

Shiwei Lan

Assistant Professor

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Education

- 2014 **Ph.D. in Statistics**, *University of California-Irvine*, Irvine, California.
- 2010 **M.S. in Mathematics**, *University of California-Irvine*, Irvine, California.
- 2005 **B.S. in Mathematics**, *Nanjing University*, Nanjing, China.

Experience

- 2019 **Assistant Professor**, *Arizona State University*, Tempe, Arizona.
- 2018 **Clinical Assistant Professor**, *University of Illinois Urbana-Champaign*, Champaign, Illinois.
- 2016 **Postdoctoral Scholar/Instructor**, *California Institute of Technology*, Pasadena, California.
- 2014 **Postdoctoral Research Fellow**, *University of Warwick*, Coventry, U.K..
- 2006 **Research/Teaching Assistant**, *University of California-Irvine*, Irvine, California.

Research Highlight

- 2018 **Nature Climate Change**, spotlight our paper *Earth System Modeling 2.0 (DEC 2017)*, "A Model Revolution".
- 2018 **Earth & Space Science News (EOS)**, spotlight our paper *Earth System Modeling 2.0 (DEC 2017)*, "Next-Generation Climate Models Could Learn, Improve on the Fly".

Preprints

- 2019 Lan, Shiwei (Jan. 2019b). "Learning Temporal Evolution of Spatial Dependence with Generalized Spatiotemporal Gaussian Process Models". arXiv:1901.04030.
- 2017 Holbrook, Andrew, Shiwei Lan, Jeffrey Streets, and Babak Shahbaba (July 2017). "The nonparametric Fisher information geometry and the chi-square process density prior". arXiv:1707.03117.

Publications

- 2019 Lan, Shiwei (2019a). "Adaptive dimension reduction to accelerate infinite-dimensional geometric Markov Chain Monte Carlo". In: *Journal of Computational Physics* 392, pp. 71–95.
- 2019 Lan, Shiwei, Andrew Holbrook, Norbert J. Fortin, Ombao Hernando, and Babak Shahbaba (2019). "Flexible Bayesian Dynamic Modeling of Covariance and Correlation Matrices". In: *Bayesian Analysis (to appear)*. arXiv:1711.02869. eprint: 1711.02869.
- 2017 Beskos, Alexandros, Mark Girolami, Shiwei Lan, Patrick E. Farrell, and Andrew M. Stuart (2017). "Geometric MCMC for infinite-dimensional inverse problems". In: *Journal of Computational Physics* 335.Supplement C, pp. 327–351.

2017

Holbrook, Andrew, Shiwei Lan, Alexander Vandenberg-Rodes, and Babak Shahbaba (Dec. 2017). "Geodesic Lagrangian Monte Carlo over the space of positive definite matrices: with application to Bayesian spectral density estimation". In: *Journal of Statistical Computation and Simulation*.

2017

Karcher, Michael D., Julia A. Palacios, Shiwei Lan, and Vladimir N. Minin (2017). "phylodyn: an R package for phylodynamic simulation and inference". In: *Molecular Ecology Resources* 17.1, pp. 96–100.

2017

Schneider, Tapio, Shiwei Lan, Andrew Stuart, and João Teixeira (Dec. 2017). "Earth System Modeling 2.0: A Blueprint for Models That Learn From Observations and Targeted High-Resolution Simulations". In: *Geophysical Research Letters*. DOI: 10.1002/2017GL076101.

2016

House, Thomas, Ashley Ford, Shiwei Lan, Samuel Bilson, Elizabeth Buckingham-Jeffery, and Mark Girolami (24 August 2016). "Bayesian uncertainty quantification for transmissibility of influenza, norovirus and Ebola using information geometry". In: *Journal of The Royal Society Interface* 13.121.

2016

Lan, Shiwei, Tan Bui-Thanh, Mike Christie, and Mark Girolami (Mar. 2016). "Emulation of higher-order tensors in manifold Monte Carlo methods for Bayesian Inverse Problems". In: *Journal of Computational Physics* 308, pp. 81–101.

2016

Lan, Shiwei and Babak Shahbaba (2016). "Chapter 2 of Algorithmic Advances in Riemannian Geometry and Applications". In: *Advances in Computer Vision and Pattern Recognition*. Ed. by Ha Quang Minh and Vittorio Murino, pp. 25–71.

2015

Lan, Shiwei, Julia A. Palacios, Michael Karcher, Vladimir N. Minin, and Babak Shahbaba (2015). "An efficient Bayesian inference framework for coalescent-based nonparametric phylodynamics". In: *Bioinformatics* 31.20, pp. 3282–3289.

