Joshua Agterberg

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ACADEMIC EMPLOYMENT

2023-Present **University of Pennsylvania**
Postdoctoral Researcher
Innovation for Data Engineering and Sciences (IDEAS) Initiative
Department of Electrical and Systems Engineering
Department of Statistics and Data Science
Advised by Professors René Vidal and Yuxin Chen

EDUCATION

2017-2023 **Johns Hopkins University**
2019-2023 PhD in Applied Mathematics and Statistics
Dissertation Title: *Asymptotics and Statistical Inference in High-Dimensional Low-Rank Matrix Models*
2017-2019 Master of Science in Engineering in Applied Mathematics and Statistics
Advised by Professor Carey Priebe

2013-2017 **University of Wisconsin-Madison**
Bachelor of Business Administration, Majors in Actuarial Science and Mathematics
Advised by Professor Marjorie Rosenberg
GPA: 3.73/4.0, Actuarial Science Major GPA: 4.0/4.0
Graduated with Distinction

RESEARCH INTERESTS

- Statistical Network Analysis
- High-dimensional Statistics
- Spectral Methods
- Mathematical Data Science
- Nonparametric Statistics

PUBLICATIONS

1. "Spectral Graph Clustering via the Expectation-Solution Algorithm,"
Zachary Pisano, **Joshua Agterberg**, Carey Priebe, and Daniel Naiman,
Electronic Journal of Statistics, 2022.

2. "Entrywise Recovery Guarantees for Sparse PCA via Sparsistent Algorithms,"
   Joshua Agterberg and Jeremias Sulam,
   AISTATS, 2022.

3. "Entrywise Estimation of Singular Vectors of Low-Rank Matrices with Heteroskedasticity and Dependence,"
   Joshua Agterberg, Zachary Lubberts, and Carey Priebe,
   IEEE Transactions on Information Theory, 2022.

4. "Valid Two-Sample Graph Testing via Optimal Transport Procrustes and Multiscale Graph Correlation: Applications in Connectomics,"
   Jaewon Chung, Bijan Varjavand, Jesús Arroyo, Anton Alyakin, **Joshua Agterberg**, Minh Tang, Joshua Vogelstein, and Carey Priebe,
   Stat, 2021.

5. "Vertex Nomination, Consistent Estimation, and Adversarial Modification,"
   Joshua Agterberg, Youngser Park, Jonathan Larson, Chris White, Carey Priebe, and Vince Lyzinski,
   Electronic Journal of Statistics, 2020.

6. "Social Determinant-Based Profiles of US Adults with the Highest and Lowest Health Expenditures Using Clusters,"
   Fanghao Zhong, Margie Rosenberg, **Joshua Agterberg**, and Richard Crabb,
   North American Actuarial Journal, 2020.

7. "Cluster Analysis Application to Identify Groups of Individuals with High Health Expenditures,"
   Joshua Agterberg, Fanghao Zhong, Richard Crabb, and Margie Rosenberg,
   Health Services and Outcomes Research Methodology, 2020.

PREPRINTS

1. "An Overview of Asymptotic Normality in Stochastic Blockmodels: Cluster Analysis and Inference,"
   Joshua Agterberg and Joshua Cape,
   Preprint Available Upon Request.

2. "Joint Spectral Clustering in Multilayer Degree-Corrected Stochastic Blockmodels,"
   Joshua Agterberg, Zachary Lubberts, and Jesús Arroyo,
   Submitted, 2023.

3. "Estimating Higher Order Mixed Memberships via the $\ell_{2,\infty}$ Tensor Perturbation Bound,"
   Joshua Agterberg and Anru Zhang,
   Submitted, 2023.

4. "Nonparametric Two-Sample Hypothesis Testing for Random Graphs with Negative and Repeated Eigenvalues,"
   Joshua Agterberg, Minh Tang, and Carey Priebe,
   Submitted, 2020.
   (Won best presentation award in Nonparametric Statistics Student Competition, JSM 2021)
   (Selected as a finalist for the Nonparametric Statistics Student Competition, JSM 2021.)

5. "Correcting a Nonparametric Two-sample Graph Hypothesis Test for Graphs with Different Numbers of Vertices,"

Anton Alyakin, **Joshua Agterberg**, Hayden Helm, and Carey Priebe,
Submitted, 2020.

6. "On Two Distinct Sources of Nonidentifiability in Latent Position Random Graph Models,"
Joshua Agterberg, Minh Tang, and Carey Priebe,
Submitted, 2020.

