

QinQin Yu

Name before 2014: Qinsi Yu

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Interests and Background

My interests are in advancing our understanding of pathogen evolution and epidemiology with the goals of information public health and basic science. I use genomics and mathematical modeling approaches and am excited to collaborate with clinicians, public health practitioners, and experimental microbiologists. I have a particular interest in collaboration and capacity-building in international low-resource settings. I am currently exploring career opportunities in public health, government, non-profit, and academia.

My background is in biophysics and microbial evolution. In my PhD, I developed methods to quantify microbial evolution in laboratory and natural systems. In my postdoctoral research, I study how the evolution and spread bacterial pathogens are affected by pressures from the human immune system, as well as assessing the equitability of disease surveillance approaches. I also have experience in science policy, international development, science education, and public outreach.

Professional Experience

Postdoctoral Fellow, Harvard School of Public Health, 2022-present

- Research topics: bacterial pathogen evolution in response to the host adaptive immune system, equity in wastewater-based epidemiology
- Advisor: Dr. Yonatan Grad

Center for Disease Dynamics, Economics, and Policy (now the One Health Trust) and National Science Policy Network SciPol Scholar, January 2022

- Topic: research and writing for WHO Reports on National Action Plans for Antimicrobial Resistance (Mali, Kenya, Malawi)
- Mentors: Dr. Erta Kalanxhi (kalanxhi@cddep.org), Jessica Craig (craig@cddep.org)

IDEAS Social Innovation Challenge Fellow based in Kepler, Kigali, Rwanda, 2015-2016

- Project: Kepler Tech Lab: Developing an affordable skills-based engineering lab course in Rwanda.
- Paper: QinQin Yu, Jakob Dahl, Alphonse Habyarimana, Kepler Tech Lab: Developing an affordable skills-based engineering lab course in Rwanda, 2017 ASEE International Forum, <https://peer.asee.org/29290>.
- References: Pedro Reynolds-Cuellar, Dr. Chrystina Russell

Education

Ph.D, Physics, University of California, Berkeley, May 2022

- Dissertation topic: Empirical tools for studying genetic drift in microbial populations
- Committee: Dr. Oskar Hallatschek (chair), Dr. Hernan Garcia, Dr. Yun Song, Dr. Matt Traxler

Marine Biology Lab Physiology Course, 2019

B.S., Physics, Massachusetts Institute of Technology, 2015

- Thesis topic: Characterization of a two-color magneto-optical trap for a spin-squeezed optical lattice clock
- Thesis Advisor: Dr. Vladan Vuletic

Fellowships

National Science Foundation Graduate Research Fellowship, 2016-2021 (3 years tuition and stipend)

UC Berkeley Chancellor's Fellowship, 2017-2019 (2 years tuition and stipend)

MIT IDEAS Social Innovation Challenge and Public Service Center Fellowships, 2015

Illinois Distinguished Fellowship, University of Illinois Urbana-Champaign, 2015 (3 years tuition and stipend, declined)

Rabi Scholars, Columbia University, 2011 (declined)

National Merit Scholar, 2011

Awards, Grants, and Professional Development

Scholarship to attend the Summer Institutes in Statistics and Modeling in Infectious Diseases, Seattle, 2023

Qlife Quantitative Biology Winter School: Quantitative Viral Dynamics Across Scales, Paris, 2022

Selected for NextProf Science Workshop, University of Michigan virtual, 2021

UC Berkeley Graduate Assembly Travel Grant, 2019

UC Berkeley Academic Opportunity Fund, 2019

UC Berkeley Graduate Division Conference Travel Grant, 2017 and 2018

UC Berkeley Microbiology Student Symposium Best Graduate Student Poster, 2018

Joel Matthew Orloff Award in service to the MIT Physics Department, 2015

MIT John P. Huchra Memorial Fund Recipient, funding to observe at Magellan telescopes in Chile, January 2013

Presidential Scholar Finalist, 2011

Siemens Competition Regional Finalist, 2009

In Preparation

1. **QinQin Yu** and Yonatan Grad. Evaluating equity in sewer connectivity for wastewater-based epidemiology.
2. Joao Ascensao*, **QinQin Yu***, Kristen Lok, Oskar Hallatschek, Evolution of variation in descendant number in the *E. coli* Long Term Evolution Experiment.

