William S. Chang-Cuello

Curriculum Vitae

CONTACT INFORMATION

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EMPLOYMENT

Los Alamos National Laboratory

Position: Postdoctoral Researcher   2022 - present

Supervisors: Dr. Carrie Manore, Dr. Sara Del Valle

Rutgers University – New Brunswick

Position: Hill Assistant Professor   2019 - 2022

Mathematical and Physical Sciences Ascending
Postdoctoral Research Fellow (2021-2022)

Supervisors: Dr. Konstantin Mischaikow, Dr. Juan Bonachela

EDUCATION

University of California, Davis

Ph.D., Applied Mathematics   2012 - 2019

Thesis: Persistence of Single and Multispecies Systems in the Face of Environmental Uncertainty

Adviser: Dr. Sebastian J. Schreiber

University of California, Berkeley

B.A., Pure Mathematics, Italian Studies   2007 - 2012

UC Education Abroad Program - Bologna, Italy   2012

TEACHING

Rutgers University – New Brunswick (Lecturer)   **2019 - 2021**

Discrete and Probabilistic Models in Biology (Math 338)	Spr. 2021
Intro to Abstract Algebra I (Math 351)	Fal. 2020
Intro to Linear Algebra (Math 250)	Fal. 2020
Intro to Real Analysis I (Math 311)	Spr. 2020
Discrete and Probabilistic Models in Biology (Math 338)	Spr. 2020
Mathematical Statistics (Math 481)	Fal. 2019

University of California – Davis (TA and Lecturer)   **2012 - 2019**

Precalculus (TA; Math 12)

Short Calculus (TA; Math 16B)

Calculus for Biologists (IOR, TA; Math 17A,B,C)

Calculus for Math and Engineering (TA; Math 21A,B,C,D)

History of Mathematics (TA; Math 111)

Ordinary Differential Equations (TA; Math 119A)

Mathematical Biology (TA; Math 124)

Real Analysis (TA; Math 125A)

Applied Mathematics (TA; Math 207C)

SERVICE

Rutgers University Research Experience for Undergraduates (REU)	Sum. 2020, 2021
UC Davis Stem Cafe Tutor at the Women's Resources and Research Center (WRRC)	2014 - 2018
California State Summer School for Mathematics and Science (COSMOS) (UC Davis)	Sum. 2016
Co-organizer of UC Davis Qualifying Exam Workshop for Graduate Groups of Applied and Pure Mathematics	Win. 2016
California State Summer School for Mathematics and Science (COSMOS) (UC Davis)	Sum. 2015

PUBLICATIONS

W.S. Cuello, J. Tipton, E. Romero-Severson, E. Hsieh, and C. Manore. "Predicting mosquito abundances across the United States using integral projection models." In prep.

W.S. Cuello and J. Bonachela. "Modeling blebbing and lysis in *Emiliania Huxleyi* virus populations." In prep.

W.S. Cuello and S.J. Schreiber. "A Mathematical Framework for Multispecies Systems Undergoing Small Environmental Fluctuations." In prep.

W.S. Cuello, M. Gameiro, J. Bonachela, K. Mischaikow. "Widespread Ecological Networks and their Dynamical Signatures (WENDy)." bioRxiv (2023). Submitted to *The American Naturalist*.

R. Frantz, H. Godinez, K. Martinez, **W.S. Cuello**, and C. Manore. Age Structured Partial Differential Equations Model for Culex Mosquito Abundance. Available at SSRN 4680323 (2022).

W.S. Cuello, J.R. Gremer, A. Sih, P.C. Trimmer, D.L. Venable, and S.J. Schreiber. "Extinction Risk of Sonoran Desert Annuals Following Potential Changes in Precipitation Regimes." bioRxiv (2022). Submitted to *The American Naturalist*.

P.H. Crowley, P.C. Trimmer, O. Spiegel, S.M. Ehlman, **W.S. Cuello**, and A. Sih. "Predicting habitat choice after rapid environmental change." *The American Naturalist* 193, no. 5 (2019): 619-632.

W.S. Cuello, J.R. Gremer, P.C. Trimmer, A. Sih, and S.J. Schreiber. "Predicting evolutionarily stable strategies from functional responses of Sonoran Desert annuals to precipitation." *Proceedings of the Royal Society B* 286, no. 1894 (2019): 20182613.

W.S. Cuello. "Persistence of Single and Multispecies Systems in the Face of Environmental Uncertainty." Ph.D. Thesis. University of California, Davis (2019).

W.S. Cuello, T.A.T. Janes, J.M. Jessee, M.A. Venecek, M.E. Sawyer, C.R. Eklund, and M.V. Evans. "Physiologically based pharmacokinetic (PBPK) modeling of metabolic pathways of bromochloromethane in rats." Journal of toxicology 2012 (2012).

PROGRAMMING LANGUAGES

R, Rstudio

Programmed discrete-time stochastic models to track long-term population dynamics (e.g. predicting seed densities of Sonoran Desert Annuals using precipitation and seed-yield data).

