CV: Daniel B. Weissman *(Last updated: July 29, 2021)*

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Education

PhD, Stanford University (2010) Physics. Thesis: "Epistasis and Evolution".
Advisers: Marc Feldman, Daniel Fisher
BA, Harvard College (2005) Physics and Mathematics

Positions

2015– : Assistant Professor of Physics, Emory University
2014–2015 : Postdoctoral researcher, UC Berkeley (adviser: Oskar Hallatschek)
2014: Research Fellow, Simons Institute for the Theory of Computing, UC Berkeley
2010–2013: Postdoctoral researcher, IST Austria (adviser: Nick Barton)

Concurrent positions

2017–: Core Faculty, Initiative in the Theory and Modeling of Living Systems (TMLS), Emory University
2017– : Associated Assistant Professor of Biology, Emory University
2015–: Faculty, Population Biology, Ecology, and Evolution (PBEE) Graduate Program, Emory University

Funding

Current

2021-2023: Sloan Research Fellowship, $75k total
2021-2022: PI, Synergy II Nexus Award / MP3 Initiative Seed Grant, "Mapping the eco-evolutionary landscape of antibiotic resistance and virulence in the bacterial pathogen *Staphylococcus aureus*", $83k total
2020-2023: co-PI, Emory MP3 Initiative Seed Grant, "Characterizing molecular regulation of *Acinetobacter baumannii* phenotypes to understand its spread dynamics in a host community", $300k total
2018–2023: co-PI, NSF PoLS 1806833 subcontract from Georgia Tech, "Collaborative Research: Formation of a High-Flux Student Research Network (HF-SRN) as a Laboratory for Enhancing Interaction in the PoLS SRN", $1.9M total, subcontract $500k total
2017–2022: Simons Investigator Award in the Mathematical Modeling of Living Systems, $660k total

Completed

2019-2021: co-I, NIH R21 AI138079-01A1, "*C. trachomatis* within-host genomic diversity and transmission between female anatomic sites", $469k total

Teaching

Emory:

Physics 152: Intro to Electricity & Magnetism (Spring 2019)
Physics 365: Electricity & Magnetism (Fall 2015, Fall 2016, Fall 2017)

Physics 421: Thermodynamics (Spring 2017, Spring 2020, Spring 2021)
Physics 502: Mathematical Physics (Fall 2019)
Physics 731R: Quantitative Population Biology (Spring 2018)
Co-instructor, IBS 592: Quantitative Methods in PBEE (Spring 2018)
Co-instructor, IBS 594: Evolutionary Biology (Spring 2016)

University of Vienna: Co-instructor, Molecular Population Genetics (Spring 2013)

Stanford and IST Austria: Teaching assistant for undergraduate and graduate courses in physics, mathematics, and biology (2008–2012)

Harvard University: Tutor, Physics Question Center (2003–2005)

See Service/Outreach below for K-12 teaching

Awards and honors

2021: Sloan Research Fellowship (as listed above)
2017: Simons Investigator Award in the Mathematical Modeling of Living Systems (as listed above)
2014: Postdoc travel award, Society for Molecular Biology and Evolution (declined)
2014: Research Fellowship, Simons Institute for the Theory of Computing
2012: 2nd prize, postdoc/faculty talks, Population Genetics Group, Glasgow
2008–2010: Stanford Graduate Fellowship
2005–2008: NSF Graduate Research Fellowship
2005: University of Cambridge, Herchel Smith Scholarship (declined)
2005: *Summa cum laude* (Harvard), highest honors (Physics Department)
2005: Stride-Rite Award for outreach and service (Harvard)
2005: Phi Beta Kappa
2001–2005: John Harvard Scholar
2002–2003: Detur Prize (Harvard)

Awards and honors to group members

2021, Brent Allman: Berl Boykin Fierce Leadership Award, Emory Office of LGBT Life
2021, Brent Allman: Bouchet Graduate Honor Society induction
2019, Brent Allman: Kharen Fulton Diversity Award, Emory Laney Graduate School
2018, Brent Allman: Student of the Year, Emory PBEE
2018, Brent Allman: Travel Award, U. Washington Summer Institute in Statistics and Modeling of Infectious Disease
2018, Mahan Ghafari: Communicate Your Science Award, Genetics Society UK
2017-2020, Brent Allman: Graduate Research Fellowship, NSF
2017, Brent Allman: Travel Award, NIMBioS workshop on Connecting Biological Data with Mathematical Models
2017, Caroline Holmes: McMullan Award, Emory College
2017, Brent Allman: Evidence-Focused Mini-Grant for Teaching, Emory Laney Graduate School
2016, Mahan Ghafari: Travel Award, 10th q-bio conference
2016, Mahan Ghafari: Scholarship, q-bio Summer School
2016, Mahan Ghafari: Professional development Travel Award, Emory Laney Graduate School
2015-2020, Tyler Smith: Woodruff Fellowship, Emory Laney Graduate School

