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5218 SAS Hall
North Carolina State University
Raleigh, NC

Jonathan P Williams

PROFESSIONAL POSITIONS

Associate Professor (with tenure), Department of Statistics, NC State University	2025 -
Visiting Fellow, Centre for Adv. Study, Norwegian Academy of Science and Letters	2022 - 2023
Assistant Professor (tenure-track), Department of Statistics, NC State University	2019 - 2025
Research Collaborator, Mayo Clinic, Rochester, MN	2017 - 2020
Biostatistics Intern, Mayo Clinic, Rochester, MN	Summer 2016
Statistical Consultant, Caster Concepts, Inc, Albion, MI	2011 - 2014
Associate Editor, *Journal of the American Statistical Association: Reviews*	2023 -
Associate Editor, *The American Statistician: Reviews*	2023 -

EDUCATION

University of North Carolina, Chapel Hill, NC　　　　　　　　　　　　2014 - 2019
Department of Statistics and Operations Research
PhD Statistics
Advisor: Professor Jan Hannig

New York University, New York, NY　　　　　　　　　　　　　　　　　2012 - 2014
Courant Institute of Mathematical Sciences
MS Mathematics

FUNDING

8. AI-driven science: Valid statistical inference with regularization (2025). NC State College of Sciences Research Initiative Funds, **sole-PI, 3,000 USD**.

7. Statistical foundations for uncertainty quantification of machine intelligence assembled from generalized fiducial inference (2023-2024). NC State Faculty Research and Professional Development Fund, **sole-PI, 7,000 USD**.

6. Seed grant: Hidden Markov methodology for assessing racial stressors (2023-2024). NC State Data Science Academy, **PI, 50,000 USD**.

5. R56: Hidden Markov methodology for machine learning applied to identifying physiological states of shock in the intensive care unit via biomedical and unstructured text data (2021-2023). NIH R56HL155373, **sole-PI, 494,527 USD**.

4. REU site: Directed research for undergraduates in mathematics and statistics (DRUMS) (2024-2027). NSF 2051010, **Faculty Associate, 560,000 USD**.

3. REU site: Directed research for undergraduates in mathematics and statistics (DRUMS) (2024-2025). NSA H98230-20-1-0259 and H98230-21-1-0014, **Faculty Associate, 125,000 USD**.

2. REU site: Directed research for undergraduates in mathematics and statistics (DRUMS) (2021-2024). NSF 2051010, **Faculty Associate, 488,397 USD.**

1. REU site: Directed research for undergraduates in mathematics and statistics (DRUMS) (2021-2022). NSA H98230-20-1-0259 and H98230-21-1-0014, **Faculty Associate, 125,000 USD.**

PEER-REVIEWED PAPERS

† Graduate student working under my supervision
* Undergraduate student working under my supervision

39. D Randahl, **J P Williams**, and H Hegre (202x). Bin-conditional conformal prediction of fatalities from armed conflict. **To appear in Political Analysis**.

38. A Hjort†, G H Hermansen, J Pensar, and **J P Williams** (2025). Uncertainty quantification in automated valuation models with locally weighted conformal prediction. **International Journal of Data Science and Analytics** 1–18.

37. E B Kendall†, **J P Williams**, G H Hermansen, F Bois, and V H Thanh (2025). Beyond time–homogeneity for continuous–time multistate Markov models. **Journal of Computational and Graphical Statistics** 34 (2) 668–682.

36. N Singer†, **J P Williams**, and S Ghosh (2025). Conformal prediction for astronomy data with measurement error. **Monthly Notices of the Royal Astronomical Society** 539 pp.1372–1380.

35. R Martin and **J P Williams** (2025). Asymptotic efficiency of inferential models and a possibilistic Bernstein–von Mises theorem. **International Journal of Approximate Reasoning** 180 pp.e109389.

34. V V Volpe, E B Kendall†, A N Collins, M G Graham, **J P Williams**, and S J Holochwost (2025). Prior exposure to racial discrimination and patterns of acute parasympathetic nervous system responses to a race-related stress task among black adults. **Psychophysiology** 62 (1) pp.e14713.

