

Education

- Tufts University B.S., Physics** Sep 2014-Jun 2018
Senior Thesis: Simulating the effects of surface defects on thin-metal conductivity.
- University of Chicago M.S. (equivalent), Physics** Sep 2018-Jun 2020
Capstone: Design and operation of 2D dual species atomic tweezer array.
- University of Chicago Ph.D., Physics** Jun 2020-Present
Thesis (Proposed): The Bayesian origin of growth, cooperation, and inequality in stochastic models of growth.

Research Experience

- University of Chicago, Mansueto Institute/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
- University of Chicago, Bernien Lab Graduate Research Assistant** Oct 2018-Oct 2020
Founding graduate student in an atomic physics lab simulating quantum systems using trapped atoms
- *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.
- MIT, Metric Geometry and Gerrymandering Group Research Intern** Jun-Jul 2018
Summer research program utilizing mathematical techniques to address congressional redistricting issues
- *Programming:* Refactored Wisconsin voter data from disparate sources (Python);
 - *Theory:* Application of Shannon information in studying county splitting; Developing discrete compactness methods for Gerrymandering analysis
- California Institute of Technology, LIGO SURF: Summer REU** Mar-Oct 2017
Cryogenic temperature control and error propagation modeling for LIGO Voyager R&D
- *Lab:* Conducting cryogenic measurements; Analyzing silicon disk mechanical spectrum using optical lever
 - *Theory:* Designing and implementing error propagation model for coupled oscillators (Mathematica)
- Tufts University, Surface Physics Lab: Research Assistant** May 2016-May 2018
Exploring the effects of surface scatterers on the conductivity of metal nanocrystals.
- *Lab:* Assembling ultra-high vacuum chamber; interfacing spectroscopy and RGA modules; designing PID heating system and cooling fluid transportation network

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

<i>Bayesian Origins of Growth, Cooperation, and Inequality in populations of learning agents</i> Accepted Abstract, APS March Meeting	Mar 2023
<i>Dynamics of Inequality in Stochastic Models of Growth and Bayesian Origin of Growth Rates</i> Invited Speaker, London Mathematical Laboratory	Jul 2022
<i>Probing Topological Quantum Systems with Cold Atoms</i> Accepted Abstract, NSBP Annual Conference	Nov 2019
<i>A Cryogenic Testbed for High-Q Thin Films and Optical Coatings</i> Poster Session, APS DAMOP Annual Conference	May 2019
<i>Producing Behaviors of the Free Electron Model using N-Body Random Walks</i> Invited Speaker, Concord Consortium	May 2018
<i>Temperature Control and Coupled Oscillator Modeling for LIGO Voyager R&D</i> Invited Speaker, NSBP Annual Conference	Nov 2017

Selected Publications

<i>The Bayesian Origins of Growth Rates in Stochastic Environments</i> JT Kemp, L Bettencourt, arXiv preprint arXiv:2209.09492.	2022
<i>Statistical Dynamics of Wealth Inequality in Stochastic Models of Growth</i> JT Kemp, LMA Bettencourt, Physica A Vol 607, 128180.	2022
<i>Dual-element, two-dimensional atom array with continuous-mode operation</i> K Singh, <i>et. al.</i> , Physical Review X 12 (1), 011040.	2022

Awards and Recognition

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

Leadership Experience

Equity, Diversity, and Inclusion Office, UChicago PSD: Student Advisor	Feb 2018-Present
<ul style="list-style-type: none"> 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
<ul style="list-style-type: none"> Established senior thesis support group, and ran campaign assessing state of social, academic, and living spaces of Tufts campus culminating in end-of-year report and presentation 	
Society of Physics Students, Tufts University Chapter: Vice President	May 2017 - May 2018
<ul style="list-style-type: none"> Coordinated research symposiums, educational talks by Tufts and outside researchers. Planned community outreach events. 	
Tufts Club Basketball: Founder/President	Sep 2016-May 2018
<i>A club to foster community of basketball players and fans at Tufts.</i> <ul style="list-style-type: none"> Managed competition team by coordinating games with other Boston area schools. 	

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