Talks and conferences

Invited talks

"Inferring dispersal patterns and gene interactions from genetic sequencing data" (2021) Networks Seminar, University of Houston

"Inferring spatial dynamics from genetic diversity and gene interactions from large bacterial phylogenies" (2021) Workshop on Quantitative Evolution, Phylogeny and Ecology: From Models to Data and Back, Institut Henri Poincaré, Paris

Cancelled due to COVID (2020) Workshop on the Mathematics of Microbial Evolution: Beyond the Limits of Classical Theory, Banff International Research Station, Canada

"Evolution in space" (2020) Bioinformatics and Genomics Seminar, University of North Carolina, Charlotte

"Evolution in space" (2019) Physics Colloquium, Georgetown University

"Evolution in space" (2019) Workshop on Out-of-Equilibrium Processes in Evolution and Ecology, Banff International Research Station - Casa Matemática Oaxaca

"Inferring spatial dynamics from genetic diversity" (2019) Telluride Science Research Center Workshop on Emergent Simplicity in Biophysical Dynamics

"Evolutionary theory: goals and methods" (2019) Telluride Science Research Center Workshop on Emergent Simplicity in Biophysical Dynamics

"Evolution in space" (2019) Physics Colloquium, Georgia Institute of Technology

"Learning influenza infection dynamics from genetic data" (2018) ITS Symposium, CUNY Graduate Center

"Clones, sex, and hitchhiking in space" (2018) Bar-Ilan University

"Clones, sex, and hitchhiking in space" (2018) Theory and Biology conference, Simons Foundation

"Evolution in spatially-structured populations" (2018) ITS Symposium, CUNY Graduate Center

"Inferring population dynamics from genetic diversity with minimal assumptions" (2017) Quantitative Biology Seminar, Cold Spring Harbor Laboratory

"Hitchhiking in space" (2017) Feldmania II, Stanford University

"Minimal-assumption historical inference from population-genomic data" (2017) Harvard University

"Inferring population dynamics from genomic diversity" (2017) Tel Aviv University

"Minimal-assumption inference from genomes" (2016) Populations, Evolution, and Physics conference, Aspen Center for Physics

"Genetic diversity in adapting, spatially-extended populations" (2014) Biology seminar, San Francisco State University

"The effect of gene interactions on evolution" (2014) Physics colloquium, Emory University

"The rate and dynamics of complex adaptation" (2013) Ecology & Evolution seminar, University of Lausanne

"The genomic effects of selective sweeps" (2012) Biomathematics seminar, University of Vienna

"The dynamics of complex adaptation" (2012) University of St. Andrews

"The effects of sweeps in large sexual populations" (2012) Institute of Evolutionary Biology seminar, University of Edinburgh

"The rate of adaptation in large sexual populations" (2011) Stanford University

"The rate of complex adaptation" (2010) University of Illinois at Urbana-Champaign

"The dynamics of complex adaptation" (2010) IST Austria

"The dynamics of complex adaptation" (2010) University of Pennsylvania

"Complex adaptations: crossing fitness valleys" (2010) KITP, UC Santa Barbara

"Complex adaptations and disease" (2010) UCLA

Home-institution seminars

"New approaches to microbial genetics" (2019) TMLS symposium, Emory
"Genetic hitchhiking in space" (2018) TMLS workshop, Emory
"From genomes to dynamics and back" (2015) PBEE seminar, Emory
"Minimal assumption inference from genomic data" (2014) Center for Theoretical Evolutionary Genomics seminar, UC Berkeley
"The rate and dynamics of complex adaptation" (2014) Statistical Mechanics seminar, UC Berkeley
"Estimating the coalescence time distribution from genomic data" (2014) Center for Theoretical Evolutionary Genomics seminar, UC Berkeley
"The dynamics of complex adaptation" (2014) Computational Theories of Evolution workshop, Simons Institute for the Theory of Computing, UC Berkeley
"What sets the rate of adaptation?" (2010) Think and Drink seminar, IST Austria

