

Joonha Park

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University of Kansas
Department of Mathematics
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Research interests

Computational statistics, Sequential Monte Carlo (SMC), Markov chain Monte Carlo (MCMC), Inference for spatio-temporal dynamics, applications to public health/epidemiological data analysis, Bayesian statistics, use of deep neural networks in the context of statistical inferences.

Education

University of Michigan, Ann Arbor, MI

Ph.D., Statistics, Sep. 2012 – May 2018

Advisor: Edward L. Ionides

Thesis: *Computational inference algorithms for spatiotemporal processes and other complex models*

Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea

M.A., Mathematical Sciences, Aug. 2010 – May 2012

Thesis: *A statistical theory of long-range target tracking and sensor formation*

Massachusetts Institute of Technology, Cambridge, MA

B.S., Mathematics, Sep. 2003 – May 2007

Previous academic positions

Boston University, Boston, MA

Postdoctoral Associate, Jul 2018 – Jun 2020. Supervisor: Yves Atchadé

Publications

Peer-reviewed

Ionides, E. L., Asfaw, K., Park, J., and King, A. A. (2021) Bagged filters for partially observed interacting systems. *Journal of the American Statistical Association*, doi: 10.1080/01621459.2021.1974867.

Park, J. and Ionides, E. L. (2020) Inference on high-dimensional implicit dynamic models using a guided intermediate resampling filter. *Statistics and Computing*, doi: 10.1007/s11222-020-09957-3, <https://rdcu.be/b5bMj>

Park, J. and Atchadé, Y. (2020) Markov chain Monte Carlo algorithms with sequential proposals. *Statistics and Computing*, doi:10.1007/s11222-020-09948-4, <https://rdcu.be/b494g>

Ionides, E. L., Breto, C., Park, J., Smith, R. A. and King, A. A. (2017) Monte Carlo profile confidence intervals for dynamic systems. *Journal of The Royal Society Interface*, **14**, 20170126. <https://doi.org/10.1098/rsif.2017.0126>

Koopman, J. S., Henry, C. J., Park, J., Eisenberg, M. C., Ionides, E. L. and Eisenberg, J. N. (2017) Dynamics affecting the risk of silent circulation when oral polio vaccination is stopped. *Epidemics*. <https://doi.org/10.1016/j.epidem.2017.02.013>

Kim, S.-H., Park, J. H., Yoon, W., Ra, W.-S. and Whang, I.-H. (2017) A note on sensor arrangement for long-distance target localization. *Signal Processing*, **133**, 18–31. <https://doi.org/10.1016/j.sigpro.2016.10.011>

Published preprints

Asfaw, K., Park, J., King, A. A., and Ionides, E. L. (2021) *Partially observed Markov processes with spatial structure via the R package spatPomp*. <http://arxiv.org/abs/2101.01157>.

Park, J. (2021) *Sampling from multimodal target distributions using tempered Hamiltonian transitions*. <https://arxiv.org/abs/2111.06871>.

Park, J. (2023) *On simulation-based inference for implicitly defined models*. <https://arxiv.org/abs/2311.09446>.

Talks and presentations

Talk, *Simulation-based inference for implicitly defined models with application to partially observed Markov processes*, Joint Statistical Meetings, Toronto, Canada, Aug. 2023

Talk, *Sampling from multimodal distributions using tempered Hamiltonian transitions*, New England Statistics Symposium (NESS), Boston University, Jun. 2023

Talk, *Simulation-based inference for implicitly defined models with application to partially observed Markov processes*, Probability and Statistics Seminar, University of Kansas, Apr. 2023

Talk, *Simulation-based inference for high dimensional implicit models and application to partially observed processes*, The 15th International Conference of the European Consortium for Information and Mathematics working group on Computational and Methodological Statistics (CMStatistics 2022), hybrid (virtual and at King's College London), Dec. 2022

Talk, *Sampling from multimodal target distributions using tempered Hamiltonian transitions*, WNAR 2022, Jun. 2022

