Lu Zhang

Curriculum Vitae

Division of Biostatistics
Department of Population and Public Health Sciences
University of Southern California
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Employment

2022–current **Assistant Professor**, *University of Southern California*, USA.

2020–2022 **Postdoctoral Researcher**, *Columbia University*, USA.
Supervisor: Bob Carpenter, Andrew Gelman

Education

2014–2020 **Ph.D. in Biostatistics**, *University of California, Los Angeles*, USA.
Advisor: Sudipto Banerjee

2010–2014 **B.S. in Mathematics and Applied Mathematics**, *Fudan University*, China.

Research Interests

Spatial analysis, Bayesian statistics, high dimensional inference, computational statistics and open-source software development

Papers (* co-first author, † students mentored by me)

Publications and Accepted Manuscripts

1. Shengjie Liu†, **Lu Zhang**, Siqin Wang. End-to-End Reconstruction of High-Resolution Temperature Data Using Physics-Guided Deep Learning. Accepted by ***ICML workshop 2025***
2. Fangqi Guo, Xinci Chen, Steve Howland, Zhongzheng Niu, **Lu Zhang**, W. James Gauderman, Rob McConnell, Nathan Pavlovic, Fred Lurmann, Theresa M. Bastain, Rima Habre, Carrie V Breton, and Shohreh F. Farzan (2025). Childhood air pollution exposure and insulin resistance in young adulthood: Exploring the mediating role of BMI growth trajectories. ***JAMA Network Open***, 8(4), e256431-e256431. `https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2833125`
3. Måns Magnusson, Jakob Torgander, Paul-Christian Bürkner, **Lu Zhang**, Bob Carpenter, Aki Vehtari.posteriordb: Testing, Benchmarking and Developing Bayesian Inference Algorithms (2025). ***AISTATS 2025 oral presentation (Top 2%).*** `https://arxiv.org/abs/2407.04967`

4. Shiwen Li, Paulina Oliva, **Lu Zhang**, Jesse Goodrich, Rob McConnell, David V. Conti, Lida Chatzi, Max Aung. Associations between per-and polyfluoroalkyl substances (PFAS) and county-level cancer incidence and incident cancer burden attributable to PFAS in drinking water in the United States (2025). ***Journal of Exposure Science & Environmental Epidemiology***, 1-12
5. **Lu Zhang**, Andrew Finley, Arne Nothdurft, Sudipto Banerjee. Bayesian Modeling of Incompatible Spatial Data: A Case Study Involving Post-Adrian Storm Forest Damage Assessment (2024). ***International Journal of Applied Earth Observation and Geoinformation*** `https://www.sciencedirect.com/science/article/pii/S1569843224005806`
6. Shane Sparkes[†], Erika Garcia, **Lu Zhang** (2024). The functional average treatment effect. ***Journal of Causal Inference*** `https://www.degruyter.com/document/doi/10.1515/jci-2023-0076/html`
7. Shengjie Liu[†], **Lu Zhang** (2024). Deep Feature Gaussian Processes for Single-Scene Aerosol Optical Depth Reconstruction. ***IEEE Geoscience and Remote Sensing Letters*** `https://ieeexplore.ieee.org/abstract/document/10526362`
8. **Lu Zhang***, Wenpin Tang*, Sudipto Banerjee (2023). Fixed-Domain Asymptotics Under Vecchia's Approximation of Spatial Process Likelihoods. ***Statistica Sinica***. `http://www3.stat.sinica.edu.tw/ss_newpaper/SS-2021-0428_na.pdf`
9. **Lu Zhang**, Bob Carpenter, Andrew Gelman, Aki Vehtari (2022). Pathfinder: Parallel quasi-Newton variational inference. ***Journal of Machine Learning Research***. . `https://www.jmlr.org/papers/volume23/21-0889/21-0889.pdf`
10. **Lu Zhang** (2022). Applications of Conjugate Gradient in Bayesian computation. ***Wiley StatsRef-Statistics Reference Online.*** `https://doi.org/10.1002/9781118445112.stat08411`
11. Wenpin Tang*, **Lu Zhang***, Sudipto Banerjee (2021). On identifiability and consistency of the nugget in Gaussian spatial process models. ***Journal of the Royal Statistical Society Series B***, *(Statistical Methodology)*, `https://rss.onlinelibrary.wiley.com/doi/10.1111/rssb.12472`
12. **Lu Zhang**, Sudipto Banerjee, (2021) Spatial Factor Modeling: A Bayesian Matrix-Normal Approach for Misaligned Data. ***Biometrics***, *78(2), 560-573.*. `http://doi.org/10.1111/biom.13452`
13. **Lu Zhang**, Sudipto Banerjee, Andrew O. Finley (2021). High-dimensional multivariate geostatistics: A Bayesian matrix-normal approach. ***Environmetrics***, *32(4), e2675.* **Selected for the 2021 Wiley-TIES Best Paper Award** `https://onlinelibrary.wiley.com/doi/10.1002/env.2675`
14. Gregory L. Watson, Di Xiong, **Lu Zhang**, Joseph A. Zoller, John Shamshoian, Phillip Sundin, Teresa Bufford, Anne W. Rimoin, Marc A. Suchard, Christina M. Ramirez (2021). Pandemic velocity: forecasting COVID-19 in the US with a machine learning & Bayesian time series compartmental model. ***PLOS Computational Biology***, 17(3), e1008837.