Contributed conference talks

Workshop on Physical Principles Governing the Organization of Microbial Communities (2018) Aspen Center for Physics
American Physical Society March Meeting (2018) Los Angeles, CA
American Physical Society March Meeting (2017) New Orleans, LA
American Physical Society March Meeting (2016) Baltimore, MD
Atlanta Systems Biophysics Workshop (2015)
Bay Area Population Genomics meeting (2014) UC Davis
ALIFE 14 (2014) New York City, NY
Quantitative Evolutionary Dynamics workshop (2013) University of Exeter, UK
Population Genetics Group 46 (2012) Glasgow, UK
Population Genetics Group 45 (2012) Nottingham, UK
European Society for Evolutionary Biology meeting (2011) Tübingen, Germany
KITP program on Microbial and Viral Evolution (2011) UC Santa Barbara
Population Genetics Group 44 (2011) Hull, UK
Evolution meeting (2009) Moscow, ID
Evolution meeting (2008) Minneapolis, MN

Conference posters

European Society for Evolutionary Biology meeting (2013) Lisbon, Portugal
Society for Molecular Biology and Evolution meeting (2012) Dublin, Ireland
Workshop on Selection in Population Genetics (2011) Paris, France
Gordon Research Conference on Microbial Population Biology (2009) Andover, NH
Society for Molecular Biology and Evolution meeting (2008) Barcelona, Spain

Other significant conference participation

iPoLS Education Meeting: Black in iPoLS (2021) Rice University, virtual
Growing Equity, Inclusion, and Diversity for the iPoLS Graduate Student Network Workshop (2020) Rice University, virtual
iPoLS Annual Meeting (2018) Rice University, Houston, TX
KITP program on Eco-Evolutionary Dynamics in Nature and the Lab (2017) UC Santa Barbara
Mind the Gap 4 (2013) Vienna, Austria
Symposium on the Evolution of Reproductive Isolation (2010) Prague, Czech Republic

Service/outreach

Emory service

Faculty Advisor, Emory College Honor Council, 2021–present
Member, Physics Diversity, Equity, and Inclusion (DEI) Committee, 2021–present
Faculty mentor, i-STEM Scholars, 2021
Member, GDBBS Web Advisory Committee, 2021
Member, LGS Woodruff Natural Science Selection Committee, 2021
IDASTP MP3 proposal reviewer, 2021
Co-organizer, TMLS workshop "SARS-CoV-2 modeling: What have we learned from this pandemic about how (not) to model disease spread?", 2021
Member, PBEE Diversity, Equity, and Inclusion committee, 2020–present
Member, PBEE Executive Committee, 2020–present
Chair, PBEE Seminar committee, 2019–present
Organizer, TMLS workshop "Can we predict the diversity of real populations?", 2020
External Member, Algebraic Number Theory Faculty Search committee, 2019–2020
Member, Physics Information Technology Staff Search committee, 2019
Volunteer, science enrichment at Fernbank Elementary, 2019
Reviewer, University Research Committee proposals, 2019
Co-organizer, TMLS symposium: "What is Theoretical Biological Physics in the Age of Quantitative Biology and Big Data?", 2019
Faculty participant, Emory Scholars program, 2018–present
Member, Information Technology Infrastructure subcommittee, 2018–present
Member, Experimental Biophysics Faculty Search committee, 2018–2019
Volunteer, Emory Science Club at Laurel Ridge Elementary, 2018
Core faculty, TMLS Initiative, 2017–present
Member, Physics Strategic Planning committee, 2017–present
Member, Physics Graduate Recruitment committee, 2017–present
Volunteer, Physics Live!, 2017–2019
Member, PBEE Seminar committee, 2016–2019
Participant, PBEE *ad hoc* Admissions committee, 2016–present
STEM Symposium: Recruitment committee, poster judge, program representative, 2016–2019
Member, Theoretical Physics Faculty Search committee, 2016–2017
Member, Physics Graduate Admissions committee, 2015–present
Co-organizer, QTM Quantitative Biology & Theoretical Biophysics seminar series, 2015–2016