33. N Dey†, R Martin, and **J P Williams** (2024). Neil Dey, Ryan Martin, and Jonathan P Williams' contribution to the Discussion of "Safe Testing" by Grünwald, de Heide, and Koolen. **Journal of the Royal Statistical Society: Series B** 86 (5) pp.1147–1148.

32. N Dey†, M Singer†, S Sengupta, and **J P Williams** (2024). Word embeddings as statistical estimators. **Sankhyā B** 86 (part 2) pp.415–441.

31. J Hickey†, **J P Williams**, and E C Hector (2024). Transfer learning with uncertainty quantification: Random effect calibration of source to target (RECaST). **Journal of Machine Learning Research** 25 (338) pp.1–40.

30. A Hjort†, **J P Williams**, and J Pensar (2024). Clustered conformal prediction for the housing market. **Proceedings of the Thirteenth Symposium on Conformal and Probabilistic Prediction with Applications, in Proceedings of Machine Learning Research** 230 pp.366–386.

29. **J P Williams** and Y Liu (2024). Decision theory via model-free generalized fiducial inference. **Belief Functions: Theory and Applications** 14909 Springer pp.131–139.

28. R Martin and **J P Williams** (2024). Large-sample theory for inferential models: A possibilistic Bernstein–von Mises theorem. **Belief Functions: Theory and Applications** 14909 Springer pp.111–120.

27. **J P Williams**, G H Hermansen, H Strand, G Clayton, and H M Nygård (2024). Bayesian hidden Markov models for latent variable labeling assignments in conflict research: Application to the role ceasefires play in conflict dynamics. **Annals of Applied Statistics** 18 (3) pp.2034–2061.

26. N Giertych†, A Shaban, P Haravu*, and **J P Williams** (2024). A statistical primer on classical period-finding techniques in astronomy. **Reports on Progress in Physics** 87 (7) 078401 pp.1–18.

25. A Murph†, J Hannig, and **J P Williams** (2024). Introduction to generalized fiducial inference. **Handbook of Bayesian, Fiducial, and Frequentist Inference (1st ed.)** Chapman and Hall/CRC pp.276–299.

24. M A Abba†, **J P Williams**, and B J Reich (2023). A penalized complexity prior for deep Bayesian transfer learning with application to materials informatics. **Annals of Applied Statistics** 17 (4) pp.3241–3256.

23. N Dey[†], J Ding[†], J Ferrell[⋆], C Kapper[⋆], M Lovig[⋆], E Planchon[⋆], and **J P Williams** (2023). Conformal prediction for text infilling and part-of-speech prediction. **New England Journal of Statistics in Data Science** 1 pp.69–83.

22. S Koner[†] and **J P Williams** (2023). The EAS approach to variable selection for multivariate response data in high-dimensional settings. **Electronic Journal of Statistics** 17 (2) pp.1947–1995.

21. **J P Williams**, Y Xie, and J Hannig (2023). The EAS approach for graphical selection consistency in vector autoregression models. **Canadian Journal of Statistics** 51 (2) pp.674–703.

20. **J P Williams**, D M Ommen, and J Hannig (2023). Generalized fiducial factor: An alternative to the Bayes factor for forensic identification of source problems. **Annals of Applied Statistics** 17 (1) pp.378–402.

19. **J P Williams** (2021). Discussion of "A Gibbs sampler for a class of random convex polytopes". **Journal of the American Statistical Association** 116 (535) pp.1198–1200.

18. S Nghiem, **J P Williams**, C Afoakwah, Q Huynh, S K Ng, and J Byrnes (2021). Can administrative health data improve the gold standard? Evidence from a model of the progression of myocardial infarction. **International Journal of Environmental Research and Public Health** 18 (14) pp.7385.

17. **J P Williams**, C B Storlie, T M Therneau, C R Jack Jr, and J Hannig (2020). A Bayesian approach to multi-state hidden Markov models: Application to dementia progression. **Journal of the American Statistical Association** 115 (529) pp.16–31.

16. **J P Williams** and J Hannig (2019). Non-penalized variable selection in high-dimensional linear model settings via generalized fiducial inference. **Annals of Statistics** 47 (3) pp.1723–1753.

