

Research Appointments

Complex Systems and Social Physics (2018-Present)

University of Chicago, Urban Science Lab/Murugan Lab *Graduate RA* Aug 2020-Present
Studying cooperation and inequality through the intersection of dynamical systems and information theory

- *Theory*: Independently derived closed-form expressions for various stochastic processes.
- *Programming*: Monte-Carlo simulations of stochastic agent-based models. Census data processing, curve fitting, and Bayesian optimization

Université de Lausanne, Département des Operations *Visiting Scholar* Jun-Sep 2023
Bayesian learnings models of dynamical principal agent problem

MIT, Metric Geometry and Gerrymandering Group *RA, Computational Thry.* Jun-Jul 2018
Mathematical modeling and data analysis of address problems in congressional redistricting

Condensed Matter Experiment (2016-20)

University of Chicago, Bernien Lab *Ph.D RA, Exper. and Computational Thry.* Oct 2018-Oct 2020
Founding graduate student in an atomic physics lab development quantum computers and simulators

- *Lab*: Implementing high-precision laser network for manipulating individual Rubidium and Cesium atoms using dynamically driven optical tweezers; CAD design/fabrication of equipment
- *Programming*: Hardware-accelerated dynamic computation of atom rearrangement RF tones, interfaced with arbitrary waveform generator (C++).
- *Theory*: Computational analysis of tight-binding Hamiltonians (Python); Metric development and analysis for computationally characterizing topological Hamiltonians.

Tufts University, Surface Physics Lab: *RA, Exper. and Computational Thry.* May 2016-May 2018
Studying conductivity of metal nanocrystals in the presence of surface scatterers in ultrahigh vacuum.

California Institute of Technology, LIGO: *RA, Exper. and Computational Thry.* Mar-Oct 2017
Cryogenic temperature control and error propagation modeling for LIGO Voyager R&D

Teaching Experience

University of Chicago: *Teaching Assistant*

- Data Science for Energy & Environmental Research Bootcamp Sep 2020
- ENST 246: Introduction to Urban Science Oct 2020-Oct 2022

Oral and Poster Presentations

Bayesian Origins of Growth, Cooperation, and Inequality in populations of learning agents Mar-Aug 2023
Accepted Abstract, APS March Meeting
Invited Seminar, University of Chicago, Computational and Applied Math Program
Invited Speaker, The Abdus Salam International Centre for Theoretical Physics, QLS
Invited Speaker, University of Lausanne, Department of Operations

Novel Dynamical Models of Wealth and Cooperation Using Information Theory Mar 2023
Invited Workshop, University of Chicago, MACSS Program

Dynamics of Inequality in Stochastic Models of Growth and Bayesian Origin of Growth Rates Jul 2022
Invited Speaker, London Mathematical Laboratory

Probing Topological Quantum Systems with Cold Atoms Nov 2019
Accepted Abstract, NSBP Annual Conference

Producing Behaviors of the Free Electron Model using N-Body Random Walks May 2018
Invited Speaker, Concord Consortium

Temperature Control and Coupled Oscillator Modeling for LIGO Voyager R&D Nov 2017
Invited Speaker, NSBP Annual Conference

Selected Publications

- Information Synergy Maximizes the Growth Rate of Heterogeneous Groups*
JT Kemp, AG Kline, LMA Bettencourt, preprint arXiv:2307.01380. 2023
- Learning Increases Growth and Reduces Inequality in Stochastic Environments*
JT Kemp, L Bettencourt, PNAS Nexus PNAS Nexus, pgad093. 2023
- Statistical Dynamics of Wealth Inequality in Stochastic Models of Growth*
JT Kemp, LMA Bettencourt, Physica A Vol 607, 128180. 2022
- Dual-element, two-dimensional atom array with continuous-mode operation*
K Singh, *et. al.*, Physical Review X 12 (1), 011040. 2022

Awards and Recognition

- ThinkSwiss Research Scholarship* Jun 2023
- National Science Foundation Graduate Research Fellowship* Apr 2020
- Best Speaker in Photonics and Optical Physics* Nov 2019
- National Society of Black Physicists Annual Conference
- Carl Rousse Fellowship* Jul 2017
- Caltech LIGO, National Society of Black Physicists

Leadership Experience

- Equity, Diversity, and Inclusion Office, UChicago PSD: Student Advisor** Feb 2018-Present
- Organizing events for the graduate student body focused on engendering community focused on marginalized identities.
 - Spoke at diversity recruitment panels, and recruited on behalf of the division in national conferences.
 - Mentoring fellow graduate students
- Tufts Community Union: Class of 2018 Senator** May 2017-May 2018
- Society of Physics Students, Tufts University Chapter: Vice President** May 2017 - May 2018
- Coordinated research symposiums, educational talks by Tufts and outside researchers. Planned community outreach events.
- Tufts Club Basketball: Founder/President** Sep 2016-May 2018
- A club to foster community of basketball players and fans at Tufts.*

Skills

Technology: C++/C, Python, LaTeX, Django, Mathematica, HTML/CSS, Regression fitting, ARCGIS, Photoshop, DAQ, analog circuits, communications management

Languages: Intermediate German, beginner Chinese Hebrew, and French

Interpersonal: Enthusiastically collaborates as member of group. Able to enter new space, learn skills, and promptly become a productive member. Reliably completes independent tasks on time