JIAJIE (JERRY) LUO

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Last update: November 12, 2025

EMPLOYMENT

Postdoctoral Scholar October 2024 – Present
The Knowledge Lab
University of Chicago
Faculty Mentor: Professor James Evans

Ph.D. Research Intern June 2022 – September 2022
Mathematics, Statistics, and Data Science
Pacific Northwest National Laboratory
Mentors: Dr. Tegan Emerson; Dr. Gregory Henselman-Petrusek Roek

EDUCATION

University of California, Los Angeles September 2019 – June 2024
Ph.D. in Mathematics.
Thesis Title: Topics in Persistent Homology and Complex Social Systems
Advisor: Professor Mason Porter

University of California, Santa Barbara September 2017 – June 2019
M.A. in Mathematics.
Thesis Title: On Abstract Witt Rings and Quadratic Extensions
Advisor: Professor Bill Jacob

University of California, Santa Barbara September 2014 – June 2017
College of Creative Studies
B.S. in Mathematics, *Highest Honors*
Faculty Advisor: Professor Jeffrey Stopple

RESEARCH INTERESTS

Topological Data Analysis, Persistent Homology and Applications, Complex Systems, Opinion Dynamics on Networks

PREPRINTS & PUBLICATIONS

1. **J. Luo**, G. Henselman-Petrusek, *Interval Decomposition of Infinite Persistence Modules over a Principal Ideal Domain*, arXiv:2511.07614
2. G. J. Li, **J. Luo**, W. Chu, *Bounded-Confidence Models of Multi-Dimensional Opinions with Topic-Weighted Discordance*, To appear in *SIAM Journal on Applied Dynamical Systems*, arXiv:2502.00284
3. **J. Luo**, G. Henselman-Petrusek, *Interval Decomposition for Persistence Modules Over a Principal Ideal Domain*, Published in *Foundations of Computational Mathematics*.

4. G. J. Li*, **J. Luo***, M. A. Porter (*Equal Contribution), *Bounded-Confidence Models of Opinion Dynamics with Adaptive Confidence Bounds*, Published in *SIAM Journal on Applied Dynamical Systems*.

5. A. Hickok*, B. Jarman*, M. C. Johnson*, **J. Luo***, M. A. Porter (*Equal Contribution), *Persistent Homology for Resource Coverage: A Case Study of Access to Polling Sites*, Published in *SIAM Review*.

6. V. Chayes, K. Miller, R. Bhalerao, **J. Luo**, W. Zhu, A. Bertozzi, W. Liao, S. Osher, *Pre-Processing and Classification of Hyperspectral Imagery Via Selective Inpainting*, Published in *ICASSP2017*.

EXPOSITORY ARTICLES

G. J. Li, **J. Luo**, K. Peng, and M. A. Porter. *Using Mathematics to Study How People Influence Each Other's Opinions*, Published in *Frontiers for Young Minds*.

AWARDS, HONORS & FELLOWSHIPS

Pacific Journal of Mathematics Dissertation Prize	2024
ModEling and uNdersTanding human behaviOR (MENTOR) Fellowship	2021–2022
College of Creative Studies Commencement Speaker	2017
Adil Yaqub is my Hero Scholarship	2016

TALKS & PRESENTATION

IMSI Workshop: The Geometric Realization of AATRN August 2025
Interval Decomposition of Persistence Modules over a Principal Ideal Domain (Poster + Lightning Talk)

IMSI Workshop: Emergent Behavior in Complex Systems of Interacting Agents March 2025
Bounded-Confidence Models of Opinion Dynamics with Adaptive Confidence Bounds (Poster Session)

Southern California Applied Mathematics Symposium (SOCAMS) April 2024
Bounded-Confidence Models of Opinion Dynamics with Adaptive Confidence Bounds

Graduate Student Topology and Geometry Conference (GSTGC2024) April 2024
Interval Decomposition of Persistence Modules over a Principal Ideal Domain (Poster Session)

Joint Mathematics Meetings 2024 (JMM 2024) January 2024
AMS Special Session on Complex Social Systems I
Persistent Homology for Assessing Facility Placement (Invited Talk)