15. E Sechi, E Shosha, **J P Williams**, S J Pittock, B G Weinshenker, B M Keegan, N L Zalewski, A S Lopez-Chiriboga, J Jitprapaikulsan, and E P Flanagan (2019). Aquaporin-4 and MOG autoantibody discovery in idiopathic transverse myelitis epidemiology. **Neurology** 93 (4) pp.e414–e420.

14. I Carmichael and **J P Williams** (2018). An exposition of the false confidence theorem. **Stat** 7 (1) pp.e201.

13. **J P Williams** and Y Lu (2015). Covariance Selection in the linear mixed effect model, **Journal of Machine Learning Research: Workshop and Conference Proceedings** 44 pp.277–291. (NIPS conference session)

Manuscripts in review

12. Y Liu and **J P Williams** (202x). An improved solution to the two normal means problem via regularization. **In review**.

11. E Yanchenko, **J P Williams**, and R Martin (202x). Hypothesis testing for community structure in temporal networks using e-values. **In review**.

10. **J P Williams** (202x). Model-free generalized fiducial inference. **R&R Journal of Machine Learning Research**.

9. N Dey[†], R Martin, and **J P Williams** (202x). Anytime–valid generalized universal inference on risk minimizers. **R&R Journal of the Royal Statistical Society: Series B**.

8. N Dey[†], R Martin, and **J P Williams** (202x). Multiple testing in generalized universal inference. **R&R Statistics and Probability Letters**.

7. N Dey[†] and **J P Williams** (202x). Valid inference for machine learning model parameters. **R&R Electronic Journal of Statistics**.

6. J Hickey[†], **J P Williams**, B J Reich, and E C Hector (202x). Multivariate and online transfer learning with uncertainty quantification. **R&R Statistics in Medicine**.

5. M A Abba[†], **J P Williams**, and B J Reich (202x). A Bayesian shrinkage estimator for transfer learning. **In review**.

4. Y Liu, Y Sung, **J P Williams**, and J Hannig (202x). Calibrated Bayesian inference. **In review**.

3. A Murph[†], C B Storlie, P M Wilson, **J P Williams**, and J Hannig (202x). Bayes Watch: Bayesian change–point detection for process monitoring with fault detection. **In review**.

2. A Murph[†], J Hannig, and **J P Williams** (202x). Generalized fiducial inference on differentiable manifolds. **In review**.

1. I Carmichael, T Keefe, N Giertych[†], and **J P Williams** (202x). yaglm: A Python package for fitting and tuning generalized linear models that supports structured, adaptive and non-convex penalties. **In progress, but manuscript available on my website**.

PRESENTATIONS

40. Transfer learning with uncertainty quantification: Random effect calibration of source to target (RECaST). *Joint Statistical Meeting*, Nashville, TN, August 2025.

39. Asymptotic efficiency of inferential models and a possibilistic Bernstein–von Mises theorem. *3rd Workshop on Game-theoretic Statistics and Sequential, Anytime-Valid Inference (SAVI)*, Chennai Mathematical Institute, India, July 2025.

38. Topics in modern HMMs: Time-inhomogeneity and applications to conflict research. *CANSSI CRT Workshop on HMMs*, Department of Statistics, University of British Columbia, February 2025.

37. Imprecision in statistical learning. *Seminar*, Department of Statistics and Data Science, Cornell University, February 2025.

36. Imprecision in decision theory. *IMS International Conference on Statistics and Data Science*, Nice, France, December 2024.

35. Anytime-valid generalized universal inference on risk minimizers. *Conference on Statistical Learning and Data Science*, Newport Beach, CA, November 2024.

34. Large-sample theory for inferential models: A possibilistic Bernstein–von Mises theorem. *8th International Conference, BELIEF*, Belfast, UK, September 2024.

33. Decision theory via model-free generalized fiducial inference. *8th International Conference, BELIEF*, Belfast, UK, September 2024.

32. Model-free generalized fiducial inference for empirical risk minimizers. *Joint Statistical Meeting*, Portland, OR, August 2024.

31. Model-free generalized fiducial inference for empirical risk minimizers. *2024 WNAR/IMS/Graybill Annual Meeting*, Colorado State University, June 2024.

30. A tutorial on conformal prediction and new ideas for model-free statistical inference. *Seminar*, Department of Psychology, University of Maryland, March 2024.

