

Chantal Nguyen

BioFrontiers Institute

University of Colorado Boulder

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EDUCATION

University of California, Santa Barbara (UCSB)

2013–2019

Ph.D., Physics

Advisor: Jean M. Carlson, Professor

Dissertation: Multiscale network characterization of the strength and resilience of trabecular bone

M.A., Physics, 2016

California State University, Los Angeles (CSULA)

2008–2013

B.S. *magna cum laude*, Physics, 2013

RESEARCH

Postdoctoral Associate, BioFrontiers Institute, University of Colorado Boulder

2019–

Advisor: Orit Peleg, Assistant Professor

Cost-benefit tradeoffs and information flow in networks of interacting plants:

- Developing experimentally-driven computational model of light-mediated interactions and self-organized growth of sunflowers
- Measuring growth, morphology, and behavior of touch-responsive *Mimosa pudica* plants under controlled environmental conditions to inform model of collective effects of behavioral plasticity
- Analyzing efficiency, robustness, and resilience of information flow in network models of plant systems

Graduate Student Researcher, Department of Physics, UCSB

2015–2019

Advisor: Jean M. Carlson, Professor

Novel insights into strength and health of trabecular bone:

- Developed novel network-based method of modeling trabecular bone (a tissue resembling a web of connected struts) for efficient, direct comparison of mechanics and architecture
- Simulated fracture with finite element analysis on beam-based structures representing 3-D realizations of bone networks; identified relationships between network topology and mechanisms of crack propagation

- Validated novel magnetic resonance (MR) technique for probing fine tissue structure; determined predictive marker of bone health from simulated MR measurements

Data-driven modeling of decision making in natural disaster evacuation:

- Developed stochastic models of collective human decision making in evacuation scenarios, driven by data from a behavioral experiment
- Characterized decision making under social influence and group vote

Optimal vaccine allocation during an infectious disease outbreak:

- Developed a stochastic form of the susceptible-infected-recovered (SIR) model to simulate infectious disease epidemics occurring in two interacting communities
- Identified optimal vaccination strategies given level of interaction between communities, and time delay between outbreak and vaccine deployment

Summer Undergraduate Research Fellow, California Institute of Technology 2012
Advisor: Christopher M. Hirata, Professor

- Wrote program to calculate upper limits of foreground pulsar and synchrotron radiation in 21-centimeter spectra in order to determine the difficulty of isolating 21-cm signals

Undergraduate Researcher, Spitzer Science Center, California Institute of Technology 2011–2012
Advisor: Donald W. Hoard, Research Scientist

- Constructed and analyzed light curves of white dwarf binary WD 0957-666
- Determined constraints for eclipse non-detection; calculated maximum inclination angle

JOURNAL PUBLICATIONS

- C. Nguyen**, D. Peetz, A. E. Elbanna, and J. M. Carlson. (2019) Characterization of fracture in topology-optimized bioinspired networks. *Physical Review E* 100(4): 042402.
- A. Mondal, **C. Nguyen**, X. Ma, A. E. Elbanna, and J. M. Carlson. (2019) Network-based models for characterization of trabecular bone. *Physical Review E* 99(4): 042406.
- C. Nguyen**, K. J. Schlesinger, F. Han, I. Gür, and J. M. Carlson. (2018) Modeling individual and group evacuation decisions during wildfires. *Fire Technology* 55(2): 517.
- C. Nguyen**, K. J. Schlesinger, T. W. James, K. M. James, R. L. Sah, K. Masuda, and J. M. Carlson. (2018) Novel magnetic resonance technique for characterizing mesoscale structure of trabecular bone. *Royal Society Open Science* 5: 180563.
- C. Nguyen** and J. M. Carlson. (2016) Optimizing real-time vaccine allocation in a stochastic SIR model. *PLOS ONE* 11(4): e0152950.

