

Ji Won Park

Research Scientist · Group Lead

San Francisco Bay Area

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Summary

Principal Scientist and Group Lead developing statistical frameworks for reliable decision making using large models, with applications to model-guided scientific discovery. My work focuses on uncertainty quantification, Bayesian experimental design, and scalable inference, emphasizing methods that provide formal guarantees, are sample-efficient, and improve with advances in foundation and generative models.

Professional Experience

Genentech

South San Francisco, CA

Principal Machine Learning Scientist

Nov 2023 - Present

- Leading a group developing the theory and algorithms for sequential decision making under uncertainty, spanning multi-objective Bayesian optimization, uncertainty calibration, simulation-based inference, and control/guidance for generative models
- Built multi-property ranking and selection modules in automated lab-in-the-loop pipelines, used to test 10,000+ antibodies, 1,000+ small molecules, and 500+ molecular glues to date
- Developing methods to denoise experimental readouts and equip them with well-calibrated measurement errors, so that they can be used to train robust machine learning models
- Advising experimental and applied machine learning scientists on active data acquisition and probabilistic modeling

Senior Machine Learning Scientist II

Nov 2021 - Nov 2023

Stanford University / SLAC National Accelerator Laboratory

Stanford, CA

Graduate Research Assistant

April 2018 - March 2022

Developed approximate inference methods for hierarchical Bayesian inference and applied them to heterogeneous, multi-modal astronomical datasets to infer the Hubble constant, a key cosmological parameter governing the expansion of the Universe

Simons Foundation Flatiron Institute, Center for Computational Astrophysics (CCA)

New York City, NY

Visiting Researcher (Supervisor: Shirley Ho)

April-July 2021

Extended latent stochastic differential equations to reconstruct multivariate time series of active galactic nuclei and infer their physical properties, which inform the evolutionary history of the Universe

NASA Ames Research Center

Mountain View, CA

Summer Ph.D. Intern

June-Oct 2019 (part-time)

Developed a video-to-image model to predict solar flux emergence from time-series magnetograms, critical for astronaut safety

Education

Stanford University

Stanford, CA

Ph.D. Physics (Co-advisors: Philip J. Marshall, Aaron Roodman)

Sept 2017 - March 2022

Dissertation: *Hierarchical Inference of the Hubble Constant from Strong Gravitational Time Delays with Bayesian Deep Learning*

Duke University

Durham, NC

B.S. Physics, B.S. Math, Graduation with High Distinction (Thesis advisor: Christopher Walter)

Aug 2013 - May 2017

Publications

* indicates equal contribution.

Peer-reviewed publications

[24] **Park, J.W.**, Cho, K. Efficient semantic uncertainty quantification in language models via diversity-steered sampling. NeurIPS (2025). [\[arXiv\]](#)

[23] Fannjiang, C., **Park, J.W.** Reliable algorithm selection for machine learning-guided design. ICML (2025). [\[arXiv\]](#)

