Ziran Liu

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Education

New York University, Leonard N. Stern School of Business
Ph.D. in Operations Research — Invited to Beta Gamma Sigma 2016 – 2023
GPA: 3.91/4.0 — Focus: Probability and Its Applications

New York University, Courant Institute of Mathematical Sciences
s M.S. in Mathematics 2014 – 2016
GPA: 3.93/4.0 — Focus: Probability and Differential Geometry

Nankai University, Chern Institute of Mathematics
M.S. in Mathematics 2011 – 2014
GPA: 4.0/4.0 — Focus: Differential Geometry, Global Analysis on Manifolds

Nankai University, School of Mathematical Sciences
B.S. in Mathematics — Honored, Shiing-Shen Chern Class 2007 – 2011
GPA: 3.85/4.0

Research Interests

Math for AI and AI for math. Mathematically, my work is rooted in probability theory and differential geometry among other necessary topics.

Academic Positions

Fudan University, Research Institute of Intelligent Complex Systems
Postdoc Researcher Current
- Conducting research on complex systems and stochastic processes, with applications to optimization and intelligent systems. - Collaborating with interdisciplinary teams on mathematical models for system analysis.

SIMIS (Shanghai Institute for Mathematics and Interdisciplinary Sciences)
Postdoc Researcher Current
- Leading research initiatives on mathematical modeling, queueing theory, and stochastic analysis. - Developing solutions to large-scale optimization problems for interdisciplinary projects.

UC Berkeley, Department of Statistics
Lecturer (position terminated due to visa issues) 2024
- Delivered undergraduate courses on probability theory, including topics such as stochastic processes, Markov chains, central limit theorem, and Poisson processes. - Developed teaching materials to strengthen conceptual understanding of random variables and probability applications.

Cardinal Operations
Visiting Scholar 2024
- Conducted research on stochastic processes, reflected Brownian motion, and queueing theory applications. - Collaborated with data science and engineering teams to implement optimization

strategies for operational systems.

New York University, Stern School of Business
Instructor, Operations Management 2019
- Designed and taught undergraduate courses on operations research, focusing on optimization, scheduling, and queueing theory applied to business problems. - Applied real-world case studies to demonstrate theoretical models' relevance to business operations.

New York University, Courant Institute of Mathematical Sciences
Recitation Leader, Mathematics for Economics 2016
- Led problem-solving sessions for students in a course covering combinatorics, probability, and optimization. - Provided practical examples to enhance understanding of mathematical applications in economics.

New York University, Courant Institute of Mathematical Sciences
Teaching Assistant, Analysis III 2015
- Developed lecture notes, graded assignments, and created problem sets for a real analysis course. - Supported students in mastering complex mathematical concepts through targeted tutoring and office hours.

Publications and Preprints

Joint Multifractal Spectra for Correlated Gaussian Multiplicative Chaos and an Application to Circular β-Ensembles
Ziran Liu, *Preprint*, 2026.

Discrepancy of Pseudorandom Vectors Generated by Elliptic Curves in the Non-Maximal-Period Regime
Ziran Liu and Chung Pang Mok, *Preprint*, 2026.

APS Spectral Flow for Selective Propagation in Geometric Deep Learning
Ziran Liu, *Preprint*, 2026.

State-Dimension Laws for Prediction: Hankel Geometry of Finite-Memory Predictors
Ziran Liu, *Preprint*, 2026.

Information-Constrained Prophet Inequalities via Kolmogorov–Wiener Prediction Theory
Ziran Liu, *Preprint*, 2026.

Gaussian Chaos Noise: Variational Noise Design for Reliable Deep Learning
Ziran Liu, *Submitted for Publication*, 2026.

Effective Hamiltonian and Asymptotics Rate for a Periodic Feynman–Kac Functional
Ziran Liu, *Preprint*, 2025.

Variational Kernel Design for Internal Noise: GCh Noise and Representation Compatibility in Deep Learning
Ziran Liu, *Submitted for Publication*, 2025.

Approaching the Prescribed Gaussian Curvature by Discrete Conformality
Ziran Liu and Tianqi Wu, *Submitted for Publication*, 2024.

Reflected Brownian Motion with Drift in a Wedge
Peter Lakner, Ziran Liu, Josh Reed, *Queueing Systems*, 2023.

Reflected Brownian Motion and its Applications to Differential Geometry and Index Theory
Ziran Liu, *Ph.D. Thesis*, New York University, 2023.

Stationary Gaussian Processes and the Kolmogorov–Wiener Prediction Problem
Ziran Liu, *M.S. Thesis*, New York University, 2016.

Lichnerowicz Type Vanishing Theorem for Mathai-Zhang Index
Ziran Liu, *M.S. Thesis*, Nankai University, 2014.

A Lichnerowicz Vanishing Theorem for Proper Cocompact Actions
Ziran Liu, *Preprint*, 2013.

Recent Conferences and Invited Talks

RMT Summer School in Japan 2025, Kyoto University
- Poster Session: Cognition Meets Coulomb: VERA Beliefs Flow Like Log-Gases – A Γ-Convergence Perspective
- September 8–12, 2025

Nankai University, Symplectic Geometry Seminar
- Talk: Lecture on Hofer Length
- June 20, 2025

The 13th National Conference in Probability and Statistics, Xiamen, China
- Invited Session I: Probability II, Advanced Probabilistic Models and Experiment Designs
- November 9, 2024

INFORMS 2024 Annual Meeting, Seattle, WA, USA
- Invited Session: Interacting Particle Systems and Stochastic Networks
- October 23, 2024

Languages

English (Native/Bilingual), Chinese (Native/Bilingual)

Awards and Honors

Ernest Kurnow Fellowship, NYU Stern School of Business 2021 – 2022
NYU Stern Doctoral Fellowship, New York University 2016 – 2020
Outstanding Student Prize, Nankai University 2009 – 2010

References

Paul Bourgade
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New York University.

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Michel Mandjes
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Shanghai Institute for Mathematics and Interdisciplinary Sciences (SIMIS),
and Fudan University.
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