Talk, *Sampling from multimodal target distributions using tempered Hamiltonian transitions*, Innovations in Design, Analysis, and Dissemination (IDAD): Frontiers in Biostatistics and Data Science, Apr. 2022

Talk, *Sampling from multimodal target distributions using tempered Hamiltonian transitions*, The 14th International Conference of the European Consortium for Information and Mathematics working group on Computational and Methodological Statistics (CMStatistics 2021), hybrid (virtual and at King's College London), Dec. 2021

Research presentation, *Monte Carlo methods in Statistics*, KU Math Sneak Peek event (designed to give information about the department for potential applicants for graduate program), Nov. 2021

Poster presentation, *Sampling from multimodal distributions using mass-modulated Hamiltonian transitions*, Bayesian Young Statisticians Meeting (BAYSM, virtual) Sep. 2021

Talk, *Mass-enhanced Hamiltonian Monte Carlo with sequential proposals for multimodal target distributions*, Joint Statistical Meetings, Virtual, 2021

Talk at KU Math Club meetings (undergraduate), *Independence, statistical models, and Bayesian inference*, University of Kansas, May 2021

Talk at *Teaching matters seminar*, *My experiences of teaching statistics at KU*, University of Kansas, Apr 2021

Talk, Smith Colloquium, *Sequential-proposal Hamiltonian Monte Carlo with mass scaling for multimodal target distributions*, University of Kansas, Feb. 2021

Talk, Probability and Statistics seminar, *Inference on coupled stochastic dynamic models using a guided intermediate resampling filter*, University of Kansas, Dec. 2020

Talk, *Markov chain Monte Carlo methods with sequential proposals*, Bayesian Young Statisticians Meeting: Online (BAYSM:O), Nov. 2020

Poster presentation, *Markov chain Monte Carlo methods with sequential proposals*, IMA workshop on Optimal Control, Optimal Transport, and Data Science (virtual) Nov. 2020

Talk, Computational and Applied Mathematics seminar, *Inference on coupled stochastic dynamic models using a guided intermediate resampling filter*, University of Kansas, Oct. 2020

Contributed paper presentation, *Markov chain Monte Carlo algorithms with sequential proposals*, Joint Statistical Meetings, Aug. 2020

Invited virtual seminar, *A selective review of Markov chain Monte Carlo methods and some recent developments*, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, South Korea, Jul. 2020

Talk, *Inference on high-dimensional implicit dynamic models using a guided intermediate resampling filter*, Workshop on Mathematical Modeling and Statistical Analysis of Infectious Disease Outbreaks, CIRM Luminy, Marseille, France, Feb. 2020

Talk, *Markov chain Monte Carlo methods with sequential proposals*, The University of Kansas, Lawrence, Jan. 2020

Poster presentation, *Markov chain Monte Carlo methods with sequential proposals*, Bayes Comp 2020, The University of Florida, Gainesville, Jan. 2020

Talk, *Sequential proposal Markov chain Monte Carlo sampling algorithms*, New England Statistics Symposium (NESS) 2019, Hartford, May 2019

Speed oral and poster presentation, *A guided intermediate resampling particle filter for inference on high dimensional systems*, Michigan Student Symposium for Interdisciplinary Statistical Sciences (MSSISS), University of Michigan, Apr. 2018

Poster presentation, *A guided intermediate resampling particle filter for inference on high dimensional systems*, SMC workshop 2017, Uppsala, Sweden, Aug. 2017

Poster presentation, *Particle filter in high dimension via intermediate resampling and its application to the analysis of the measles epidemic in the UK, 1949-1964*, World Congress in Probability and Statistics, Toronto, Jul. 2016

Poster presentation, *Estimation of epidemic parameters by sequential Monte Carlo: a case study in measles*, Joint Statistical Meetings, Seattle, Aug. 2015

Talk, *Determinants of Silent Polio Circulation during the Eradication Endgame*, Workshop on analyzing the polio eradication endgame, Fred Hutchinson Cancer Research Center, Jul. 2015

