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# Yunyi Shen

## Education

2022 – **Massachusetts Institute of Technology**, Cambridge, MA, United States
**PhD, Computer Science** (minor in Astronomy)

2022 – 2024 **Massachusetts Institute of Technology**, Cambridge, MA, United States
**SM, Computer Science**

2019 – 2021 **University of Wisconsin-Madison**, Madison, WI, United States
**MSc, Statistics**

2018 – 2021 **University of Wisconsin-Madison**, Madison, WI, United States
**MSc, Wildlife Ecology**

2014 – 2018 **Peking University**, Beijing, China
**BSc, Integrated Science (Biology/Physics)**

## Publications and Preprints

* indicating corresponding author, " indicating equal-contribution

### Preprints/Under review

**Yunyi Shen"** , Renato Berlinghieri", and Tamara Broderick. Multi-marginal Schrödinger bridges with iterative reference refinement. *arXiv preprint arXiv:2408.06277*, 2024

J Arturo Esquivel", **Yunyi Shen"** , Vianey Leos-Barajas, Gwendolyn Eadie, Joshua Speagle, Radu V Craiu, Amber Medina, and James Davenport. Detecting stellar flares in photometric data using hidden Markov models. *arXiv preprint arXiv:2404.13145*, 2024. (*under review*)

**Yunyi Shen**, Lorenzo Masoero, Joshua G Schraiber, and Tamara Broderick. Double trouble: Predicting new variant counts across two heterogeneous populations. *arXiv preprint arXiv:2403.02154*, 2024. (*under review*)

David R Burt, **Yunyi Shen**, and Tamara Broderick. Consistent validation for predictive methods in spatial settings. *arXiv preprint arXiv:2402.03527*, 2024

**Yunyi Shen*** , Erik R. Olson, and Timothy R. Van Deelen. Geometric theory on large-scale and local determination of density dependence of a recovering large carnivore population. *arXiv preprint arXiv:2311.14815*, 2023. (*under review*)

Hongliang Bu and **Yunyi Shen*** . Identify local limiting factors of species distribution using min-linear logistic regression. *arXiv preprint arXiv:2302.09217*, 2023

**Yunyi Shen** and Sameer K. Deshpande. On the posterior contraction of the multivariate spike-and-slab LASSO. *arXiv preprint arXiv:2209.04389*, 2022. (*under review*)

**Yunyi Shen** and Claudia Solís-Lemus. Bayesian chain graph LASSO models to learn sparse microbial networks with predictors. *arXiv preprint arXiv:2012.08397*, 2020.

## Peer reviewed

### Journals & Conferences

Erik Olson, **Yunyi Shen**, Parker Matzinger, Guido Solano Mora, Evelynand Saborío-R, and Alejandro Azofeifa. Conservation crisis? status of jaguars panthera onca in corcovado national park, costa rica. *Oryx*, 2024 (accepted)

**Yunyi Shen**, Claudia Solís-Lemus, and Sameer K Deshpande. Estimating sparse direct effects in multivariate regression with the spike-and-slab lasso. *Bayesian Analysis*, 1(1):1–25, 2024

**Yunyi Shen** and Claudia Solís-Lemus. The effect of the prior and the experimental design on the inference of the precision matrix in gaussian chain graph models. *Journal of Agricultural, Biological and Environmental Statistics*, pages 1–70, 2024

Xiaonan Chen, Jia Tian, Mingzhang Liu, **Yunyi Shen**, Jianping Yu, Feng Liu, Xiaoli Shen, and Li Sheng. Estimating the population size of wild boar (*Sus scrofa*) in Kaihua county, Zhejiang province using camera trap data. *Acta Theriologica Sinica, 43(5): 523-532*, 2023. (in Chinese)

Elyse C. Mallinger, Katy R. Goodwin, Alan Kirschbaum, **Yunyi Shen**, Erin H. Gillam, and Erik R. Olson. Species-specific responses to white-nose syndrome in the Great Lakes region. *Ecology and Evolution*, 13:e10267, 2023

**Yunyi Shen**, Mingzhang Liu, Dajun Wang, Xiaoli Shen, and Sheng Li. Using an integrative mapping approach to identify the distribution range and conservation needs of a large threatened mammal, the Asiatic black bear, in China. *Global Ecology and Conservation*, 31:e01831, 2021

**Yunyi Shen*** , Erik R Olson, and Timothy R Van Deelen. Spatially explicit modeling of community occupancy using Markov random field models with imperfect observation: Mesocarnivores in Apostle Islands National Lakeshore. *Ecological Modelling*, 459:109712, 2021

Jianping Yu, **Yunyi Shen**, Xiaoyou Song, Xiaonan Chen, Sheng Li, and Xiaoli Shen. Evaluating the effectiveness of functional zones for black muntjac (*Muntiacus crinifrons*) protection in Qianjiangyuan National Park pilot site. *Biodiversity Science*, 27(1):5, 2019. (in Chinese)