- [21] Fagin, J. and 7 others including **Park, J.W.** Joint Modeling of Quasar Variability and Accretion Disk Reprocessing using Latent Stochastic Differential Equations. *The Astrophysical Journal* (2025). [\[arXiv\]](#)
- [20] **Park, J.W.**, Tibshirani, R., Cho, K. Semiparametric conformal prediction. AISTATS (2025). [\[arXiv\]](#)
- [19] Bazgir, O., Wang, Z., **Park, J. W.**, Hafner, M., Lu, J. Integration of Graph Neural Network and Neural-ODEs for Tumor Dynamic Prediction. ICLR (2024) MLGenX Workshop. [\[arXiv\]](#)
- [18] Griffiths, R. and 24 others including **Park, J.W.** GAUCHE: a library for Gaussian processes in chemistry. NeurIPS (2024). [\[arXiv\]](#)
- [17] Fagin, J., **Park, J. W.**, Best, H., Chan, J. H., Ford, K. S., Graham, M. J., ..., O'Dowd, M. Latent Stochastic Differential Equations for Modeling Quasar Variability and Inferring Black Hole Properties. *The Astrophysical Journal* (2024). [\[arXiv\]](#) [\[ADS\]](#)
- [16] Saremi, S., **Park, J. W.**, Bach, F. Chain of Log-Concave Markov Chains. ICLR (2024). [\[arXiv\]](#)
- [15] **Park, J.W.***, Tagasovska, N.*, Maser, M., Ra, S., Cho, K. BOTied: Multi-objective Bayesian optimization with tied multivariate ranks. ICML (2024). [\[arXiv\]](#)
- [14] Ng, N., **Park, J.W.**, Lee, J.H., Kelly, R., Cho, K. Blind Sequence Denoising with Self-Supervised Set Learning. TMLR (2023). [\[arXiv\]](#)
- [13] **Park, J.W.**, Birrer, S., Ueland, M., Cranmer, M., Wagner-Carena, S., Marshall, P.J., Roodman, A. 2021. Hierarchical Inference of Weak Lensing Convergence from Photometric Catalogs with Bayesian Graph Neural Networks. *The Astrophysical Journal* (2023). [\[arXiv\]](#)
- [12] Maser, M., **Park, J.W.**, Lin, J.Y.Y., Lee, J.H., Frey, N., Watkins, A. SupSiam: Non-contrastive Auxiliary Loss for Learning from Molecular Conformers. ICLR (2023) Machine Learning for Drug Discovery Workshop. [\[arXiv\]](#)
- [11] Fagin, J.* **Park, J.W.***, Best, H., Ford, S., Graham, M., Villar, A., Ho, S., Chan, J., O'Dowd, M. Latent Stochastic Differential Equations for Modeling Quasar Variability and Inferring Black Hole Properties. ICLR (2023) *Physics for Machine Learning* Workshop. Spotlight. [\[arXiv\]](#)
- [10] **Park, J.W.**, Stanton, S., Saremi, S., Watkins, A., Dwyer, H., Gligorijevic, V., Bonneau, R., Ra, S., Cho, K. PropertyDAG: Multi-objective Bayesian Optimization of Partially Ordered, Mixed-Variable Properties for Biological Sequence Design. NeurIPS (2022) AI for Science Workshop. [\[arXiv\]](#)
- [9] Berenberg, D., Lee, J.H., Kelow, S., **Park, J.W.**, Watkins, A., Gligorijevic, V. Bonneau, R., Ra, S., Cho, K. Multi-Segment Preserving Sampling for Deep Manifold Sampler. ICLR (2022) Machine Learning for Drug Discovery Workshop. Spotlight. [\[arXiv\]](#)
- [8] Morgan, R., Nord, B., Bechtol, K., Gonzalez, J., Buckley-Geer, E., Moller, A., **Park, J.W.** followed by 38 others. Deepzipper: A Novel Deep-Learning Architecture for Lensed Supernovae Identification. *The Astrophysical Journal* (2022). [\[ADS\]](#)
- [7] **Park, J.W.**, Villar, A., Li, Y., Jiang, Y.F., Ho, S., Lin, J.Y.Y., Marshall, P.J., Roodman, A. Inferring Black Hole Properties from Astronomical Multivariate Time Series with Bayesian Attentive Neural Processes. ICML (2021) Uncertainty and Robustness in Deep Learning and Time Series Workshops. [\[arXiv\]](#) [\[ADS\]](#)
- [6] **Park, J.W.**, Wagner-Carena, S., Birrer, S., Marshall, P.J., Lin, J.Y.Y., Roodman, A. (LSST Dark Energy Science Collaboration). Large-scale Gravitational Lens Modeling with Bayesian Neural Networks for Accurate and Precise Inference of the Hubble Constant. *The Astrophysical Journal* (2021). [\[arXiv\]](#)
- [5] Wagner-Carena, S., **Park, J.W.**, Birrer, S., Marshall, P.J., Roodman, A., Wechsler, R.H. (LSST Dark Energy Science Collaboration). Hierarchical Inference with Bayesian Neural Networks: An Application to Strong Gravitational Lensing. *The Astrophysical Journal* (2021). [\[arXiv\]](#) [\[ADS\]](#)
- [4] LSST Dark Energy Science Collaboration including **Park, J.W.** The LSST DESC DC2 Simulated Sky Survey. *The Astrophysical Journal Supplement Series* (2021). [\[arXiv\]](#) [\[ADS\]](#)
- [3] Ding, X., Treu, T., and 26 others including **Park, J.W.** Time Delay Lens Modeling Challenge. *Monthly Notices of the Royal Astronomical Society* (2021). [\[arXiv\]](#) [\[ADS\]](#)

[2] Birrer S., Shajib, A.J., Gilman, D., Galan, A., and 16 others including **Park, J.W.** Lenstronomy II: A Gravitational Lensing Software Ecosystem. *The Journal Open Science Software* (2021). [\[arXiv\]](#) [\[ADS\]](#)

[1] Birrer S., Shajib, A.J., Galan, A., Millon, M., Treu, T. and 22 others including **Park, J.W.** TDCOSMO IV: Hierarchical Time-Delay Cosmography — Joint Inference of the Hubble Constant and Galaxy Density Profiles. *Astronomy and Astrophysics* (2020). [\[arXiv\]](#)

Preprints

[31] Kim, K., Gruffaz, S., **Park, J.W.**, Durmus, A. Analysis of kinetic Langevin Monte Carlo under the stochastic exponential Euler discretization from underdamped all the way to overdamped. Under review.