2023 Algorithms for Threat Detection PI Workshop (ATD2023) October 2023
Bounded-Confidence Models of Opinion Dynamics with Adaptive Confidence Bounds

Computation Persistence Workshop (ComPer23) September 2023
Interval Decomposition for Persistence Modules of Free Abelian Groups

SIAM Conference on Applications of Dynamical Systems (DS23) May 2023
Bounded-Confidence Models of Opinion Dynamics with Adaptive Confidence Bounds

Southern California Applied Mathematics Symposium (SOCAMS) April 2023
Persistent Homology for Resource Coverage: A Case Study of Access to Polling Sites

SIAM Workshop on Network Science (NS22) September 2022
Bounded-Confidence Models with Adaptive Confidence Bounds

Virtual Research Symposium, Pacific Northwest National Laboratory. August 2022
Topological Data Analysis and Machine Learning

TEACHING EXPERIENCE

As Graduate Student Instructor (UCLA)

Math 110A: Abstract Algebra	Winter 2024
Math 115A: Linear Algebra (proof-based)	Winter 2023

As Graduate Teaching Assistant (UCLA)

Math 31AL: Differential and Integral Calculus Laboratory	Winter 2021
Math 115A: Linear Algebra (proof-based)	Fall 2020, Spring 2021
Math 31B: Integration and Infinite Series	Spring 2020
Math 33A: Linear Algebra and Application	Winter 2020, Fall 2020, Spring 2021
Math 3B: Calculus for Life Sciences II	Fall 2019, Winter 2021

As Graduate Teaching Assistant (UCSB)

Math 117: Methods of Analysis	Spring 2019
Math 108A: Introduction to Linear algebra (proof-based)	Winter 2019
Math 4A: Linear Algebra and Applications	Fall 2018
MATH 100B: Mathematics for Elementary Teaching II	Summer 2018
Math 34B: Calculus for Social Sciences II	Winter 2018, Spring 2018
Math 34A: Calculus for Social Sciences I	Fall 2017

UNDERGRADUATE MENTORING

Research Mentoring:

William Flowers — Bounded-Confidence Models of Opinion Dynamics	Fall 2024 – Present
Yuexuan Wu — A Bounded-Confidence Model with Adaptive Edge Weights	Summer 2024 – Present
Leila Thompsky — A Bounded-Confidence Model with Adaptive Edge Weights	Fall 2023 – Present
Amos Ancell — Persistent Homology for Resource Coverage	Fall 2023 – Spring 2024
Ruyi Lu — Bounded-Confidence Models on Random Configuration Models	Winter 2023 – Fall 2023
Xinyue (Serena) Li — Persistent Homology for Resource Coverage	Winter 2023 – Spring 2023
Xiaohe (Haley) Zhang — Bounded-Confidence Models with Repulsion	Winter 2022 – Spring 2022

Directed Reading Program:

DRP Committee	Fall 2021 – Spring 2024

Students:

Yuexuan (Yolanda) Wu — Models of Opinion Dynamics	Spring 2024
Leila Thompsky — Complex Social Systems	Fall 2023
Amos Ancell — Applied Topology, Persistent Homology	Winter 2023 – Spring 2023
Xinyue (Serena) Li — Applied Topology, Persistent Homology	Fall 2022 – Winter 2023
Ruyi Lu — Opinion Dynamics on Networks	Fall 2022 – Winter 2023
Haoyang Lyu — Applied Topology, Persistent Homology	Winter 2022 – Spring 2022
Chenxin (Amy) Shen — Applied Topology, Persistent Homology	Fall 2021 – Spring 2022
Xiaohe (Haley) Zhang — Opinion Dynamics on Networks	Fall 2021 – Winter 2022
Tanishq Bhatia — Topics in Persistent Homology	Winter 2021 – Spring 2021

Other Mentoring:

Mentor for UCLA Applied Mathematics REU (ATD Traffic Challenge)	Summer 2021

Students:

- Matthew Hudes (Tufts University)
- Naji Sarsam (UCLA)
- Chenxin (Amy) Shen (UCLA)
- Wenwen Tang (USC)

MISCELLANEOUS

Citizenship: United States
Programming Experience: Python, MATLAB, R., C++

Languages: Chinese (Mandarin), English.