### Workshops

**Yunyi Shen"** , Renato Berlinghieri", and Tamara Broderick. Learning a vector field from snapshots of unidentified particles rather than particle trajectories. *AI4DiffEqtnsInSci workshop at ICLR*, 2024

**Yunyi Shen**, Lorenzo Masoero, Joshua Schraiber, and Tamara Broderick. Double trouble: Predicting new variant counts across two heterogeneous populations. *Learning Meaningful Representation of Life (LMLR) workshop at NeurIPS*, 2022

## Awards and Honor

2020 Finalist of Janice Lee Fenske Memorial Award of The Wildlife Society (TWS)

2019 Conservation Leader for Tomorrow (CLfT) Scholarship

2017 Peking University Annual Award in Social Works

### Travel awards

2024 TWS-BWG travel award

2023 BayesComp-2023 travel award

2023 ISBA travel award for BNP2023

## Grants Funded

### Co-PI

2024 NPS PMIS 322581,U.S. National Park Services (pending final approval), PI: Timothy Van Deelen (UW-Madison)

### Co-Investigator

2020-2022 Hatch 142 Formula Fund 1023699, U.S. Department of Agriculture, PI: Claudia Solís-Lemus (UW-Madison)

## Invited Talks

08/2022 "Conditional probabilities in some multispecies models", Merging statistical theory and analyses at the interface of microbial and "macrobial" ecology workshop. (NSF-funded) Concordia University, Montréal, Canada.

05/2022 "Stellar flare detection using HMM combined with Gaussian process", Stellar Stats Workshop, David A. Dunlap Department of Astronomy and Astrophysics, University of Toronto, Toronto, Canada.

05/2022 "Use cases of high throughput computing in statistical ecology and astronomy", HTCondor week, Center of high throughput computing, UW-Madison, Madison, WI

03/2022 "HMMs in Astronomy", JSC 270/370 Seminar, Department of Statistical Science, University of Toronto, Toronto, Canada.

## Selected Conference Talks

**Yunyi Shen**, Lorenzo Masoero, Joshua Schraiber, and Tamara Broderick. Double trouble: Predicting new variant counts across two heterogeneous populations. Joint Statistical Meeting 2023, Toronto, Canada (given by coauthor due to visa difficulty); BAYSM:O-2023, CT, USA, 2023

**Yunyi Shen**, Fan Fan, Sheng Li, and Claudia Solís-Lemus. Direct (conditional) and net (marginal) effects of environmental predictors in multivariate normal and autologistic models for multispecies modeling. 2022 International Statistical Ecology Conference, Cape Town, South Aferica, 2022

**Yunyi Shen**, Dwayne Etter, and Timothy Van Deelen. Age structure effects and population control in urban/suburban white-tailed deer, Chicago, IL 1992-2006. 2020 Midwest Fish and Wildlife Conference, 2020

## Software

R packages `mSSL`: Collection of multivariate Spike-and-Slab regression models, GitHub

`CARlasso`: Conditional autoregressive LASSO and extensions, CRAN

`linconGaussR`: Sampling multivariate Gaussian under linear constraint, CRAN

`robustcov`: Collection of robust precision estimation, CRAN

Stan `CeleriteQFD`: Stellar flare detection using Gaussian process combined with HMM, GitHub

## Teaching

2023 Spring 6.7830 (Bayesian Modeling and Inference) TA, MIT

2018-2019 Chemistry 103-104 TA, UW-Madison

2016-2017 Evolution of Human Intelligence TA, Peking University

## Services

### Reviewing

Statistics/ML EJS(1), JMLR(1), NeurIPS-2023(3), ICML-2023(1), AISTATS-2023(3), Annals of Applied Statistics(2)

Ecology J. Appl. Ecol.(1), GECCO(1), Ecology and Evolution(1), Biological Conservation(2), Biodiversity & Conservation(2), Ecosphere(1)

### Departmental

MIT EECS Graduate Student Association Vice President in Academics, 2024

MIT EECS Graduate Student Association executive board, 2023

### Diversity, Equity and Inclusion

Mentoring Student support network member, Undergraduate Network for Increasing Diversity of Ecologists (UNIDE)

### Miscellaneous

Consulting Statistical consulting, Qianjiangyuan National Park, Zhejiang, China, Summer 2018

Statistical and data management consulting, Corcovado and Piedras Blancas National Parks, Costa Rica, Summer 2023 (in collaboration with Northland College & UW-Madison, WI, USA)

## Outreach

2021 PBS WI meet the lab "data decoder" program, as "data scientist", see website

2018 Peking University Biology Museum, as docent

2016 *Bo Wu*, Chinese National Geography Magazine, as editor