[30] Prinster, D., Fannjiang C., **Park, J.W.**, Cho, K., Liu, A., Saria, S., Stanton, S. Conformal Policy Control. In prep.

[29] Makino, T., **Park, J.W.**, et al. Supervised contrastive block disentanglement. [\[arXiv\]](#)

[28] Frey, N. and 62 authors including **Park, J.W.** Lab-in-the-loop therapeutic antibody design with deep learning. [\[bioRxiv\]](#)

[27] Lahiri, P., **Park, J.W.**, Vasilaki, S., Dreyer, F., Stanton, S., Seeger, F., Kelly, R. (Author list and ordering TBD.) High-throughput affinity characterization with AffiMapper. In prep.

[26] Nerli, S.*, **Park, J.W.***, Lu, C., Davidson, D., Kelow, S., Bonneau, R., Cho, K., Watkins, A. P-flex: Modeling peptide conformational flexibility in pHLA-I molecules with machine-learned structural descriptors. In prep.

[25] Tagasovska, N.*, **Park, J.W.***, Kirchmeyer, M., Frey, N., Ismail, A., Jamasb, A., Lee, E., Bryson, T., Ra, S., Cho, K. 2023. Antibody DomainBed: Out-of-Distribution Generalization in Therapeutic Protein Design. In prep. [\[arXiv\]](#)

Patents

Provisional applications

Seven patent applications under review (details withheld for confidentiality)

Published patents

[1] Gligorijevic, V., Lee, J.H., Kelow, S., **Park, J.W.**, Watkins, A., Berenberg, D., Bonneau, R., Ra, S., Cho, K. 2022. "Protein Design with Segment Preservation." Application 18842226. Published June 2025.

Presentations

External presentations

February 2026 (planned). *Lab-in-the-Loop Therapeutic Antibody Design*. **Invited talk** at Biologic Summit. San Diego, CA.

January 2026. *Lab-in-the-Loop Therapeutic Antibody Design*. **Invited talk** at Biologic Summit. San Diego, CA.

November 2025. *Lab-in-the-Loop Application for Clinically Relevant Antigen Targets*. **Invited talk** at PEGS Europe, "Machine Learning for Protein Engineering" session Part 1. Lisbon, Portugal.

November 2025. *Antibody DomainBed: Out-of-Distribution Generalization in Therapeutic Protein Design*. **Invited talk** at PEGS Europe, "Machine Learning for Protein Engineering" session Part 2. Lisbon, Portugal.

July 2025. *Targeting the multivariate tails in AI-driven molecular optimization*. **Invited talk** and panel at the ICML 2025 "Exploration in AI Today" workshop. Vancouver, Canada.

May 2025. *Uncertainty-guided drug discovery*. **Invited talk** at the workshop, "From Models to Molecules: AI's Expanding Roles in Therapeutics" hosted by Novoprotein. South San Francisco, CA.

April 2025. *Multivariate tails for active molecular design*. **Invited talk** and panelist at the Molecule Maker Lab Annual Symposium, "AI Scientist? What Would It Take?" Urbana, IL.

November 2024. *Semiparametric conformal prediction for molecular property prediction*. Poster presentation at the Molecular Machine Learning Conference (MoML). Cambridge, MA.

October 2024. **Invited panelist** at the CMG AI Summit, “How to win in the age of AI.” South San Francisco, CA.

June 2024. *Finding Signal in the Noise for Lab-in-the-Loop Molecular Design*. **Invited talk**: Stanford University Bio-X (Interdisciplinary Biosciences Institute).

June 2024. *Multi-objective optimization for molecular design using multivariate ranks and quantiles*. **Invited talk**: Cradle.ai. Zurich, Switzerland.

March 2024. *BOtied: Multi-objective Bayesian optimization with tied multivariate ranks*. **Invited talk**: Neural Concept and EPFL. Lausanne, Switzerland.

February 2024. *BOtied: Multi-objective Bayesian optimization with tied multivariate ranks*. **Invited talk**: 2024 SIAM Conference on Uncertainty Quantification. Trieste, Italy.

January 2024. *Multi-Objective Bayesian Optimization for Molecular Design*. **Invited talk**: KASBP-SF Annual Symposium. South San Francisco, CA.

January 2024. **Invited plenary panelist** at the American Physical Society 2024 Conference for Undergraduate Women in Physics (APS CUWiP) at Stanford University. The goal of CUWiP is to encourage undergraduate women and gender minorities to continue in physics.

November 2023. *Multi-Objective Bayesian Optimization for Molecular Design*. Industry Research Workshop: Machine Learning for Health Care and Life Sciences. ETH Zurich, Zurich, Switzerland.