2015

Lan, Shiwei, Vasileios Stathopoulos, Babak Shahbaba, and Mark Girolami (2015). "Markov Chain Monte Carlo from Lagrangian Dynamics". In: *Journal of Computational and Graphical Statistics* 24.2, pp. 357–378.

2014

Lan, Shiwei, Jeffrey Streets, and Babak Shahbaba (July 2014). "Wormhole Hamiltonian Monte Carlo". In: *Proceedings of the 28th AAAI Conference on Artificial Intelligence*. Pp. 1953–1959.

2014

Lan, Shiwei, Bo Zhou, and Babak Shahbaba (22–24 Jun 2014). "Spherical Hamiltonian Monte Carlo for Constrained Target Distributions". In: *Proceedings of the 31st International Conference on Machine Learning*. Proceedings of Machine Learning Research 32.1. Ed. by Eric P. Xing and Tony Jebara, pp. 629–637.

2014

Shahbaba, Babak, Shiwei Lan, Wesley O. Johnson, and Radford M. Neal (May 2014). "Split Hamiltonian Monte Carlo". In: *Statistics and Computing* 24.3, pp. 339–349.

2014

Shahbaba, Babak, Shiwei Lan, and Jeffrey Streets (2014). "Contribution to the Discussion of the Paper 'Geodesic Monte Carlo on Embedded Manifolds'". In: *Scandinavian Journal of Statistics* 41.1, pp. 14–15.

2014

Shahbaba, Babak, Bo Zhou, Shiwei Lan, Hernando Ombao, David Moorman, and Sam Behseta (2017/09/28 2014). "A Semiparametric Bayesian Model for Detecting Synchrony Among Multiple Neurons". In: *Neural Computation* 26.9, pp. 2025–2051.

Teaching

- Instructor @CalTech: Bayesian Analysis (17W); @UIUC: Methods of Applied Statistics (18F), Statistics and Probability I (19S), Basics of Statistical Learning (19S)
- Certificate *Certificate of Interest* (17) by CalTech Project for Effective Teaching Program
- Guest Lecturer Hamiltonian Monte Carlo (13), Bayesian Statistics (14), Statistical Computing Method (UCI, 17W, 4 hours)
- Teaching Assistant Calculus (07/08/09), Math for Econ (08/09), Linear Algebra (10), Intro to Bio Stats (11/12/13), Intro Prob and Stats Theory (11), Stats Methods (11), Stats Methods for Data Analysis (12/13)

Activities

Membership

- Statistics American Statistical Association (ASA)
International Chinese Statistical Association (ICSA)
- Applied Math Society for Industrial and Applied Mathematics (SIAM)

Reviewer

- Journals Journal of the American Statistical Association, Journal of Computational and Graphical Statistics, Scandinavian Journal of Statistics, Bayesian Analysis, Statistics and Probability Letters, Statistical Analysis and Data Mining, Computational Statistics and Data Analysis, Statistics and Computing, Journal of Statistical Computation and Simulation, SIAM J. Uncertainty Quantification, SIAM J. Scientific Computing, Nature Scientific Reports, PLOS ONE, Scientific Research Essays, Advances in Systems Science and Applications

Selective Invited Talks

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|----------------|---|---|
| UC-Irvine | Learning Temporal Evolution of Spatial Dependence in Brain Images | <i>SMI19</i> |
| New Brunswick | Learning Temporal Evolution of Spatial Dependence | <i>ICSA18</i> |
| Garden Grove | Adaptive Dimension Reduction to Accelerate ∞-Dim GMC | <i>SIAM UQ18</i> |
| Duke | About ∞-Dimensional Geometric MCMC | <i>SAMSI workshop17</i> |
| Atlanta | Geometric MCMC for Infinite-Dimensional Inverse Problems | <i>SIAM CSE17</i> |
| Lausanne, CH | Geometric ∞-Dimension MCMC for Inverse Problems | <i>SIAM UQ16</i> |
| Warwick, UK | Spherical Augmentation for Constrained Probability Distributions | <i>WCPM15</i> |
| Warwick, UK | Gaussian Process-Geometric Monte Carlo For Big Models | <i>MIR@W15</i> |
| Warwick, UK | Geometric Techniques in Advanced MCMC | <i>EQUIP 14</i> |
| Beijing, China | Spherical HMC for Constrained Target Distributions | <i>ICML 14</i> |
| Oviedo, Spain | Split Hamiltonian Monte Carlo | <i>ERCIM on Computing & Statistics 12</i> |
| UC-Irvine | Lagrangian Dynamical Monte Carlo | <i>AI/ML seminar 12</i> |

Skills

Mathematics

Statistics Bayesian Data Analysis
Statistical Computing

Mathematics Uncertainty Quantification
Data Assimilation

Computing

Languages C/C++, Python

Software Matlab, R, SAS, FEniCS