Estimated unknown parameters of population models via statistical regressions (e.g. binomial and tobit regressions)

Used parallel computing on a cluster to keep track of multiple, large-scale simulations (e.g. tracking multiple lineages of a population for millions of iterations)

Hierarchical clustering analyses (e.g. grouping geographical regions by interactions and duration of contacts)

Python, Jupyter Notebook

Coded scripts for data manipulation (e.g., string parsing and data cleaning).

Analyzed long-term effects of species-to-species interactions via network analyses.

AWARDS & FELLOWSHIPS

Mathematical and Physical Sciences Ascending   2021 - 2022
Postdoctoral Fellowship ($300,000 for 3 years; accepted $100,000 for 1 year)
Combinatorially modeling community dynamics and investigating how species' densities change as a function of their interactions.

NJ-NExT Fellow   2021 - 2022
Professional development program for academic careers

William K. Schwarze Scholarship ($10,000)   Spr. 2017
Award for excellence in teaching and scholarship

UC Davis GGAM Departmental Fellowship   2013-15, 2017
Semester-long funding for graduate research

SEMINAR TALKS & RESEARCH PROGRAMS

Oregon State University   Spr. 2024
Seminar Presentation – mathematical presentation on combinatorial framework
for determining long-term persistence of species within predator-prey and
mutualistic networks.

Society of Vector Ecology   Fal. 2023
Seminar Presentation – demonstrating my framework for translating life cycle
diagrams into integral projection models and output population dynamics.

SIAM Conference on Applications of Dynamical Systems   Sum. 2023
Association for Women in Mathematics (AWM) presentation – showing how
combinatorial dynamics can bypass the mathematical challenges that come
with traditional ODE models.

Los Alamos National Laboratory   Sum. 2022
Seminar Presentation – predicting how increased variance and overall reduction
in rainfall affect Sonoran Desert Annuals' seed densities and germination
rates. Predicting what life-history traits will drive these changes the most.

Montana State University   Spr. 2022
Seminar Presentation – introducing Widespread Ecological Dynamics and
their Dynamical Signatures (WENDy), i.e., combinatorial modeling of species'
interactions and dynamics.

Tulane University, New Orleans, LA   Fal. 2019
Seminar Presentation – predicting long-term behavior and germination rates
of Sonoran Desert annuals. Modeling species interactions with their environment
via stochastic difference equations.

University of California, Davis, Davis, CA   Spr. 2019
MathBio Seminar – Thesis presentation and exit seminar.

Zuse Institute Berlin, Berlin, Germany   Sum. 2017
Graduate-Level Research in Industrial Projects for
Students in Berlin (GRIPS)
Summer Research – Using convolutional neural networks to predict 3D facial
structures from 2D facial images.

North Carolina State University, Raleigh, NC   Sum. 2011
Research Experience for Undergraduates (REU+)
Poster Conference – Using compartment modeling to determine the metabolism
of bromochloromethane within rats.

REFEREE

Referee for Journal of Dynamics and Differential Equations

Referee for Journal of Mathematical Biology

Referee for Proceedings of the Royale Society B

CONFERENCES & WORKSHOPS

Society of Vector Ecology in South Carolina	Fal. 2023
SIAM Portland	Fal. 2023
Rules of Life Workshop	Apr. 2022
Joint Mathematics Meetings JMM workshop – Mathematical Modelling Of Real-World Infectious Disease Epidemics	Apr. 2022
Computational Persistence Workshop – Purdue	Nov. 2021
NJ-Mathematical Association of America Meeting	Apr. 2021
NJ-NExT Fellows Workshop	Apr. 2021
Theoretical Ecology Seminar Series	2020 - 2021
UC Davis DataLab Introduction to Git Workshop	Dec. 2020
Banff International Research Station	May 2020
Nat'l Institute for Math and Bio Synthesis (NIMBioS) Math Modeling of Malaria Transmission by Mosquitoes	Apr. 2020
University of Delaware, Newark, Delaware Workshop on Topology: Identifying Order in Complex Systems	Nov. 2019
Centre de Recherches Mathématiques: Topological and Rigorous Computational Methods for High Dimensional Dynamics	Apr. 2019
MSRI Stochastic Partial Differential Equations	Jul. 2014
GGAM Mini-Conference	Jan. 2014
GGAM Mini-Conference	Jan. 2013

Sebastian Schreiber

Position: Professor (Dept. of Evolution and Ecology) (Thesis Advisor)

Institution: University of California – Davis

Email: sschreiber@ucdavis.edu

Jennifer Gremer

Position: Associate Professor (Dept. of Evolution and Ecology)

Institution: University of California – Davis

Email: jrgremer@ucdavis.edu

Konstantin Mischaikow

Position: Professor (Dept. of Mathematics)

Institution: Rutgers University

Email: mischaik@math.rutgers.edu

Juan Bonachela

Position: Assistant Professor (Dept. of Ecology, Evolution, and Natural Resources)

Institution: Rutgers University

Email: juan.bonachela@rutgers.edu

Timothy Lewis

Position: Professor (Dept. of Mathematics) (Teaching)

Institution: University of California – Davis

Email: tjlewis@math.ucdavis.edu

Andy Sih

Position: Professor (Dept. of Environmental Science & Policy)

Institution: University of California – Davis

Email: asih@ucdavis.edu