15. Di Xiong*, **Lu Zhang***, Gregory L. Watson, Phillip Sundin, Teresa Bufford, Joseph A. Zoller, John Shamshoian, Marc A. Suchard, Christina M. Ramirez, (2020). Pseudo-likelihood based logistic regression for estimating COVID-19 infection and case fatality rates by gender, race, and age in California. ***Epidemics***, *33, 100418.* https://www.sciencedirect.com/science/article/pii/S1755436520300396

16. **Lu Zhang**, Abhirup Datta, Sudipto Banerjee. (2019). Practical Bayesian modeling and inference for massive spatial data sets on modest computing environments. ***Statistical Analysis and Data Mining: The ASA Data Science Journal***, *12(3), 197-209.* https://onlinelibrary.wiley.com/doi/full/10.1002/sam.11413

Preprints

17. **Lu Zhang**, Wenpin Tang, Sudipto Banerjee. Bayesian Geostatistics Using Predictive Stacking, https://arxiv.org/abs/2304.12414

18. Shane Sparkes[†], **Lu Zhang**. Properties and Deviations of Random Sums of Densely Dependent Random Variables, https://arxiv.org/abs/2310.11554

19. Soumyakanti Pan, **Lu Zhang**, Jonathan R. Bradley, Sudipto Banerjee. Bayesian Inference for Spatial-temporal Non-Gaussian Data Using Predictive Stacking, https://arxiv.org/abs/2406.04655

20. Shengjie Liu[†], Siqin Wang, **Lu Zhang**. Daily land surface temperature reconstruction in Landsat cross-track areas using deep ensemble learning with uncertainty quantification.

22. Shengjie Liu[†], Siqin Wang, **Lu Zhang**. Uncertainty-Aware Hourly Air Temperature Mapping at 2 km Resolution via Physics-Guided Deep Learning.

23. **Lu Zhang**. ProjMC^2: Scalable and Stable Posterior Inference for Bayesian Spatial Factor Models with Application to Spatial Transcriptomics, https://arxiv.org/abs/2506.01098

Packages

1. **Lu Zhang** and Jun Yin (2018). *phase1PRMD: Personalized Repeated Measurement Design for Phase I Clinical Trials. R package version 1.0.2. CRAN:* https://cran.r-project.org/web/packages/phase1PRMD/index.html

2. Xiang Chen, **Lu Zhang**, Sudipto Banerjee (2018). *JAMAJniLite: A JAVA package providing a java interface for lapack and blas libraries and using the classes defined by JAMA Package Github:* https://github.com/JAMAJni/JAMAJniLite

3. **Lu Zhang**, LiZhen Nie, Sudipto Banerjee (2017). *JALAJni: A JAVA package providing a java interface for lapack and blas library Github:* https://github.com/JaLAJni/JaLAJni

Grants

03/2023-03/2024 **Principal Investigator**, *Assessing Particulate Matter Exposures Based On Multi-Source Satellite Data Using Scalable Gaussian Process Models*, Southern California Environmental Health Sciences Center (P30ES007048) Pilot Projects Program. Total Direct Costs $47,500

