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## Jonathan P Williams

### PROFESSIONAL POSITIONS

**Visiting Fellow**, Centre for Advanced Study, Norwegian Academy of Science and Letters 2022 - 2023  
**Assistant Professor (tenure-track)**, Department of Statistics, NC State University 2019 -  
**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

### EDUCATION

**University of North Carolina, Chapel Hill, NC** 2014 - 2019  
Department of Statistics and Operations Research  
PhD Statistics  
Advisors: Dr. Jan Hannig (UNC) and Dr. Curtis Storlie (Mayo Clinic)  
  
**New York University, New York, NY** 2012 - 2014  
Courant Institute of Mathematical Sciences  
MS Mathematics  
Advisor: Dr. Ying Lu  
  
**Eastern Michigan University, Ypsilanti, MI** 2008 - 2012  
Honors College  
BS double major in Economics and Mathematics, minor in Finance  
*Summa Cum Laude*

### FUNDING

1. 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 (2021-2022). NIH R56HL155373, Sole-PI, 494,527 USD.
2. REU Site: Directed Research for Undergraduates in Math and Statistics (DRUMS) (2021-2024). NSF 2051010, NSA H98230-21-1-0014, Faculty Associate, 443,037 USD.

### PEER-REVIEWED PAPERS

<sup>†</sup> Graduate student working under my supervision

\* Undergraduate student working under my supervision

1. N Giertych<sup>†</sup>, **J P Williams**, and P Haravu\* (2022+). A statistical primer on exoplanet detection methods. *In review*.
2. M A Abba<sup>†</sup>, **J P Williams**, and B J Reich (2022+). A penalized complexity prior for deep Bayesian transfer learning with application to materials informatics. *In review*.
3. N Dey<sup>†</sup>, J Ding<sup>†</sup>, J Ferrell\*, C Kapper\*, M Lovig\*, E Planchon\*, and **J P Williams** (2021+). Conformal prediction for text infilling and part-of-speech prediction. *To appear in New England Journal of Statistics in Data Science*.

4. I Carmichael, T Keefe, N Giertych<sup>†</sup>, and **J P Williams** (2021+). `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*.
5. **J P Williams**, G H Hermansen, H M Nygård, G Clayton, S A Rustad, and H Strand (2021+). Do Ceasefires Work? A Bayesian autoregressive hidden Markov model to explore how ceasefires shape the dynamics of violence in civil war. *In review*.
6. S Koner<sup>†</sup> and **J P Williams** (2021+). The EAS approach to variable selection for multivariate response data in high-dimensional settings. *In review*.
7. **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.
8. A Murph<sup>†</sup>, J Hannig, and **J P Williams** (2020+). Introduction to Generalized Fiducial Inference. *To appear in CRC Press BFF Handbook*.
9. **J P Williams**, D M Ommen, and J Hannig (2020+). Generalized fiducial factor: an alternative to the Bayes factor for forensic identification of source problems. *To appear in Annals of Applied Statistics*.
10. 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.
11. **J P Williams**, Y Xie, and J Hannig (2019+). The EAS approach for graphical selection consistency in vector autoregression models. *To appear in Canadian Journal of Statistics*.
12. **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.
13. **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.
14. E Sechi, E Shosha, **J P Williams**, S J Pittock, B G Weinshenker, B M Keegan, N L Zalewski, A S Lopez-Chiriboga, J Jitrapaikulsan, and E P Flanagan (2019). Aquaporin-4 and MOG autoantibody discovery in idiopathic transverse myelitis epidemiology. *Neurology* 93 (4), pp.e414–e420.
15. I Carmichael and **J P Williams** (2018). An exposition of the false confidence theorem. *Stat* 7 (1), pp.e201.
16. **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)

## PRESENTATIONS

1. Conformal predictors constructed from generalized fiducial inference. *Joint Statistical Meeting*, Washington, DC, August 2022.
2. The role of Bayesian hidden Markov models in conflict research. *Pre-CAS Workshop on Stability and Change*, Oslo, Norway, May 2022.
3. Research experience at NC State University for undergraduate students. *Seminar*, Department of Mathematics, High Point University, October 2021.
4. Discussion of “A Gibbs sampler for a class of random convex polytopes”. *JASA T&M Invited Session, Joint Statistical Meeting*, Seattle, WA, August 2021.
5. Generalized fiducial factor: an alternative to a Bayes factor for forensic identification of source problems. *Joint Statistical Meeting*, Seattle, WA, August 2021.
6. A Bayesian hidden Markov model framework for monitoring and diagnosing critically ill hospital patients. *28th Nordic Conference in Mathematical Statistics*, Tromsø, Norway, June 2021.