PUBLICATIONS IN CONFERENCE PROCEEDINGS

- C. Nguyen**, K. J. Schlesinger, and J. M. Carlson. (2017) Data-driven models for individual and group decision making. In the *Proceedings of the 2017 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining*. doi.org/10.1145/3110025.3116204
- C. Nguyen**, K. J. Schlesinger, and J. M. Carlson. (2017) Collective decision dynamics in group evacuation. In the *Proceedings of the Summer Computer Simulation Conference 2017*. doi.org/10.22360/SummerSim.2017.SCSC.002

AWARDS AND FELLOWSHIPS

GSNP Student Speaker Award Finalist, American Physical Society	2019
DBIO Shirley Chan Student Travel Grant, American Physical Society	2019
Graduate Opportunity Fellowship, UCSB Graduate Division	2017
Worster Summer Research Fellowship (as graduate mentor), UCSB Physics	2017
Doctoral Student Travel Grant, UCSB Academic Senate	2017
Chair's Outstanding Service Award, UCSB Physics	2017
Herbert P. Broida Fellowship, UCSB Physics	2013
Doctoral Scholars Fellowship, UCSB Graduate Division	2013
Summer Undergraduate Research Fellowship, California Institute of Technology	2012
Roland L. Carpenter Memorial Scholarship, CSULA Physics and Astronomy	2012
Larry Chu Scholarship, CSULA Physics and Astronomy	2011

CONFERENCE PRESENTATIONS

- APS March Meeting Mar 4, 2019
 Talk: "Characterization of Fracture Resistance and Robustness in Network-Based Models of Bone"
 Boston, MA
- APS March Meeting Mar 5, 2018
 Talk: "Complex Network Analysis of Bone for Understanding Multiscale Mechanisms of Strength"
 Los Angeles, CA
- Memory Formation: From Condensed Matter to Biological Matter and Beyond Feb 13, 2018
 Poster: "Quantifying Architectural Mechanisms for Fracture Resistance in Trabecular Bone with Network Models"
 Kavli Institute for Theoretical Physics, Santa Barbara, CA

Workshop on Social Influence	Jul 31, 2017
IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining	
Talk: "Data-Driven Models for Individual and Group Decision Making"	
Sydney, Australia	
Summer Computer Simulation Conference	Jul 10, 2017
Talk: "Collective Decision Dynamics in Group Evacuation"	
Bellevue, WA	

TEACHING

Teaching Assistant, UCSB

Observational Astrophysics	Spring 2015
<ul style="list-style-type: none"> • Upper division elective course for physics majors • Led laboratory sections, graded homework assignments and lab reports 	
Advanced Mechanics	Winter 2015
<ul style="list-style-type: none"> • Upper division required course for physics majors • Led discussion and review sections, graded exams 	
Introductory Experimental Physics A	Fall 2015, Winter 2014
<ul style="list-style-type: none"> • Lower division introductory course for life sciences majors • Led laboratory sections, graded lab reports 	
Introductory Experimental Physics B	Spring 2014
<ul style="list-style-type: none"> • Lower division introductory course for life sciences majors • Head TA; organized duties of other TAs for the course • Led laboratory sections, graded lab reports and exams 	

MENTORING

Avik Mondal, UCSB physics undergraduate student	2017–2018
Imtiaz Ali, UCSB physics undergraduate student	2015–2016

SKILLS

- Programming languages: MATLAB, Python
- Other applications: Mathematica, LaTeX, Abaqus FEA, Adobe Creative Suite, Processing
- Operating systems: Mac OS, Windows, Linux
- Languages: English (native), French (basic)

OTHER ACTIVITIES

Organizing committee member for the 2019 Conference for Undergraduate Women Physics at UCSB	2018–2019
Board member, UCSB Women in Physics	2015–2019
<ul style="list-style-type: none">• Organized round-table discussions on the gender gap and sexual harassment in academia• Organized lunch talks with visiting women professors and scientists from local companies• Organized advice sessions on research involvement and applying to graduate school for UCSB undergraduates• Participated in outreach activities and science demonstrations at local schools and the Girls Inc. after-school program	
Physics Circus, UCSB	2013–2019
<ul style="list-style-type: none">• Led science demonstrations at local elementary schools	
Secretary, CSULA Physics and Astronomy Club	2012–2013