Talk, *Computational sampling methods in high dimension and applications to modeling of infectious diseases*, Workshop on Statistics and Nonlinear Dynamics in Biology and Medicine, Banff International Research Station, Jul. 2014

Poster presentation, *Estimation of epidemic parameters by sequential Monte Carlo: a case study in measles*, Michigan Student Symposium for Interdisciplinary Statistical Sciences (MSSISS), University of Michigan, Mar. 2014

Poster presentation, *A statistical theory of long-range target tracking and sensor formation*, Michigan Student Symposium for Interdisciplinary Statistical Sciences (MSSISS), University of Michigan, Mar. 2013

Talk, *A statistical theory of long-range target tracking and sensor formation*, SIAM student conference, University of Michigan, Feb. 2013

Talk, *Multi-sensor statistical target tracking based on range difference data*, Graduate Seminar, KAIST, Nov. 2011

Teaching

Course taught at the University of Kansas:

MATH 996 Special Topics: Computational Methods in Statistical Learning, Spring 2023.

MATH 605 Applied Regression Analysis, Fall 2022.

MATH 526 Applied Mathematical Statistics, Fall 2020, Spring 2021, Fall 2021, Spring 2022, Fall 2022.

PhD advisees

Ming Wang, Fall 2021 – present.

Sungmin Won, Spring 2022 – present.

Undergraduate research mentorship

Viet Le (Undergraduate research award, Honor's thesis, Spring 2022 – present.)

Led *Statistics reading group on Bayesian data analysis*, University of Kansas, Fall 2021.

Math 699 Directed Reading, University of Kansas, Summer 2021, Spring 2022.

Lab instructor for *MA 213 Basic Statistics and Probability*, Boston University, Spring 2019 and Fall 2019.

Awards and Honors

Rackham Research Grant, University of Michigan Rackham Graduate School, 2017. Award: \$1,613 for travel support to SMC workshop 2017, Uppsala, Sweden.

Rackham Predoctoral Fellowship, University of Michigan Rackham Graduate School, 2016–2017. Award: \$32,000

Outstanding Teaching Award, University of Michigan Department of Statistics, 2013–2014

Rackham International Student Fellowship, University of Michigan Rackham Graduate School, 2013. Award: \$10,000

Outstanding First-Year Ph.D. Student Award, University of Michigan Department of Statistics, 2012–2013

Samsung Scholarship, Full tuition and living expenses for undergraduate education. 2003–2007

Gold Medal, International Physics Olympiad (IPhO), 2002

Other Services

Refereed papers for several journals, including *Statistics and Computing*, *Journal of Computational and Graphical Statistics*, *Computational Statistics and Data Analysis*, *American Journal of Epidemiology*, *Stochastic Environmental Research and Risk Assessment*, *Journal of the Korean Statistical Society*, *Austrian Journal of Statistics*, *Bernoulli*, *Journal of the American Statistical Association*

Panelist for the National Science Foundation, 2022.

Co-organized undergraduate students' participation in the William Lowell Putnam Mathematical Competition by leading and coordinating practice sessions, University of Kansas, AY 2022-2024.

Led *Seminar on Advances in Machine Learning*, University of Kansas, Summer 2022, Fall 2022.

Center for Teaching Excellence (CTE) Ambassador, University of Kansas, Fall 2020 – present.

Co-organizer of the Smith Colloquium at the Department of Mathematics, the University of Kansas. AY 2021-2024.

Co-organizer of the probability/statistics seminar at the University of Kansas, Mathematics department. Fall 2020 - Spring 2021.

Graduate Student Consultant at Consulting for Statistics, Computing, and Analytics Research (CSCAR), University of Michigan. Provided consultation for various research-related statistical questions. Jan. 2016 – Apr. 2016.

Organizer for Michigan Student Symposium for Interdisciplinary Statistical Sciences (MSSIIS) 2016, University of Michigan, Sept. 2015 – Mar. 2016.

Organizer for Graduate Student Statistical Topics Seminar Series (GSSTSS), Statistics Department, University of Michigan. Invited speakers and organized seminars. Sept. 2013 – May 2015