Professional

Organizer: Focus Session on Evolutionary & Ecological Dynamics, APS March Meeting 2022
Associate Editor: American Naturalist (2021–)
Guest Editor: eLife, PLOS Computational Biology
Proposal reviewer: Israel Science Foundation, Simons Foundation
Lifetime memberships: American Physical Society, Society for the Study of Evolution
Reviewer for (among others): American Naturalist, Cambridge University Press, eLife, Evolution, Genetics, Journal of Evolutionary Biology, Journal of the Royal Society Interface, JSTAT, Journal of Theoretical Biology, Molecular Biology and Evolution, Molecular Ecology, mSphere, Nature Communications, NAR Genomics and Bioinformatics, PCI Evolutionary Biology, Philosophical Transaction of the Royal Society B, Physical Review E, Physical Review Letters, PLOS Biology, PLOS Computational Biology, PLOS Genetics, PLOS ONE, PNAS, Proceedings of the Royal Society B, Scientific Reports, Theoretical Population Biology

Before Emory

Stanford Science Bus: Science enrichment teacher in East Palo Alto Charter School, 2006–2010
Stanford Student Labor Action Coalition, 2006–2010
Boston Refugee Youth Enrichment: Science teacher, science director, summer school teacher, support staff, mentor, 2001–2005
Harvard Progressive Student Labor Movement, 2001–2005
East Central Illinois Refugee Mutual Assistance Center: Tutor, 2000–2001

Publications

Allman BE, Koelle K, **DBW** (2021) Heterogeneity in viral infections increases the rate of deleterious mutation accumulation. bioRxiv. DOI: 10.1101/2021.05.07.443113.

Rybnikov S, **DBW**, Hübner S, Korol AB (2021) Fitness dependence preserves selection for recombination across diverse mixed mating strategies. Journal of Theoretical Biology: 110849. DOI: https://doi.org/10.1016/j.jtbi.2021.110849. URL: https://www.sciencedirect.com/science/article/pii/S002251932100268X.

Ghafari M, Lumby CK, **DBW**, Illingworth CJR (2020) Inferring transmission bottleneck size from viral sequence data using a novel haplotype reconstruction method. Journal of Virology 94: e00014–20.

Smith T, **DBW** (2020) Isolation by distance in populations with long-range dispersal. bioRxiv. DOI: 10.1101/2020.06.24.168211.

Ghafari M, **DBW** (2019) The expected time to cross extended fitness plateaus. Theoretical Population Biology 129: 54–67.

Li ZRT, Zarnitsyna VI, Lowen AC, **DBW**, Koelle K, Kohlmeier JE, Antia R, Garcia-Sastre A (2019) Why are CD8 T cell epitopes of human influenza A virus conserved? Journal of Virology 93: e01534–18.

Allman BE, **DBW** (2018) Hitchhiking in space: ancestry in adapting, spatially extended populations. Evolution 72: 722–734.

Holmes CM, Nemenman I, **DBW** (2018) Increased adaptability to sudden environmental change can more than make up for the two-fold cost of males. Europhysics Letters 123: 58001.

DBW, Hallatschek O (2017) Minimal-assumption inference from population-genomic data. eLife 6: e24836.

Delarue M, **DBW**, Hallatschek O (2017) A simple molecular mechanism explains multiple patterns of cell-size regulation. PLoS ONE 12: e0182633.

Sobel Leonard A, **DBW**, Greenbaum BD, Ghedin E, Koelle K (2017) Transmission bottleneck size estimation from pathogen deep-sequencing data, with an application to human influenza A virus. Journal of Virology 91: e00171–17.

Van Cleve J, **DBW** (2015) Measuring ruggedness in fitness landscapes. Proceedings of the National Academy of Sciences 112: 7345–7346.

Arbilly M, **DBW**, Grodzinski U, Feldman MW (2014) Arms races between producers and scroungers can drive the evolution of social cognition. Behavioral Ecology 25: 487–495.

DBW (2014) Stress-induced variation can cause average mutation and recombination rates to be positively correlated with fitness. ALIFE 14: 43–44.

DBW, Hallatschek O (2014) The rate of adaptation in large sexual populations with linear chromosomes. Genetics 196: 1167–1183.

Trotter MV, **DBW**, Peterson GI, Peck KM, Masel J (2014) Cryptic genetic variation can make "irreducible complexity" a common mode of adaptation in sexual populations. Evolution 68: 3357–3367.

DBW, Barton NH (2012) Limits to the rate of adaptive substitution in sexual populations. PLoS Genetics 8: e1002740.

DBW, Feldman MW, Fisher DS (2010) The rate of fitness-valley crossing in sexual populations. Genetics 186: 1389–1410.

DBW, Desai MM, Fisher DS, Feldman MW (2009) The rate at which asexual populations cross fitness valleys. Theoretical Population Biology 75: 286–300.

Desai MM, **DBW**, Feldman MW (2007) Evolution can favor antagonistic epistasis. Genetics 177: 1001–1010.