Daniel Tamor Liu Citron

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EDUCATION AND TRAINING

University of Washington — Seattle, WA
Postdoctoral Researcher — 2017 – Present
Advisor: David L. Smith

Cornell University — Ithaca, NY
Ph.D. Theoretical Physics; Experimental Physics Minor — 2011 – Present
M.S. Physics — 2014
Committee: Christopher R. Myers, Chair; Paul Ginsparg; Paul McEuen

University of Chicago — Chicago, IL
B.A. Physics with Honors — 2009
Senior Honors Thesis: "Simulating Jamming in Granular Materials"

AWARDS & FELLOWSHIPS

NSF Graduate Research Fellowship (Cornell University) — 2012
Phi Beta Kappa (University of Chicago) — 2009

RESEARCH INTERESTS

- Strategic planning for malaria elimination
- Applied infectious disease modeling
- Human travel as driver of imported infections
- Cluster randomized trial design
- Modeling vaccine efficacy
- Collaboration network assembly

MALARIA ELIMINATION

Effects of Spatial Uncertainty in Malaria Transmission — Seattle, WA
Postdoctoral Researcher — 2017 – Present

- Adapted geospatial estimate maps of malaria prevalence to simulate malaria transmission
- Utilized simulation model to estimate health outcomes following different interventions
- Performed sensitivity analysis of health outcomes to uncertainty in geospatial maps

Mapping Human Mobility Patterns and Malaria Importation — Seattle, WA
Postdoctoral Researcher — 2017 – Present

- Worked with collaborators to model patterns of travel on Bioko Island using survey data.
- Integrated travel survey data into malaria transmission simulation model
- Estimated malaria prevalence attributable to cases acquired off-island

Cluster Randomized Trial Design — Seattle, WA
Postdoctoral Researcher — 2017 – Present

- Adapted malaria transmission models to estimate vaccine efficacy
- Developed framework for selecting optimal sites cluster randomized trials

MODELING PROJECTS

Network Analysis of Ecology of Vector-Borne Disease Transmission Seattle, WA
Postdoctoral Researcher 2017 – Present

- Developed spatially-explicit simulation model of mosquito ecology and behavior
- Constructed transmission networks to characterize distribution of infectious secondary bites

Contact Network Heterogeneity and Persistence of Disease Ithaca, NY
Graduate Research Assistant, Cornell University 2014 – 2017

- Derived and solved equations describing disease model on annealed networks
- Utilized computer simulations to verify and augment the numerical results
- Explored how contact network heterogeneity affects disease persistence

Infectious Disease Dynamics Ithaca, NY
Graduate Research Assistant, Cornell University 2013 – 2017

- Programmed a variety of software tools for simulating disease dynamics in Python and Julia
- Performed mathematical analyses of stochastic models using moment closure techniques

DATA SCIENCE PROJECTS

Network Assembly in Scientific Collaboration Networks Ithaca, NY
Graduate Research Assistant, Cornell University 2016
Complex Systems Summer School, Santa Fe Institute 2015

- Used topic modeling software to detect subfields of articles in a large scientific corpus
- Created Python tools for studying development of scientific collaboration networks
- Measured patterns in network community formation across variety of scientific subfields

Measuring Patterns in Text Reuse in Scholarly Corpus Ithaca, NY
Graduate Research Assistant, Cornell University 2012

- Converted raw data into social network dataset for easy visualization and exploration
- Measured rate and distribution of text reuse in online database of scientific articles (arXiv)
- Discovered negative correlation between citation count and amount of reused text

SOFTWARE AND HARDWARE DEVELOPMENT

MACRO: a spatially-explicit, agent-based simulation of malaria transmission Seattle, WA
Postdoctoral Researcher 2017 – Present

- Worked with collaborators to develop and design simulation software
- Verified and validated simulation outputs

Synchrotron X-Ray Tomography Experiment Argonne National Lab, Chicago IL
Research Support Staff, GSECARS 2010 – 2011

- Improved synchrotron X-ray tomography experiment at Advanced Photon Source
- Rewrote IDL software to allow for faster tomographic data collection
- Redesigned user interface for controlling tomography experiment
- Designed and built optical mount for new tomography experiment apparatus