June 2023. *A Tail of Many Tails: Multi-Objective Bayesian Optimization for Molecular Design*. **Invited talk**: Seoul National University, Seoul, South Korea.

June 2023. *A Tail of Many Tails: Multi-Objective Bayesian Optimization for Molecular Design*. **Invited talk**: Korea Advanced Institute of Science & Technology, Daejeon, South Korea.

May 2022. *Inferring the Hubble Constant from Strong Lensing Time Delays with Bayesian Deep Learning*. Departmental tea talk: Kavli Institute of Particle Astrophysics and Cosmology, Stanford, CA.

May 2021. *Inferring the Hubble Constant from Strong Lensing Time Delays with Bayesian Deep Learning*. Departmental tea talk: Kavli Institute of Particle Astrophysics and Cosmology, Stanford, CA.

April 2021. *Large-Scale Gravitational Lens Modeling with Bayesian Neural Networks for Accurate and Precise Inference of the Hubble Constant*. Oral presentation, competitive. Time-Domain Cosmology with Strong Gravitational Lensing Workshop, virtual.

July 2021. *Inferring Black Hole Properties from Astronomical Multivariate Time Series with Bayesian Attentive Neural Processes*. Poster presentation, competitive. International Conference on Machine Learning (ICML) Uncertainty and Robustness in Deep Learning and Time Series Workshops, virtual.

July 2021. *Joint Light Curve Reconstruction and Parameter Inference from LSST-like Active Galactic Nuclei (AGN) Light Curves with Bayesian Neural Networks*. Oral presentation, competitive. Supermassive Black Hole Studies with the Legacy Survey of Space and Time – The 2021 Summer Meeting of the LSST AGN Science Collaboration, virtual.

February 2020. *Validation of AGN Variability in DC2 (the Second Data Challenge)*. Oral presentation: Winter 2020 DESC Collaboration Meeting, Tucson, AZ.

November 2019. *Inference of the Hubble Constant Using Bayesian Neural Networks*. Oral presentation: Bay Area Likelihood-Free Inference Workshop, Berkeley, CA.

July 2019. *Hierarchical Inference of the Hubble Constant: Simulation Design*. Oral presentation: Summer 2019 DESC Collaboration Meeting, Paris, France.

July 2019. *Catalog-Level Detection of Strong Lenses with Probabilistic Machine Learning*. Oral presentation: Summer 2019 DESC Collaboration Meeting, Paris, France.

February 2019. Emulating LSST Catalogs with Deep Learning. **Invited keynote**. Plenary session at the Winter 2019 DESC Collaboration Meeting, Berkeley, CA.

July 2018. *Catalog-Level Lens Finding with Variational Recurrent Autoencoders*. Oral presentation: Summer 2018 DESC Collaboration Meeting, Pittsburgh, PA.

Research Mentoring

2024-2025	Kyurae Kim Graduate Student	University of Pennsylvania
2023	Taro Makino Graduate Student	New York University
2022	Nathan Ng Graduate Student	University of Toronto
2022-2023	Joshua Fagin Graduate Student	City University of New York
2021-2020	Madison Ueland Undergraduate Summer Research Student	Stanford University
2019	Alex Fegghi Undergraduate Intern	NASA Ames Research Center

Outreach

(Planned)	Stanford Women in Engineering Invited Guest in the SWE Speaker Series	Stanford, CA
February 2024	US Particle Physics Featured in periodical <i>Particle Physics Builds STEM Leaders</i>	Online
January 2024	APS Conferences for Undergraduate Women in Physics (CUWiP) Invited Plenary Panelist	Stanford, CA
2019–2021	Stanford Physics Peer Mentoring Program Graduate Peer Mentor	Stanford, CA

Organizing activities

Dec 2025	NeurIPS 2025 Workshop: AI Virtual Cells and Instruments Co-organizer	San Diego, CA
October 2025	Uncertainty Quantification for Decision Making (UQ4DM) Workshop Co-organizer	Berkeley, CA
2025	Genentech Computational Sciences Internship Program Department Representative (AI for Drug Discovery)	South San Francisco, CA
2024–2025	Korean American Society in Biotech and Pharmaceuticals (KASBP) Organizing Committee, San Francisco Chapter	San Francisco Bay Area
2021–Present	Prescient Design Machine Learning Journal Club “Tea Time” Creator, Co-organizer	South San Francisco, CA
2019–2021	Breakfast Club (journal club on probabilistic ML for high energy physics) Organizer	Stanford, CA
2020	Summer 2020 DESC Collaboration Meeting Scientific Organizing Committee	Virtual
2016–2017	Korean-American Scientists and Engineers Association (KSEA) Co-President, Duke Chapter	Durham, NC
2013–2017	CHANCE (volunteer tutoring organization) Tutor, Vice President of Treasury	Durham, NC