29. Model-free generalized fiducial inference. *Seminar*, Department of Statistics, North Carolina State University, March 2024.

28. Multistate Markov models: Application to dementia progression. *16th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2023)*, HTW Berlin, University of Applied Sciences, Berlin, Germany, December 2023.

27. R package: HMMs for conflict research. *Uncertainty of Forecasting Fatalities in Armed Conflict Research Kitchen*, Peace Research Institute Oslo (PRIO), Oslo, Norway, December 2023.

26. Discussion of "Imprecise probability in statistics: why imprecision is needed, where it comes from, and how it's beneficial". *Seminar*, Department of Statistics, North Carolina State University, October 2023.

25. Discussion of topic-contributed session on astrostatistics. *Joint Statistical Meeting*, Toronto, Canada, August 2023.

24. Model-free generalized fiducial inference. *Eighth Bayesian, Fiducial, and Frequentist Conference*, University of Cincinnati, May 2023.

23. Model-free generalized fiducial inference. *Seminar Series in Statistics and Data Science*. Department of Mathematics, University of Oslo, Norway, December 2022.

22. Introduction to conformal-based uncertainty quantification and applications to automated valuation models. *CAS Workshop: Prediction with Uncertainty*, Oslo, Norway, December 2022.

21. Tutorial on conformal prediction, and a new idea. *Seminar*, Norwegian Computing Center, Oslo, Norway, December 2022.

20. Hidden Markov model applications for conflict data. *CAS Workshop: From Processes to Models*, Oslo, Norway, October 2022.

19. Conformal predictors constructed from generalized fiducial inference. *Joint Statistical Meeting*, Washington, DC, August 2022.

18. The role of Bayesian hidden Markov models in conflict research. *Pre-CAS Workshop on Stability and Change*, Oslo, Norway, May 2022.

17. Research experience at NC State University for undergraduate students. *Seminar*, Department of Mathematics, High Point University, October 2021.

16. Discussion of "A Gibbs sampler for a class of random convex polytopes". *JASA T&M Invited Session, Joint Statistical Meeting*, Seattle, WA, August 2021.

15. Generalized fiducial factor: An alternative to a Bayes factor for forensic identification of source problems. *Joint Statistical Meeting*, Seattle, WA, August 2021.

14. A Bayesian hidden Markov model framework for monitoring and diagnosing critically ill hospital patients. *28th Nordic Conference in Mathematical Statistics*, Tromsø, Norway, June 2021.

13. Generalized fiducial factor: An alternative to a Bayes factor for forensic identification of source problems. *BFF 6.5 – Virtual Workshop on Bayesian, Fiducial, and Frequentist Statistical Inference*, virtual conference hosted on https://researchers.one/, February 2021.

12. The EAS approach for graphical selection consistency in vector autoregression models. *12th International Conference of the European Research Consortium for Informatics and Mathematics Working Group on Computational and Methodological Statistics (CMStatistics)*, University of London, UK, December 2019.

11. The EAS approach for graphical selection consistency in vector autoregression models. *Sixth Bayesian, Fiducial, and Frequentist Conference on Model Uncertainty*, Duke University and SAMSI, May 2019.

10. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *Seminar*, Department of Statistics, University of Florida Gainesville, January 2019.

9. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *Seminar*, Department of Statistics, Iowa State University, January 2019.

8. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *Seminar*, Department of Statistics, University of Illinois Urbana–Champaign, December 2018.

7. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *Seminar*, Department of Statistics, North Carolina State University, December 2018.

6. Non-penalized variable selection via generalized fiducial inference. *Graduate Seminar*, Department of Statistics and Operations Research, UNC Chapel Hill, November 2018.

5. Non-penalized variable selection via generalized fiducial inference. *AISC 2018 International Conference on Advances in Interdisciplinary Statistics and Combinatorics*, UNC Greensboro, October 2018.

4. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *27th Nordic Conference in Mathematical Statistics*, Tartu, Estonia, June 2018.

3. A Bayesian approach to multi-state hidden Markov models: Application to dementia progression. *Graduate Seminar*, Department of Statistics and Operations Research, UNC Chapel Hill, September 2017.