Software Testing of Implantable Medical Device Yehud, Israel
Biomedical Engineering Intern, Biocontrol Medical 2009

- Designed firmware test protocol for electronic wand used to communicate with the device

- Performed tests on software for programming the device

PUBLICATIONS

- Sean L. Wu, Daniel T. Citron, et al, "Exploring effects of inefficient malaria transmission with an agent-based simulation model." *In preparation*
- Daniel T. Citron, Carlos A. Guerra, et al. "Propagating spatial uncertainty through a simulation model of malaria transmission on Bioko Island." *In preparation*
- Sean L. Wu, et al. "Vector bionomics and vectorial capacity as emergent properties of mosquito behaviors and ecology." *In preparation*
- Carlos A. Guerra, Su Yun Kang, Daniel T. Citron, et al. "Human mobility patterns and malaria importation on Bioko Island." *Accepted by Nature Communications 2019*
- Daniel T. Citron, Samuel F. Way. "Network assembly of scientific communities of varying size and specificity." *Journal of Informetrics, 12*(1), DOI:https://doi.org/10.1016/j.joi.2017.12.008
- Daniel T. Citron, Paul Ginsparg. "Patterns of Text Reuse in a Scientific Corpus." PNAS 2014; published ahead of print December 8, 2014, DOI:10.1073/pnas.1415135111
- Mark L. Rivers, Daniel T. Citron, Yanbin Wang. "Recent Developments in Computed Tomography at GSECARS," Proc. SPIE 7804, 780409 (2010), DOI:10.1117/12.861393
- X. Cheng, G. Varas, D. Citron, H. Jaeger, and S. Nagel. "Collective Behavior in a Granular Jet: Emergence of a Liquid with Zero Surface Tension," Physical Review Letters, Vol. 99, Nov. 2007

CONFERENCES AND WORKSHOPS

Applied Simulation Modeling for Interrupting Malaria Transmission on Bioko Island
7th Annual Disease Modeling Symposium — April, 2019

Agent-Based Modeling for Malaria Policy
African Health Economics and Policy Association Conference — March, 2019

Network Analysis of Mosquito Habitats for Controlling Vector-Borne Pathogens
NetSci — June, 2018

Contact Network Heterogeneity and Persistence of Endemic Disease
NetSci — June, 2017

Network Assembly in Scientific Collaboration Networks — Northwestern U.
International Conference on Computational Social Science — June, 2016

Network Analysis of ArXiv — Santa Fe Institute
SFI Complex Systems Summer School 2015 — June, 2015

Moment Closure Analysis of SIRS Disease Model on Heterogeneous Networks
APS March Meeting 2015 — March, 2015

Accounting for Fluctuations in Stochastic SIRS Model on Networks — U. of Pittsburgh
International Workshop on Advances in Discrete Networks — December, 2014

TECHNICAL SKILLS

Programming Languages and Tools

- R, Python, Mathematica, SQL, Julia, HTML, Git, Unix, Matlab, Octave

Methods

- Discrete- and Continuous-time Stochastic Models, Dynamical Models on Complex Networks
- Computational Network Analysis, Topic Modeling (MALLET)

COURSEWORK

SISMID University of Washington, Summer 2018

- Statistics, Monte Carlo methods, partially-observed Markov processes

Complex Systems Summer School Santa Fe Institute, Summer 2015

- Computational complexity, social network modeling and analysis, agent-based modeling

Machine Learning Coursera, Summer 2014

- Logistic regression, neural networks, clustering, principle component analysis

Introduction to Data Science Coursera, Summer 2014

- SQL, MapReduce, decision trees and random forests, model cross-validation

Computational Physics Cornell University, Spring 2014

- Linear algebra, numerical methods for differential equations, Monte Carlo, optimization

Applied Stochastic Processes Cornell University, Fall 2013

- Markov Processes, branching processes, random walks, Martingales, renewal theory

Nonlinear Dynamics and Chaos Cornell University, Spring 2013

- Bifurcations; nonlinear oscillators, iterated mappings, chaos, attractors, fractals