Preprints

1. **QinQin Yu**, Joao Ascensao*, Takashi Okada*, Olivia Boyd, Erik Volz, Oskar Hallatschek. Lineage frequency time series reveal elevated levels of genetic drift in SARS-CoV-2 transmission. *bioRxiv* (2022).

Publications

1. **QinQin Yu**, Matti Gralka, Marie-Cécilia Duvernoy, Megan Sousa, Arbel Harpak, and Oskar Hallatschek. Mutability of demographic noise in microbial range expansions. *ISME J* (2021). <https://doi.org/10.1038/s41396-021-00951-9>

2. Milan Delor, Hannah L. Weaver, **QinQin Yu**, and Naomi S. Ginsberg. Imaging material functionality through three-dimensional nanoscale tracking of energy flow. *Nature materials* 19, no. 1 (2020): 56-62.
3. Jona Kayser, Carl F. Schreck, **QinQin Yu**, Matti Gralka, and Oskar Hallatschek. Emergence of evolutionary driving forces in pattern-forming microbial populations, *Philosophical Transactions of the Royal Society B*, 373: 20170106.
4. Heather R. Jacobson, Stefan Keller, Anna Frebel, Andrew R. Casey, Martin Asplund, Michael S. Bessell, Gary S. Da Costa, Karin Lind, Anna F. Marino, John E. Norris, Jose M. Pena, Brian P. Schmidt, Patrick Tisserand, Jennifer M. Walsh, David Yong, **Qinsi Yu**. High-Resolution Spectroscopic Study of Extremely Metal-Poor Star Candidates from the SkyMapper Survey, *The Astrophysical Journal*, Volume 807, Issue 1, 171, 2015.
5. A. Kawasaki, B. Braverman, **Q. Yu**, and V. Vuletic. Two-Color Magneto-Optical Trap with Small Magnetic Field for Ytterbium, *Journal of Physics B: Atomic, Molecular and Optical Physics*, 48 (2015) 155302.
6. M. J. Jackson, E. Lhotel, S. R. Giblin, S. T. Bramwell, D. Prabhakaran, K. Matsuhira, Z. Hiroi, **Q. Yu**, and C. Paulsen. Dynamic behavior of magnetic avalanches in the spin-ice compound $Dy_2Ti_2O_7$, *Physical Review B*, 90, Issue 6, 2014.
7. Andrew R. Casey, Stefan Keller, Alan Alves-Brito, Anna Frebel, Gary Da Costa, Amanda Karakas, David Yong, Kevin Schlaufman, Heather R. Jacobson, **Qinsi Yu**, and Cherie Fishlock. The Aquarius Co-Moving Group is Not a Disrupted Classical Globular Cluster, *Monthly Notices of the Royal Astronomical Society Main Journal*, Vol. 443, 828-851, 2014.
8. A. Frebel, **Q. Yu**, and H. Jacobson. A new r-process star with low abundances of r-process elements, *Nuclear Physics in Astrophysics VI Conference Proceedings*, 2013.
9. A. Frebel, A. Casey, H. Jacobson, and **Q. Yu**. Deriving Stellar Effective Temperatures of Metal-Poor Stars with the Excitation Potential Method, *The Astrophysical Journal*, 769, Issue 1, 57, 2013.

Invited Talks

1. MIT Physics of Living Systems Seminar, October 2022, Cambridge, MA. *Inferring genetic drift in SARS-CoV-2 transmission*.