HONORS AND AWARDS

Johns Hopkins University

Summer 2022	Acheson J. Duncan Fund for the Advancement of Research in Statistics Travel Award (awarded twice)
Spring 2022	MINDS (Mathematical Institute of Data Science) Fellowship
Summer 2021	Best Presentation Award, JSM Student Competition in Nonparametric Statistics
Spring 2021	IMS (Institute of Mathematical Statistics) Hannan Graduate Student Travel Award
Spring 2021	MINDS (Mathematical Institute of Data Science) Fellowship
Spring 2021	Finalist for JSM Student Competition in Nonparametric Statistics
2021-2023	Applied Mathematics and Statistics Teaching Fellow
2020-2021	Applied Mathematics and Statistics Apprentice Teaching Fellow
2019-2023	Charles and Catherine Counselman Fellowship
Spring 2020	MINDS (Mathematical Institute of Data Science) Fellowship

University of Wisconsin-Madison

Spring 2017	Graduated with distinction
Spring 2017	DW Simpson Scholarship
Fall 2016	Bicknell Scholarship
2013-2014	Arthur C. Nielsen Scholarship
2013	Directly Admitted to Wisconsin School of Business
2014-2017	Dean's list (>3.8 Semester GPA – achieved five separate times)

TALKS

2/9/2023	"Estimating Higher-Order Memberships via the $\ell_{2,\infty}$ Tensor Perturbation Bound," *Statistics Department Seminar*, University of Illinois-Urbana Champaign (Invited Talk)
2/1/2023	"Estimating Higher-Order Memberships via the $\ell_{2,\infty}$ Tensor Perturbation Bound," *Statistics Department Seminar*, University of California-Riverside (Invited Talk)
1/24/2023	"Estimating Higher-Order Memberships via the $\ell_{2,\infty}$ Tensor Perturbation Bound," *Statistics Department Seminar*, University of Virginia (Invited Talk)
1/19/2023	"Estimating Higher-Order Memberships via the $\ell_{2,\infty}$ Tensor Perturbation Bound," *Applied Mathematics and Statistics Department Seminar*, JHU
1/10/2023	"Estimating Higher-Order Memberships via the $\ell_{2,\infty}$ Tensor Perturbation Bound," *Statistics Department Seminar*, University of South Carolina (Invited Talk)
12/22/2022	"Estimating Higher-Order Memberships via the $\ell_{2,\infty}$ Tensor Perturbation Bound," *Statistics and Actuarial Science Department Seminar*, University of Waterloo (Invited Talk)

12/19/2022 "Joint Spectral Clustering in Multilayer Degree-Corrected Stochastic Blockmodels," *Center for Imaging Science Retreat*, JHU

10/4/2022 "Community Detection in Multilayer Degree-Corrected Stochastic Blockmodels," *Applied Mathematics and Statistics Student Seminar*, JHU

8/23/2022 "Community Detection in Multilayer Degree-Corrected Stochastic Blockmodels," *COMPSTAT*, Bologna, Italy (Invited Talk)

8/11/2022 "Entrywise Estimation of Singular Vectors of Low-Rank Matrices with Heteroskedasticity and Dependence," *Joint Statistical Meetings*, Washington, D.C. (Contributed Talk)

7/11/2022 "Community Detection in Multilayer Degree-Corrected Stochastic Blockmodels," *Statistical Inference for Network Models (NETSCI Satellite)*, Virtual (Contributed Talk)

4/19/2022 "Entrywise Recovery Guarantees for Sparse PCA via Sparsistent Algorithms," *Applied Mathematics and Statistics Student Seminar*, JHU

3/30/2022 "Entrywise Recovery Guarantees for Sparse PCA via Sparsistent Algorithms," *AISTATS, 2022*, ~~Valencia, Spain~~Virtual

1/20/2022 "Entrywise Estimation of Singular Vectors of Low-Rank Matrices with Heteroskedasticity and Dependence," *2022 TRIPODS Winter School on Interplay between Artificial Intelligence and Dynamical Systems*, JHU (Invited Talk)

12/6/2021 "From RDPGs to General Signal Plus Noise Models," *Guest Lecture for 553.742 Statistical Inference on Graphs*, JHU

12/6/2021 "Entrywise Estimation of Singular Vectors of Low-Rank Matrices with Heteroskedasticity and Dependence," *Venkataraman Lab*, JHU (Invited Talk)

9/21/2021 "Entrywise Estimation of Singular Vectors of Low-Rank Matrices with Heteroskedasticity and Dependence," *Applied Mathematics and Statistics Student Seminar*, JHU

8/10/2021 "Nonparametric Two-Sample Hypothesis Testing for Random Graphs with Negative and Repeated Eigenvalues," *Joint Statistical Meetings*, ~~Seattle, WA~~Virtual (Topic-Contributed Talk)
(**Received Best Presentation Award in the Nonparametric Statistics Student Competition**)

2/2/2021 "Nonparametric Two-Sample Hypothesis Testing for Random Graphs with Negative and Repeated Eigenvalues," *Applied Mathematics and Statistics Student Seminar*, JHU

8/6/2020 "Consistent Nonparametric Hypothesis Testing for Low Rank Random Graphs with Negative and Repeated Eigenvalues," *Joint Statistical Meetings*, ~~Philadelphia, PA~~Virtual (Contributed Talk)