7. 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.
8. 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 2019)*, University of London, UK, December 2019.
9. 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.
11. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *Seminar*, Department of Statistics, Iowa State University, January 2019.
12. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *Seminar*, Department of Statistics, University of Illinois Urbana–Champaign, December 2018.
13. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *Seminar*, Department of Statistics, North Carolina State University, December 2018.
14. Non-penalized variable selection via generalized fiducial inference. *Graduate Seminar*, Department of Statistics and Operations Research, UNC Chapel Hill, November 2018.
15. Non-penalized variable selection via generalized fiducial inference. *AISC 2018 International Conference on Advances in Interdisciplinary Statistics and Combinatorics*, UNC Greensboro, October 2018.
16. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *27th Nordic Conference in Mathematical Statistics*, Tartu, Estonia, June 2018.
17. 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.
18. 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.
19. 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

1. 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.
2. A statistical primer on classical methods for exoplanet detection. *Statistical Challenges in Modern Astronomy VII conference*, virtual conference, June 2021.
3. 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.
5. Generalized fiducial inference for high dimensional problems. *Invited Poster Session, Joint Statistical Meeting*, Baltimore, MD, July 2017.

6. Non-penalized variable selection in high-dimensional linear model settings via generalized fiducial inference. *Fourth Bayesian, Fiducial, and Frequentist Conference*, Harvard University, May 2017.
7. Covariance Selection in the Linear Mixed Effect Model. *Feature Extraction: Modern Questions and Challenges, NIPS*, 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

## PROFESSIONAL ACTIVITIES

- Session Chair; Statistics for 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 2019)*, University of London, UK, December 2019.
- Session Chair; Statistical Controversies in Forensic Evidence Interpretation. *International Chinese Statistical Association Conference*, Raleigh, NC, June 2019.
- Referee for *The New England Journal of Statistics in Data Science* 1 time
- Referee for *SCIENCE CHINA Mathematics* 1 time
- Referee for *Statistics in Medicine* 1 time
- Referee for *Mathematics* 1 time
- Referee for *Statistical Methods in Medical Research* 2 times
- Referee for *Journal of the American Statistical Association – Theory and Methods* 2 times
- Referee for *Biometrics* 2 times
- Referee for *Communications in Statistics – Theory and Methods* 1 time
- Referee for *Journal of Computational and Graphical Statistics* 2 times
- Referee for *Computers* 1 time
- Referee for *PLOS ONE* 1 time
- Referee for *Stat* 6 times
- Referee for *Journal of Statistical Planning and Inference* 1 time
- Referee for *Statistical Modelling* 1 time
- Referee for *Negotiation Journal* 1 time
- Referee for *CRC Press* 1 time
- Referee for *Stats* 1 time

## TEACHING AND ADVISING

### Courses taught:

- Advanced computing for statistical methods (undergraduate; ST 495 NCSU) Spring '22
- Introduction to probability and distribution theory (undergraduate; ST 371 NCSU) Fall '20
- Linear models (graduate; ST 705 NCSU) Spring '20, '21, '22
- Fundamentals of statistical inference II (graduate; ST 502 NCSU) Fall '19
- STOR-BIOS grad student boot camp (real analysis section; UNC) Summer '17
- Introduction to statistics (first year undergraduate; STOR 155 UNC) Spring '16, Fall '16
- Tutor (economics and mathematics undergraduate; EMU) '09 - '12

### PhD students advised/co-advised:

1. Neil Dey (NCSU; expected graduation Summer 2025)
2. Emmett Kendall (NCSU; expected graduation Summer 2025)
3. Mohamed Abba (NCSU; expected graduation Summer 2023)
4. Naomi Giertych (NCSU; expected graduation Summer 2024)
5. Jimmy Hickey (NCSU; expected graduation Summer 2024)
6. Alexander Murph (UNC; expected graduation Summer 2023)
7. Salil Koner, PhD, NCSU 2021

### PhD committees served on:

1. Matthew Singer (NCSU; expected graduation Summer 2024)
2. Xinyu Zhang (NCSU; expected graduation Summer 2023)
3. Annie Tang (NCSU; expected graduation Summer 2022)
4. Kang Wang (NCSU; expected graduation Summer 2023)
5. Ian Grace (NCSU; expected graduation NA)
6. Alvin Sheng (NCSU; expected Spring 2024)
7. Yin-Jen Chen, PhD, NCSU 2022
8. Pei-Shien Wu, PhD, NCSU 2022

### Undergraduate students mentored:

1. Jack Ferrell (University of Florida; REU student 2021)
2. Carolina Kapper (High Point University; REU student 2021)
3. Maxwell Lovig (University of Louisiana, Lafayette; REU student 2021)
4. Emiliano Planchon (NCSU; REU student 2021)
5. Pragma Haravu (NCSU; expected graduation 2023)

## DEPARTMENT SERVICE

- Qualifying exam committee NCSU January 2022
- Seminar committee NCSU Fall 2021
- Seminar committee NCSU Spring 2021
- Qualifying exam committee NCSU January 2021
- Qualifying exam committee NCSU August 2020

## **COMPUTING SKILLS**

R, Python, Julia, Linux, HPC environments