

# Joshua Agterberg

June 2022

[jagterberg.github.io](https://jagterberg.github.io)

[jagterberg@jhu.edu](mailto:jagterberg@jhu.edu)

## EDUCATION

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### 2017-Present    **Johns Hopkins University**

2019-2023    PhD in Applied Mathematics and Statistics

**Dissertation Title:** *Asymptotic Theory 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

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

## PUBLICATIONS

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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 Lubbets, 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

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1. *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.)
2. *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.
3. *On Two Distinct Sources of Nonidentifiability in Latent Position Random Graph Models*  
**Joshua Agterberg**, Minh Tang, and Carey Priebe,  
Submitted, 2020.

## TALKS

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| 8/23/2022 | “Community Detection in Multilayer Degree-Corrected Stochastic Blockmodels,” <i>COMPSTAT</i> , Bologna, Italy  |
| 8/11/2022 | “Entrywise Estimation of Singular Vectors of Low-Rank Matrices with Heteroskedasticity and Dependence,” <i>Joint Statistical Meetings</i> , Washington, D.C. |
| 7/11/2022 | “Community Detection in Multilayer Degree-Corrected Stochastic Blockmodels,” <i>Statistical Inference for Network Models (NETSCI Satellite)</i> , Virtual    |
| 4/19/2022 | “Entrywise Recovery Guarantees for Sparse PCA via Sparsistent Algorithms,” <i>Applied Mathematics and Statistics Student Seminar</i> , 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
- 12/6/2021 “From RDPGs to General Signal Plus Noise Models,” *Guest Lecture for 553.742 Statistical Inference on Graphs*, JHU
- 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  
**(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
- 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

## HONORS AND AWARDS

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### *Johns Hopkins University*

Summer 2022	Acheson J. Duncan Fund for the Advancement of Research in Statistics Travel Award
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-Present	Applied Mathematics and Statistics Teaching Fellow
2020-2021	Applied Mathematics and Statistics Apprentice Teaching Fellow
2019-Present	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)

## TEACHING

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### *Johns Hopkins University*

Fall 2022	Instructor for 500.111: Statistics and Data Science with Networks
Winter 2021	Instructor for 553.283 Introduction to R
Fall 2021	Instructor for 500.111: Statistics and Data Science with Networks
Summer 2021	Instructor for Master's Program Statistics Review
Winter 2021	Instructor for 553.283 Introduction to R
Summer 2020	Instructor for Master's Program Statistics Review
Summer 2020	Teaching Assistant for 553.310 Probability and Statistics for Vittorio Loprinzo
Fall 2019	Co-created a topics course in probability with another graduate student
Summer 2019	Instructor for Master's Program Statistics Review
Summer 2019	Teaching Assistant for 553.310 Probability and Statistics for Vittorio Loprinzo
Spring 2019	Teaching Assistant for 553.762 Nonlinear Optimization II for Professor Daniel Robinson
Fall 2018	Teaching Assistant for 553.730 Statistical Theory for Professor Carey Priebe
Summer 2018	Instructor for Financial Mathematics Master's Program Statistics Review

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

Spring 2017	Grader for ActSci 655 Health Analytics for Professor Margie Rosenberg
Fall 2016	Grader for ActSci 651 Life Contingencies II for Professor Paul Johnson
Spring 2016	Grader for ActSci 650 Life Contingencies I for Professor Margie Rosenberg

### *University of Wisconsin-Madison (School of Music)*

Spring 2015-Spring 2017	Private Piano Instructor
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## PROFESSIONAL ACTIVITIES

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

## EXPERIENCE

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2018 - Present	<b>Research Assistant</b> , Johns Hopkins University, Baltimore, MD  Research assistant to Professor Carey Priebe in the Applied Mathematics and Statistics Department.
Summer 2017	<b>Analytics Intern</b> , CNA Financial, Chicago, IL  Analyzed loss data for products and professional liability for medical devices using new FDA data and GLMs.
Summer 2016	<b>Actuarial Intern</b> , CNA Financial, Chicago, IL  Developed a model for predicting the probability of payment for insurance.
Summer 2015	<b>Actuarial Intern</b> , 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

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### Skills

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

### Quantitative Coursework

*Johns Hopkins University*

Probability Theory I and II, Statistical Theory I and II, Nonlinear Optimization I and II, Combinatorial Optimization, Matrix Analysis, Topics in Statistical Pattern Recognition, Statistical Inference

on Random Graphs, Riemannian Geometry I and II, Complex Variables, Functional Analysis, Topics in Probability (co-organized), Sparse Representations in Computer Vision and Machine Learning, Harmonic Analysis, Partial Differential Equations, Stochastic Calculus with Applications

*University of Wisconsin-Madison*

Real Analysis I and II, Measure Theory, Actuarial Mathematics, Loss Models I and II, Linear Programming, Numerical Analysis, Stochastic Processes, Stochastic Calculus, Linear Regression, Theory of Probability

## **HOBBIES**

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Playing jazz piano, playing with synthesizers, reading fantasy, hiking, and biking