OLIVIA M. GHOSH

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EDUCATION

Stanford University, Stanford, CA — Sep 2020 -
Ph.D. (ongoing) in Physics

Columbia University – Columbia College, New York, NY — September 2015 - May 2019
B.A. in Physics, 2019

University of Oxford – St Peter's College, Oxford, UK — October 2017-June 2018
Visiting Student – Physics

RESEARCH OVERVIEW

Dissertation title: Quantifying genotype-phenotype-fitness maps across environmental scales
Research description: I use high-throughput fitness assays with yeast, combined with mathematical modeling and data science approaches, to understand the structure of the mapping between genetic changes, phenotypic effects, and evolutionary fitness. I apply these techniques to understand adaptation via experimental evolution, and standing genetic variation and long-term evolution through a large collection of yeast natural isolates.

PUBLICATIONS AND MANUSCRIPTS

An empirical long-term competition among natural yeast isolates reveals that short-term fitness largely, but not entirely, predicts long-term fitness
Alexandra N Khristich, **Olivia M Ghosh***, Jean CC Vila, Shaili Mathur, Abhishek Dutta, Marion Garin, Joseph Schacherer, Dmitri A Petrov*

bioRxiv 2025.10.09.681448; doi: https://doi.org/10.1101/2025.10.09.681448

Low-dimensional genotype-fitness mapping across divergent environments suggests a limiting functions model of fitness
***Olivia M. Ghosh**, Grant Kinsler, Benjamin H. Good, Dmitri A. Petrov*

bioRxiv 2025.04.05.647371; doi: https://doi.org/10.1101/2025.04.05.647371

Quantitative measurement of viscosity in two-dimensional electron fluids
*Yihang Zeng, Haoyu Guo, **Olivia M. Ghosh**, Kenji Watanabe, Takashi Taniguchi, Leonid S. Levitov, Cory R. Dean*

arXiv:2407.05026v1, in review at *Science* (2024)

Massively parallel experimental interrogation of natural variants in ancient signaling pathways reveals both purifying selection and local adaptation
*José Aguilar-Rodríguez, Jean Vila, Shi-An A. Chen, Manuel Razo-Mejia, **Olivia M. Ghosh**, Hunter B. Fraser, Dan F. Jarosz, Dmitri A. Petrov*

bioRxiv 2024.10.30.621178 (2024)

Emergent evolutionary forces in spatial models of luminal growth and their application to the human gut microbiota
***Olivia M. Ghosh** and Benjamin H. Good*

Proceedings of the National Academy of Sciences, 119 (28) e2114931119 (2022)

High quality magnetotransport in graphene using the edge-free Corbino geometry
*Y. Zeng, J.I.A. Li, S.A. Dietrich, **Olivia M. Ghosh**, K. Watanabe, T. Taniguchi, J. Hone, and C.R. Dean*

Phys. Rev. Lett. 122, 137701 – (2019)

Search for diboson resonances in the llqq final state in pp collisions at 13 TeV with the ATLAS detector
Steve Alkire, Konstantinos Bachas, Gabriele Chiodini, Roberto Di Nardo, Flavia A. Dias, ***Olivia M. Ghosh****, Sarah Heim, Laser Seymour Kaplan, Christos Leonidopoulos, Eleni Mountricha, Alexey Myagkov, Alexander Oh, Arturos Sanchez Pineda, Jianming Qian, Elvira Rossi, Andrey Ryzhov, Savanna Shaw, Andreas Sogaard, Stefania Spagnolo, Sau Lan Wu, Zhaoxu Xi, Lailin Xu, Bing Zhou*

ATLAS Internal Note (2016)

AWARDS AND FELLOWSHIPS

Society for Modeling and Theory in Population Biology, Best Poster Award - NITMB, Chicago	2025
Paul Kirkpatrick Award for excellence in teaching undergraduate physics - Stanford University	2021
EDGE Doctoral Fellowship - Stanford University	2020
National Science Foundation Graduate Research Fellowship Program - Physics of Living Systems	2020
Cum Laude, Columbia University	2019
Dean's List, Columbia College	2019
John Jay Fellowship, Columbia University	2015
Francis Parker School Valedictorian	2015

RESEARCH EXPERIENCE

Petrov Lab – Stanford University — Stanford, CA
Ph.D. Student — *March 2021 -*

- Dissertation research

Good Lab – Stanford University — Stanford, CA
Ph.D. Student — *January 2021 -*

- Derived evolutionary dynamics expectations under simple spatial models of bacterial growth in the human gut microbiota
- Dissertation research

Quake Lab – Stanford University — Stanford, CA
Rotation Student — *September-December 2020*

- Generated ultrasound phantoms for experiment using nanobubbles with molecular markers and ultrasound imaging to identify neoangiogenesis.

Dean Lab – Columbia University — New York, NY
Undergraduate Researcher — *January 2017 - June 2019*

- Fabrication of two-dimensional nanoelectronic devices to study topological phenomena in graphene
- Perform transport measurements on Van der Waals heterostructure devices and analyze data

Contera Lab – University of Oxford — Oxford, UK
Undergraduate Researcher — *April -June 2018*

- Image magnetic nanowires in biophysics lab using Atomic Force Microscopy, for use in tissue engineering

Hughes Lab – CERN, Columbia University — Geneva, Switzerland
Undergraduate Researcher — *June-July 2016*

- Analyzed LHC data using ROOT, a C++ program, for the ATLAS experiment
- Edited ATLAS internal note for dilepton-dijet analysis

TEACHING EXPERIENCE

Stanford University

Fundamentals of Molecular Evolution, *Guest Lecturer*	Winter 2025
Quantitative Evolutionary Dynamics and Genomics, *Teaching Assistant*	Spring 2024
Quantum and Thermal Physics, *Teaching Assistant*	Summer 2021
Mechanics, *Teaching Assistant*	Spring 2021

Columbia University

Materials Science and Nanotechnology Summer High School Program, *Teaching Assistant*	Summer 2019

ORAL AND POSTER PRESENTATIONS

Nordita conference on Eco-evolutionary processes in context *Poster presentation*	July 2025
Molecular Mechanisms in Evolution Gordon Research Conference *Poster presentation*	June 2025
Society for Modeling and Theory in Population Biology at NITMB *Poster presentation and Discussion leader*	June 2025
Bay Area Population Genomics *Poster presentation*	October 2024
Chan-Zuckerberg Biohub Confab *Poster presentation*	October 2024
3rd Joint Congress on Evolutionary Biology, Symposium on Predictability in Evolution, *Oral presentation*	July 2024
Advanced Seminar in Microbiology *Oral presentation*	October 2024
National Institute for Theory and Mathematics in Biology,	
Emerging Directions Workshop *Poster presentation*	February 2024
Eco-evo lunch *Oral presentation*	February 2024
Society for Molecular Biology and Evolution, *Poster presentation*	July 2023
Molecular Mechanisms of Evolution Gordon Research Conference, *Poster presentation*	June 2023
Population, Evolutionary, and Quantitative Genetics, *Poster presentation*	June 2022
American Physical Society March Meeting, *Oral presentation*	March 2022
American Physical Society March Meeting, *Oral presentation*	March 2019

OUTREACH AND MENTORING

Teacher for Stanford Jail and Prison Education Program	Spring 2024 -
Organizer for Physics for Inclusion and Equity workshop	Summer 2024
Mentor through EDGE fellowship	2022-2024
Research mentor for high school student (3 months)	Summer 2022
Organizer for Conference for Undergraduate Women in Physics	2018