2. Non-penalized variable selection in high-dimensional linear model settings via generalized fiducial inference. *Graduate Seminar*, Department of Statistics and Operations Research, UNC Chapel Hill, February 2017.

1. A Bayesian approach to multi-state hidden Markov models: Application to dementia progression. *Tea Time for Science*, Biomedical Statistics and Informatics, Health Sciences Research, Mayo Clinic, Rochester, MN, August 2016.

POSTER PRESENTATIONS

7. A Bayesian hidden Markov model framework for monitoring and diagnosing critically ill hospital patients. *Seventh Bayesian, Fiducial, and Frequentist Conference*, University of Toronto, Canada, May 2022.

6. A statistical primer on classical methods for exoplanet detection. *Statistical Challenges in Modern Astronomy VII conference*, virtual conference, June 2021.

5. Non-penalized variable selection via generalized fiducial inference. *Recycled Poster Session of the North Carolina Chapter of the American Statistical Association*, SAS Campus, NC, September 2019.

4. Non-penalized variable selection via generalized fiducial inference. *Fifth Bayesian, Fiducial, and Frequentist Conference*, University of Michigan Ann Arbor, May 2018.

3. Generalized fiducial inference for high dimensional problems. *Invited Poster Session, Joint Statistical Meeting*, Baltimore, MD, July 2017.

2. Non-penalized variable selection in high-dimensional linear model settings via generalized fiducial inference. *Fourth Bayesian, Fiducial, and Frequentist Conference*, Harvard University, May 2017.

1. Covariance Selection in the Linear Mixed Effect Model. *Feature Extraction: Modern Questions and Challenges, Neural Information Processing Systems*, Montreal, Canada, December 2015.

AWARDS

- Thank-a-Teacher Award, NCSU   2022
- LeRoy and Elva Martin Award for Teaching Excellence   2021 - 2022
- Best poster award, *Recycled Poster Session of the NC ASA*   September 2019
- Graduate Student Travel Grant – 1,000 USD   Summer 2018
- Carl M. Erikson Mathematics Department Scholarship   2011 - 2012
- Regents Scholarship   2009 - 2012
- National Scholars Program Scholarship   2008 - 2012
- Leader Award Scholarship   2009 - 2011

TEACHING AND ADVISING

Courses taught (†courses designed):

- †Bayesian computations for machine learning (grad; DSA 595 NCSU)   Spring '25
- †Navigating the PhD program and beyond (grad; ST 790 NCSU)   Fall '24, '25
- †Adv. computing for stat. reasoning (undergrad; ST 453 NCSU)   Spring '22, '23, '24, Fall '24
- Intro. to math. stat. I (undergrad; ST 421 NCSU)   Fall '24, '25
- Intro. to prob. and dist. theory (undergrad; ST 371 NCSU)   Fall '20
- Linear models (grad; ST 705 NCSU)   Spring '20, '21, '22, '23, '24, '25
- Fundamentals of statistical inference II (grad; ST 502 NCSU)   Fall '19
- STOR-BIOS grad student boot camp (real analysis section; UNC)   Summer '17
- Intro. to statistics (first year undergrad; STOR 155 UNC)   Spring '16, Fall '16

PhD students advised/co-advised:

8. Ananya Roy (NCSU; expected graduation Spring 2029)
7. Emmett Kendall, PhD, NCSU – Currently tenure-track assistant professor at UT Dallas   2025
6. Naomi Singer, PhD, NCSU   2025
5. Neil Dey, PhD, NCSU – Currently machine learning engineer at Google   2025
4. Jimmy Hickey, PhD, NCSU – Currently at Optum   2024
3. Mohamed Abba, PhD, NCSU – Currently at Amazon   2023
2. Alexander Murph, PhD, UNC Chapel Hill – Currently at Los Alamos National Lab   2023
1. Salil Koner, PhD, NCSU – Currently tenure-track assistant professor at UC Riverside   2021

PhD committees served on:

10. Jisu Oh (NCSU; expected graduation Summer 2027)
9. Shuvrarghya Ghosh (NCSU; expected graduation Summer 2027)
8. Matthew Singer (NCSU; expected graduation Fall 2025)
7. Ian Grace, PhD, NCSU   2025
6. Alvin Sheng, PhD, NCSU   2024
5. Xinyu Zhang, PhD, NCSU   2024
4. Annie Tang, PhD, NCSU   2023
3. Kang Wang, PhD, NCSU   2023
2. Yin-Jen Chen, PhD, NCSU   2022
1. Pei-Shien Wu, PhD, NCSU   2022