Contributed Talks

1. Bay Area Population Genomics XIX, Stanford University, April 2022. *Lineage frequency time series reveal elevated levels of genetic drift in SARS-CoV-2 transmission in England*.
2. Bay Area Ecology and Evolution of Infectious Diseases conference, February 2022, virtual. *SARS-CoV-2 population heterogeneity and measurement noise in England*.
3. UC Berkeley Ecology and Evolution of Infectious Diseases seminar, October 2021, virtual. *SARS-CoV-2 lineage frequency fluctuations show evidence of elevated levels of genetic drift in transmission dynamics*.
4. UC Berkeley Center for Theoretical Evolutionary Genomics Seminar, September 2021, virtual. *SARS-CoV-2 effective population size over time and space*.
5. UC Berkeley Center for Theoretical Evolutionary Genomics Seminar, November 2020, virtual. *Evolution of genetic drift in E. coli*.
6. Microbial Ecology and Evolution Virtual Conference, August 2020. *The local mutational landscape of demographic noise in microbial range expansions*.
7. Evolutionary and Ecological Systems Biology Seminar, August 2020, virtual. *The local mutational landscape of demographic noise in microbial range expansions*.

8. American Physical Society March Meeting, March 2018, Los Angeles, CA. *Visualizing evolutionary forces with non-invasive spatial lineage tracking.*
9. Physics Department Graduate Student Seminar, February 2017, UC Berkeley. *Modeling biological evolution in self-organizing microbial colonies.*
10. UC Berkeley Biophysics Program Retreat, October 2017, Tomales Bay, CA. *Mechanical interactions in microbial biofilms and its effect on evolution.*
11. American Society for Engineering Education International Forum, June 2017, Columbus OH. Oral and poster presentations. Best poster award. *Kepler Tech Lab: Developing an affordable skills-based engineering lab course in Rwanda.*
12. Physics Department Graduate Student Seminar, February 2017, UC Berkeley. *Exploring noise in bacterial biofilm growth.*

Poster Presentations

1. 5th Workshop on Virus Dynamics, October 2021, virtual. *SARS-CoV-2 lineage frequency fluctuations show evidence of elevated levels of genetic drift in transmission dynamics*
2. Quantitative Evolution, Phylogeny and Ecology: From Models to Data and Back, January-February 2021, Institut Henri Poincaré, Paris, France, virtual. *The evolution of genetic drift in microbial populations.*
3. Bay Area Population Genetics Meeting, November 2019, UC Berkeley, Poster presentation and lightning talk. *Determinants of genetic drift in microbial range expansions.*
4. Molecular Mechanisms in Evolution Gordon Research Conference, June 2019, Stonehill College, MA. *Genotypic determinants of genetic drift in microbial range expansions.*
5. American Society for Microbiology Conference on Biofilms, October 2018, Washington DC. *Reconstructing evolutionary genealogies in biofilms.*
6. UC Berkeley Microbiology Student Symposium, May 2018, Best graduate student poster. *Structural features in bacterial biofilms and their influence on evolutionary dynamics.*
7. UC Berkeley Statistical Mechanics Meeting, January 2018, Berkeley, CA. *Structural features in bacterial biofilms and their influence on evolutionary dynamics.*

Policy Activities

National Science Policy Network SciPol Scholar, 2021

- 1 month full time residency at Center for Disease Control, Dynamics, and Policy, January 2022. Research topic: research and writing for WHO Reports on National Action Plans for Antimicrobial Resistance (Mali, Kenya, Malawi).

UC Berkeley Science Policy Group, 2017-2021

- Vice President of Campus Affairs, 2019-2020
 - Organized biweekly speaker series and communication workshops
 - Lead effort to create a graduate certificate program for Science and Technology Policy
 - Attended AAAS CASE workshop in Washington DC, met with representatives to advocate for basic science research funding

Policy Briefs

1. World Health Organization (2023). Malawi national action plan on antimicrobial resistance: review of progress in the human health sector. <https://www.who.int/publications/i/item/9789240065468>

2. World Health Organization (2022). Malawi national action plan on antimicrobial resistance: review of progress in the human health sector.
<https://www.who.int/publications/i/item/9789240056848>
3. World Health Organization (2022). Kenya national action plan on antimicrobial resistance: review of progress in the human health sector.
<https://www.who.int/publications/i/item/9789240062689>