Teaching Experience

Instructor at USC

Summer 2025 PM 511a: **Data Analysis (a)**

Summer 2024 PM 511a: **Data Analysis (a)**

Fall 2023 PM 569: **Spatial Statistics**

Graduate Teaching Assistant at UCLA

2015-2020 Biostat 100A: **Introduction to Biostatistics**
(Summer 2015, Fall 2015, Spring 2016, Summer 2017, Fall 2019)

2016-2020 Biostat 100B: **Introduction to Biostatistics**
(Winter 2016, Winter 2017, Winter 2018, Winter 2020)

Fall 2016 Biostat 200A: **Basic Biostatistics**

Spring 2017 Biostat 411: **Analysis of Correlated Data**

Fall 2017 Biostat 255A: **Advanced Topics & Probability in Biostatistics**

Winter 2017 Biostat 255B: **Advanced Topics & Probability in Biostatistics**

Spring 2018 Biostat 257: **Statistical Computing**

Spring 2019 Biostat 241: **Spatial modeling**

Fall 2019 Public Health 200: **Foundations in Public Health**

Spring 2020 Biostat 214: **Finite Population Sampling**

Working Experience

Jun. - Sep. 2018 **Internship in Biostatistics**, *Mayo Clinic*, Rochester, Minnesota USA,
Sponsor: Yin Jun, Ph.D.

- Statistical consultation to Physicians
- Experimental design (clinical trial design)
- Software development (develop R package)

Selected Awards

2020 **Dean's Outstanding Student Award in Biostatistics**, Department of Biotatistics, UCLA

2018 **Celia G. and Joseph G. Blann Fellowship**, Department of Biotatistics, UCLA

2016 **Graduate Summer Research Mentorship,** Department of Biotatistics, UCLA

Talks

Invited

Jun. 2025 **2025 ICSA Applied Statistics Symposium, Storrs, Connecticut, USA**.

Dec. 2024 **CFE-CMStatistics 2024 hybrid conference, King's College London, UK**.

Aug. 2024 **JSM, Portland, Oregon, USA**.

Jul. 2024 **ISBA, Venice, Italy**.

June 2024 **EAC-ISBA, Hong Kong, China**.

May 2024 **NESS, Storrs, Connecticut, USA**.

May 2023 **IRSA's 2023 conference, Institute for Research in Statistics and its Applications at University of Minnesota, Minneapolis, MN, USA**.

Apr. 2023 **DMS Colloquium, Department of Mathematics and Statistics at Auburn University, Auburn, AL, USA**.

Mar. 2023 **Bayes Comp 2023, Levi, Finland**.

Jan. 2023 **Purdue Research Colloquium, Statistics at Purdue University, West Lafayette, IN, USA**.

Sep. 2022 **SIAM, Conference on Mathematics of Data Science, San Diego, CA, USA**.

Aug. 2022 **JSM, Washington, DC, USA**.

Apr. 2022 **SIAM Conference on Uncertainty Quantification (UQ22), Atlanta, Georgia, U.S.**.

Nov. 2021 **Broad Institute, Remote**.

Sep. 2021 **Mathematics and Applied Mathematics at Fudan University, Shanghai, China**.

Sep. 2021 **School of Statistics and Management at Shanghai University of Finance and Economics, Shanghai, China**.

Jun. 2021 **Biostatistics at Columbia University, New York, New York, USA**.

Dec. 2020 **Johns Hopkins University BLAST working group, Baltimore, Maryland, USA**.

Mar. 2020 **ENAR, Nashville, Tennessee, USA**.

Contributed

Aug. 2022 **IMSI Workshop, Chicago, IL, USA**.

Aug. 2021 **Joint Statistical Meetings**.

Aug. 2020 **Bernoulli-IMS One World Symposium 2020**.

Jul. 2019 **Joint Statistical Meetings, Colorado, USA, poster presentation**.

Aug. 2017 **Joint Statistical Meetings, Baltimore, Maryland, USA**.

Referee Experience

Journal of the Royal Statistical Society: Series B (1)

Biometrics (1)

Journal of Machine Learning (1)

Journal of Computational and Graphical Statistics (4)

Annals of Applied Statistics (3)

Bayesian Analysis (1)

Nature Communications (1)

Statistical Science (1)

Spatial Statistics (1)

Environmetrics (1)

New England Journal of Statistics in Data Science (1)

Statistics Papers (1)

Professional Memberships

American Statistical Association

Eastern North American Region

International Chinese Statistical Association