4/7/2020 "Nonidentifiability and nonparametric random graph hypothesis testing," *MINDS Seminar*, JHU

1/28/2020 "On Two Distinct Sources of Nonidentifiability in Latent Position Random Graph Models," *Applied Mathematics and Statistics Student Seminar*, JHU

4/23/2019 "Vertex Nomination, Consistent Estimation, Adversarial Modification," *Applied Mathematics and Statistics Student Seminar*, JHU

TEACHING

Johns Hopkins University

Fall 2022	**Instructor**, 500.111: Statistics and Data Science with Networks Undergraduate course for first and second-year engineering students on basics of data science and network analysis
Winter 2021	**Instructor**, 553.283 Introduction to R Undergraduate introduction to statistical computing with R
Fall 2021	**Instructor**, 500.111: Statistics and Data Science with Networks Undergraduate course for first and second-year engineering students on basics of data science and network analysis
Summer 2021	**Instructor**, Master's Program Statistics Review Review sessions on mathematical statistics for Master's students
Winter 2021	**Instructor**, 553.283 Introduction to R Undergraduate introduction to statistical computing with R
Summer 2020	**Instructor**, Master's Program Statistics Review Review sessions on mathematical statistics for Master's students
Summer 2020	**Teaching Assistant**, 553.310 Probability and Statistics for Vittorio Loprinzo Undergraduate introduction to statistics
Summer 2019	**Instructor**, Master's Program Statistics Review Review sessions on mathematical statistics for Master's students
Summer 2019	**Teaching Assistant**, 553.310 Probability and Statistics for Vittorio Loprinzo Undergraduate introduction to statistics
Spring 2019	**Teaching Assistant**, 553.762 Nonlinear Optimization II for Professor Daniel Robinson Graduate-level course on constrained optimization
Fall 2018	**Teaching Assistant**, 553.730 Statistical Theory for Professor Carey Priebe Graduate-level course on statistical theory
Summer 2018	**Instructor**, Master's Program Statistics Review Review sessions on mathematical statistics for Master's students

University of Wisconsin-Madison (Wisconsin School of Business, Risk and Insurance)

Spring 2017	**Grader**, ActSci 655 Health Analytics for Professor Margie Rosenberg Upper-level undergraduate course on statisical analysis for health insurance
Fall 2016	**Grader**, ActSci 651 Life Contingencies II for Professor Paul Johnson Upper-level undergraduate course on actuarial mathematics for life insurance
Spring 2016	**Grader**, ActSci 650 Life Contingencies I for Professor Margie Rosenberg Upper-level undergraduate course on actuarial mathematics for life insurance

University of Wisconsin-Madison (School of Music)

Spring 2015-Spring 2017 Private Piano Instructor

PROFESSIONAL ACTIVITIES

Reviewer	IEEE Transactions on Signal Processing (1), AISTATS (2), Statistics and its Interface (1), IEEE Transactions on Pattern Analysis and Machine Intelligence (1), Statistics in Medicine (1), Journal of Statistical Planning and Inference (1), Journal of Multivariate Analysis (1)
Member	ASA, IMS
Chair	2022 Joint Statistical Meetings session on Network Data Analysis
Organizer	Summer 2020 and Summer 2021 reading group on eigenvectors and random graph inference, Fall 2021 reading group on deep and graph learning, 2020-2021 Johns Hopkins Applied Mathematics and Statistics student seminar
Attendee	2022 International Centre for Mathematical Sciences (ICMS) Workshop on Structural Breaks and Shape Constraints, 2019 Joint Statistical Meetings
Committee Member	Fall 2019 and Fall 2020 Graduate student committee to meet with potential JHU AMS faculty

ADDITIONAL EXPERIENCE

2018 - 2023 **Research Assistant**, Johns Hopkins University, Baltimore, MD

Research assistant to Professor Carey Priebe in the Applied Mathematics and Statistics Department.

Summer 2017 **Analytics Intern**, CNA Financial, Chicago, IL

Analyzed loss data for products and professional liability for medical devices using new FDA data and GLMs.

Summer 2016 **Actuarial Intern**, CNA Financial, Chicago, IL

Developed a model for predicting the probability of payment for insurance.

Summer 2015 **Actuarial Intern**, CUNA Mutual Group, Madison, WI

Created spreadsheets to replicate GAAP and Statutory reserves results from PolySystems for equity-indexed annuity policies and analyzed mortality experience data for the purposes of creating a new mortality table.

TECHNICAL QUALIFICATIONS

Proficient in R, Java, Python, Linux, Git, C++ (Rcpp), Matlab, LaTeX, Microsoft Excel, and VBA
Passed three actuarial exams (P, FM, and MFE)

HOBBIES

Biking, jazz piano, reading fantasy, and hiking