024), Shuyi Li (2023), Esther Boyle (2023), Wilmer Martinez Rivera (2022), Lauren Crow (2021), Amani Alrumayh (2020), Hazar Khogeer (2020).

Master Students (Chair)

- *Graduated:* Xiaoxi Liu (2025), Zachary Johnson (2023), Haoran Shi (2020).

Master Students (Committee Member)

- *Graduated:* Lin Bao (2020), Huifeng Sun (2020), Lilan Chen (2020), Tianxiang Cao (2020), Shuchen Huang (2020), Jiuyun Hu (2020). Arizona State University.

Master Students (Summer Block Grant Project Mentor)

- Yumeng Cao (2020), Shuyi Li (2019). Arizona State University.

Undergraduate Students (Project Mentor)

- Elizabeth Terry (2024), Adrian Ciotinga (2024), Mia Cavalier (2023), Joel Parker (2019). Arizona State University.

REFEREE EXPERIENCE

Bernoulli; Statistica Sinica; Annals of Applied Statistics; Extremes; Journal of Computational and Graphical Statistics; Annals of Applied Probability; Annals of Probability; Stochastic Processes and Their Applications; Advances in Applied Probability; Electronic Journal of Probability; Electronic communications in Probability; Mathematics of Operations Research; Journal of Theoretical Probability; Modern Stochastics: Theory and Applications; Statistics and Probability Letters; Tests; Latin American Journal of Probability and Mathematical Statistics; Transactions of the American Mathematical Society.