Undergraduate students mentored:

10. Aditya Basarkar (NCSU; expected graduation 2026)
9. Madeline Mariano (Rochester Institute of Technology; REU student 2024)
8. Adam Ousherovitch (University of California, Berkley; REU student 2024)
7. Natalia Velez-Rios (Vasser College; REU student 2024)
6. Fiona Romanoschi (University of Texas, Austin; REU student 2024)
5. Jack Ferrell (University of Florida; REU student 2021)
4. Carolina Kapper (High Point University; REU student 2021)
3. Maxwell Lovig (University of Louisiana, Lafayette; REU student 2021)

2. Emiliano Planchon (NCSU; REU student 2021)

1. Pragya Haravu (NCSU 2023)

DEPARTMENT SERVICE

- Data science committee NCSU   2025-2026
- PhD program committee NCSU   2024-2025, 2025-2026
- Admissions committee NCSU   2023-2024
- Search committee NCSU   2022-2023
- Seminar committee NCSU   Spring 2021, Fall 2021
- Qualifying exam committee NCSU   Aug '20, '23, '24, Jan '21, '22

UNIVERSITY SERVICE

- Advisory board (Statistics rep.) for Foundations of Data Science Masters Program   2025-

PROFESSIONAL SERVICE

- Organizer of a topic-contributed session on astrostatistics. *Joint Statistical Meeting*, Toronto, Canada, August 2023.
- Organizer of a contributed session on hidden Markov models. *28th Nordic Conference in Mathematical Statistics*, Tromsø, Norway, June 2021.
- Chair of a contributed session on valid and flexible inference. *Joint Statistical Meeting*, Portland, OR, August 2024.
- Chair of a session on complex inference problems in data science. *12th International Conference of the European Research Consortium for Informatics and Mathematics Working Group on Computational and Methodological Statistics (CMStatistics)*, University of London, UK, December 2019.
- Chair of a session on forensic statistics. *International Chinese Statistical Association Applied Statistics Symposium*, Raleigh, NC, June 2019.
- Reviewer for *National Science Foundation*   1 proposal
- Referee for *Journal of the Royal Statistical Society: Series B*   2 manuscripts
- Referee for *Journal of the American Statistical Association: Theory and Methods*   4 manuscripts
- Referee for *Pattern Recognition*   1 manuscript
- Referee for *Statistical Science*   1 manuscript
- Referee for *Sankhyā A*   1 manuscript
- Referee for *Statistics in Medicine*   1 manuscript
- Referee for *Biometrics*   2 manuscripts
- Referee for *Journal of Computational and Graphical Statistics*   4 manuscripts
- Referee for *International Journal of Approximate Reasoning*   2 manuscripts
- Referee for *Machine Learning*   1 manuscript
- Referee for *Scandinavian Journal of Statistics*   1 manuscript
- Referee for *Journal of Statistical Planning and Inference*   1 manuscript
- Referee for *Statistical Methods in Medical Research*   2 manuscripts
- Referee for *The American Statistician*   1 manuscript
- Referee for *Statistics & Probability Letters*   1 manuscript
- Referee for *Stat*   6 manuscripts

- Referee for *The New England Journal of Statistics in Data Science* 1 manuscript
- Referee for *SCIENCE CHINA Mathematics* 2 manuscripts
- Referee for *CRC Press* 1 manuscript
- Referee for *Communications in Statistics: Theory and Methods* 1 manuscript
- Referee for *British Journal of Mathematical and Statistical Psychology* 1 manuscript
- Referee for *SIAM/ASA Journal on Uncertainty Quantification* 1 manuscript
- Referee for *PLOS ONE* 1 manuscript
- Referee for *Statistical Modelling* 1 manuscript
- Referee for *Negotiation Journal* 1 manuscript
- Referee for *Computers* 1 manuscript
- Referee for *Mathematics* 1 manuscript
- Referee for *Stats* 1 manuscript