TEACHING EXPERIENCE

Instructor Cornell University

Physics GRE Preparation Short Course Spring 2013, 2014, 2015, 2016

- Designed syllabus and lecture slides for 6-week course
- Gave lectures and led discussions to review undergraduate physics material for exam

Teaching Assistant Cornell University

Electricity and Magnetism (honors sequence) Spring 2016
Mechanics and Special Relativity (honors sequence) Fall 2014, 2015
Introduction to Electricity and Magnetism Spring 2012
Mechanics and Heat Fall 2011

EDUCATION COURSEWORK

Science Communication Fellowship Pacific Science Center, Spring 2018

- Trained to communicate ongoing researchwith Science Center visitors
- Developed interactive activity illustrating infectious disease modeling

An Introduction to Evidence-Based Undergraduate STEM Teaching Fall 2016

CIRTL online course, administered through edX

- Participated in weekly Cornell campus discussion group

- Reviewed current research-supported trends in undergraduate STEM teaching
- Applied new knowledge of active learning to develop an annotated example lesson plan

Teaching in Higher Education Cornell University, Spring 2016

- Developed a syllabus and example lesson plan for introductory physics courses
- Presented on and demonstrated use of peer instruction and other active learning techniques

SERVICE AND OUTREACH

Pacific Science Center Seattle, WA

Volunteer Spring 2018 – Present

- Participated in quarterly "Meet a Scientist" events at the science center
- Discussed disease modeling research with science center visitors using interactive activities

Destination Imagination Central New York

Board Member and Volunteer Spring 2015 – Summer 2017

- Organized and supervised two large events with 50-100 K12 students
- Supervised educational team-building exercises with groups of 5-10 K12 students

Cornell Center for Materials Research Outreach Cornell University

Volunteer Summer 2014 – Summer 2017

- Conducted science outreach with 10-30 elementary school students
- Performed physics and chemistry demonstrations and explained basic scientific concepts
- Supervised small groups of 2-3 students to help them conduct simple experiments

Graduate & Professional Students Assembly Cornell University

Chair, Faculty Awards Committee Fall 2014 – Fall 2015

Physics Field Representative Fall 2013 – Spring 2016

- Attended biweekly meetings to discuss issues and initiatives relevant to graduate students
- Communicated with peers in physics department about events and other GPSA activities
- Planned faculty awards ceremony with small group of graduate student peers

Physics Graduate Society Cornell University

Treasurer, Event Coordinator Summer 2012 – Spring 2013

- Organized lecture on science communication given by extra-departmental speaker
- Organized STEM graduate student summer colloquium series
- Conducted science outreach activities with community elementary school students and parents

University of Chicago Scavenger Hunt University of Chicago

Judge (event organizer) 2009 – 2014

- Collaborated closely with group of 15-20 individuals to plan four day University-wide event
- Organized successful Guinness World Record as World's Largest Scavenger Hunt in 2011

UNDERGRADUATE RESEARCH

Two-Dimensional Jamming Transition Chicago, IL

Undergraduate Research Assistant, University of Chicago 2008 – 2009

- Developed computer simulation in Fortran to explore jamming transition in soft discs
- Studied behavior of system's displacement field above and below jamming

– Collaborated with an experimentalist to compare simulation results to real-world phenomena

Simulating Role of Friction in Granular Physics Santiago, Chile

Undergraduate Research Assistant Universidad de Chile Summer 2008

– Utilized molecular dynamics software to simulate a shaken quasi-2D granular system
– Performed mathematical analysis of simulation outputs to calculate structure factor
– Investigated the role of friction in creating/destroying long-range order

Numerical Modeling of Cell Division Chicago, IL

University of Chicago Physics REU Summer 2007

– Modeled cell division as a viscous fluid drop pinching off
– Numerically solved differential equations of fluid motion in mathematica

Measurements of Granular Jet Behavior Chicago, IL

University of Chicago Physics REU Summer 2006

– Studied the rebound behavior of a granular jet striking a target at high velocity
– Collected and analyzed experimental data using high-speed video camera
– Empirically compared the granular jet's behavior to a fluid with zero surface tension