Outreach Talks

1. The Compass Lectures at UC Berkeley, *Change and Probability in Microbial Evolution*, April 2022. 1-hour presentation to UC Berkeley undergraduate and graduate students.
2. Bay Area Physics Circle, *Chance in microbial evolution*, July 2021. 1-hour presentation to 15 middle and high schoolers.
3. Popping the Science Bubble Series at the Berkeley Public Library, *Chance in microbial evolution*, July 2021,
https://www.youtube.com/watch?v=2M3mN0lfgnM&ab_channel=PoppingtheScienceBubble.
4. Berkeley High School STEMInist Club Meeting Presentation, June 2020 and September 2021. 30 minute presentation to ~10 high school girls about research and my path in science.
5. Wonderfest Ask a Science Envoy, *Using bacteria to understand evolution in space and time*. May 2019, San Francisco, CA. 20-minute presentation to the general public.
6. Radio talk show interview on KPOO San Francisco. 1-hour interview to a general public audience about my personal and professional journey in science.
7. UC Berkeley Grad Slam, *Predicting unpredictability in evolution*, April 2019, Berkeley, CA. 3-minute thesis presentation to the general public. People's choice award winner.
8. CalAcademy NightLife Darwin Night Exhibition. February 2019. Created an interactive museum exhibit on my lab's research.
9. Popping the Science Bubble, *The Great American Solar Eclipse*, June 2017, Berkeley, CA. Half-hour seminar to the general public.

Non-academic writing

1. M. Brush, J. Liu, **Q. Yu**, Commentary: revamping graduate biophysics education, *Physics Today*, 2021,
<https://physicstoday.scitation.org/doi/10.1063/PT.6.3.20210623a/full/>.
2. E. Lee, E. Sullivan, V. Velan, **Q. Yu**, Bridging the culture gap between science and policy, *Berkeley Science Review* blog, 2019,
<https://berkeleysciencereview.com/2019/07/culture-science-policy/>.
3. **Q. Yu**, Falling in love with bacteriophage: an interview with Diana Fusco, *Berkeley Science Review* blog, 2019, <https://berkeleysciencereview.com/2019/03/fusco-bacteriophage/>.
4. E. Sullivan, K. Huynh, and **Q. Yu**, UC Berkeley must demand funding for basic research, *Op-Ed for the Daily Cal Newspaper*, 2019, <https://www.dailycal.org/2019/02/05/uc-berkeley-must-demand-funding-for-basic-research/>.
5. **Q. Yu**, The Cal Future Forum: An Exploration of Research to Save a Changing World, *Berkeley Science Review* blog, 2018, <https://berkeleysciencereview.com/2017/11/cal-future-forum-exploration-research-save-changing-world/>.
6. **Q. Yu**, Diversity's Positive Feedback Loop, *Berkeley Science Review* blog, 2017,
<https://berkeleysciencereview.com/2017/06/diversitys-positive-feedback-loop/>.

7. **QinQin Yu**, Jakob Dahl, Alphonse Habyarimana, Kepler Tech Lab: Developing an affordable skills-based engineering lab course in Rwanda, 2017 ASEE International Forum, Columbus, Ohio, <https://peer.asee.org/29290>.

Research mentorship

Graduate students

- 2020-2021, Aditya Prasad, UC Berkeley Physics (entered 2019)

Undergraduate students

- 2020-2021, Kristen Lok, UC Berkeley Bioengineering, Class of 2023
- 2020-2021, Can Goksal, UC Berkeley Molecular and Cell Biology, Class of 2021
- 2019-2020, Megan Sousa, UC Berkeley Linguistics and Public Health, Class of 2021
 - Summer Undergraduate Research Fellowship, 2020
 - Berkeley Physics Undergraduate Research Scholars Program, Spring 2020
- 2018-2019, Annie Cheng, UC Berkeley Bioengineering, Class of 2019

Teaching

Hallatschek Lab Summer Undergraduate Journal Club, Summer 2020.

Workshop Leader for UC Berkeley Conference for First Time Graduate Student Instructors in the Physical Sciences, Fall 2019

- Organized and led an interactive workshop for 30 participants on effective teaching strategies

Graduate Student Instructor, UC Berkeley, Principles of Molecular Biophysics, Spring 2017

- Designed and led weekly discussion sessions, graded assignments, held office hours, assisted in designing homework and exam questions.

Kepler Tech Lab, Kigali, Rwanda, 2015-2016

- Developed high-school level curricula, taught courses, facilitated professional development sessions with teachers.

Nuvu Labs, Cambridge, MA, May 2015

- Developed and taught a two-week hands-on module on building science equipment to middle schoolers.

Cambridge Science Festival, Cambridge, MA, 2015

- Taught hands-on relativity demos to 7th grade students.

MIT Junior Lab Undergraduate Teaching Assistant, Fall 2014

- Assisted in answering questions from third year physics undergraduates on experimental setup, data analysis, and presentations.

MIT Italy Global Teaching Labs, Crema, Italy, Jan. 2014

- Designed and taught a hands-on electrodynamics and magnetism course for a total of three hundred 4th and 5th year Italian high school students in English.

MIT Educational Studies Program, Summer 2013

- Prepared and taught a sequence of 7 lecture and seminar classes on quantum mechanics to ten 10-12th graders.

Service

Facilitator for the 11th Annual Workshop to Increase Diversity in Mathematical Modeling and Public Health hosted by CCDD and MIDAS, March 27-28, 2023

UC Berkeley Physics Department 1st Year Grad Mentor Buddy, 2018-2022

UC Berkeley Physics Department Colloquium Committee Student Representative, 2020-2021
UC Berkeley Physics Department Faculty Search Committee Student Member, 2019
Lab tours for Berkeley Connect Course, 2017, 2020
UC Berkeley Society of Womxn in the Physical Sciences, 2016-present

- Treasurer, 2019-2020
 - Wrote budget requests, managed spending, interfaced with financial analyst
- Head coordinator, 2018-2019
 - Managed a 10-person coordinator board in planning monthly events to promote women in physical science.
 - Organized discussions over tea with visiting female professors and postdocs in the physics department
- Outreach coordinator, 2017-2018
 - Organized a research shadow day for 10 local high school students.
 - Organized a graduate school information panel for 30 undergraduates.

MIT Undergraduate Women in Physics, 2011-2015

- President 2014-2015, Vice President 2013-2014
 - Planned social, educational, and outreach activities for a group of 25 undergraduate women physics majors.
 - Organized PhysEx, an annual event for high school students to explore physics at MIT. (physicsforgirls.wordpress.com)

Additional Research Experience

Rotation student, Naomi Ginsberg Group, UC Berkeley, Spring 2017.

- Microscope stage design and sample position stabilization method for interferometric scattering microscopy

Undergraduate Researcher, Vladan Vuletic Group, MIT.

- Characterization of a two-color magneto-optical trap for a spin-squeezed optical lattice clock, 2014-2015.
- Design and implementation of a laser frequency stabilization setup using optical fiber cavity feedback, 2013-2014.
- Optimization of imaging resolution in an optical setup with Zemax and construction of electronic control circuits. Summer 2013.

Summer Intern, Immanuel Bloch Group, Simon Fölling Subgroup, Ludwig Maximilian University, Munich, Germany, Summer 2014.

- Design and implementation of a stable laser setup with optical feedback.

Undergraduate Researcher, Anna Frebel Group, MIT, 2012-2013.

- Observation and analysis of spectra from metal-poor stars for determining elemental abundances.

Summer Intern, Carley Paulsen and Elsa Lhotel Groups, Institut Néel, CNRS, Grenoble, France, Summer 2012.

- Measurement of properties of frustrated magnetic materials with SQUID magnetometry.

Undergraduate Researcher, Benjamin Weiss Group, MIT, November 2011-May 2012.
Measurement and analysis of natural remnant magnetization in Apollo 15 lunar samples with SQUID magnetometry.

Skills

Computational: genomics, mathematical modeling, statistical inference, image analysis

Experimental: microscopy, microbiology wet lab, microfluidics

Software: bash, python, MATLAB, LaTeX

Foreign Language: Chinese (conversational), French (intermediate), German (intermediate)