Berkeley™ Miller Institute for Basic Research in Science

Lodge at Marconi on Tomales Bay

26th Annual Interdisciplinary Symposium

May 31 - June 2, 2024

Berkeley Miller Institute

About the Symposium

The Miller Institute's Annual Interdisciplinary Symposium samples broadly across the full spectrum of basic sciences by bringing together members of our scientific community over a weekend of talks and activities. We hope you find the sessions to be informative, enjoyable, and productive with new research collaborations emerging from discussions sparked by the presentations. This is also an opportunity for participants to meet and interact with the Miller Research Fellows, some of the brightest researchers now entering the sciences.

Your presence is especially valued as a distinguished "discussant" that is, an experienced scientist who can help facilitate discussions between the disciplines. We have put as much effort into choosing our invited guests as into choosing our speakers, because we believe that each participant contributes to the success of the Symposium. Thank you for joining us!

About the Institute

The Miller Institute for Basic Research in Science at the University of California, Berkeley is dedicated to the encouragement of creative research and investigation in the pure and applied sciences. Learn more about our programs for postdocs (left), Berkeley professors (middle), and visiting professors (right) below.

2024 Symposium Committee

Anna Barth, Miller Fellow 2021-2024, EPS

Michael Celentano, Miller Fellow 2021-2024, Statistics *

Clara Duman, Miller Institute Staff

Shashank Gandhi, Miller Fellow 2021-2024, MCB

Boryana Hadzhiyska, Miller Fellow 2022-2025, Physics

Hilary Jacobsen, Miller Institute Staff

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Michael Manga, Miller Institute Symposium Committee Chair

James Santangelo, Miller Fellow 2023-2026, IB

Carly Schissel, Miller Fellow 2022-2025, Chemistry

Veronika Sunko, Miller Fellow 2020-2023, Physics *

George Varnavides, Miller Fellow 2022-2025, MSE & Physics

Elena Zavala, Miller Fellow 2022-2025, MCB

* indicates a fellow has since completed their term

Executive Committee

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Executive Director
Astronomy & Physics

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Professor Alistair Sinclair
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Astrophysical Sciences, Princeton

Miller Institute Interdisciplinary Symposium 2024 Guest Speakers

Harmit Malik
Fred Hutchinson
Basic Sciences

Jonas Peters
Caltech
Chemistry

Eric Neuscamman
UC Berkeley
Chemistry

Mikhail Shapiro
Caltech
Chemical and Medical Engineering

Dianne Newman
Caltech
Biology and Geobiology

Nicholas Swanson-Hysell
UC Berkeley
Earth and Planetary Science

Rachel Pepper
University of Puget Sound
Physics and Biophysics

Special Presenter:
Mike Bostock
CEO & co-founder, Observable

Representative articles can be found here:

Harmit Malik
Division of Basic Sciences
Fred Hutchinson Cancer Center
hsmalik@fredhutch.org

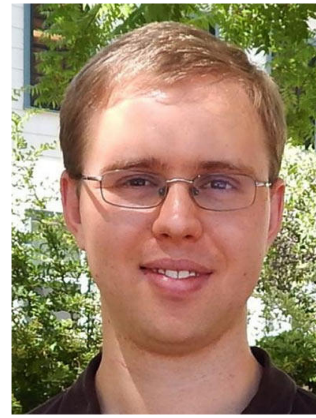
Harmit Malik got his BTech, Chemical Engineering, at the Indian Institute of Technology, Mumbai, India where he became interested in molecular biology and selfish genes. He then moved to the US to get his PhD in Biology, at the University of Rochester, NY, under the mentorship of Prof. Thomas Eickbush. In 1999, he moved to Seattle to the Fred Hutchinson Cancer Center (the "Hutch"), to do his postdoc with Dr. Steve Henikoff. In 2003, he started his own lab and is currently Professor and Associate Director in the Division of Basic Sciences at the Fred Hutchinson Cancer Center & an Investigator of the Howard Hughes Medical Institute.

One half of his lab has used an evolutionary lens to dissect and discover both primate antiviral as well as viral adaptation strategies. A second half of the Malik lab studies rapid evolution in genes involved in essential cellular processes such as chromosome segregation and mitochondrial biology. His work has received significant accolades for him and his lab members. He was awarded the 2017 Eli Lilly Prize by the American Society of Microbiology, and the 2022 Edward Novitski Prize by the Genetics Society of America. He was elected to the US National Academy of Sciences in 2019 and to the American Academy of Arts & Sciences in 2022.

Abstract: "Rules of engagement: molecular arms races between host and viral genomes."

The evolutionary battle between viruses and the immune system is a high-stakes arms race. The immune system makes antiviral proteins, called restriction factors, which can stop the virus from replicating. In response, viruses evolve to evade the effects of restriction factors. To counter this, restriction factors evolve too, and the cycle continues, in which both sides rapidly evolve at interaction interfaces to gain or evade immune defense. For example, primate TRIM5α uses its rapidly evolving 'v1' loop to bind retroviral capsids whereas the MxA antiviral protein uses its rapidly evolving Loop L4 domain to recognize viruses such as influenza; single mutations in these loops can dramatically improve viral restriction. The challenge for the immune system is that mammals do not evolve as fast as viruses. How then, in the face of this disadvantage, can the immune system hope to keep pace with viral evolution? Using deep mutational scanning, we comprehensively measured how single mutations in the TRIM5α v1 loop affect restriction of divergent retroviruses. Unexpectedly, we found that most mutations increase weak antiviral function. Moreover, most random mutations do not disrupt potent viral restriction, even when it is newly acquired via a single adaptive substitution. Our results indicate that TRIM5α's adaptive landscape is remarkably broad and mutationally resilient, maximizing its chances of success in evolutionary arms races with retroviruses. We also exploit combinatorial mutagenesis at rapidly evolving positions to dissect and enhance the antiviral properties of MxA antiviral proteins, revealing unprecedented capacity for antiviral adaptation and a 'breath versus specificity' tradeoff that constrains their natural evolution.

Eric Neuscamman
Department of Chemistry
UC Berkeley / LBNL
eneuscamman@berkeley.edu



Eric got started towards theoretical chemistry unknowingly by initially trying to pursue chemical engineering, which his parents thought would be a good practical amalgamation of his interests in chemistry and mathematics. As an undergraduate at UCLA, however, Eric got hooked on quantum mechanics and has pursued increasingly less practical directions ever since.

At Cornell, he completed a PhD under Garnet Chan studying electronic structure theory, an interest he carried forward into postdoctoral stints as a Miller Fellow at Berkeley and a Lawrence Fellow at Livermore. Since joining the Berkeley faculty, he has continued to enjoy the development of mathematical models for how electrons behave within molecules. Eric's current pursuits include modeling excited states and sneaking increasingly sophisticated concepts into the freshman chemistry curriculum.

Abstract: "Losing electrons in crowds to predict a molecule's color."

How do we predict a molecule's color from basic physical principles? Can we use the molecular orbital diagrams of freshman chemistry, or do we need something more? What are those diagrams really telling us, anyway? In this talk, we will explore how ideas like molecular orbital theory allow us to accurately approximate electrons' intricate interactions by simpler group behavior. In particular, we will discuss recent progress in generalizing these approaches so that they can be used to model the "excited" states that molecules adopt when they absorb light.

Dianne Newman
Departments of Biology & Geobiology
Caltech
dkn@caltech.edu

Dianne Newman's interdisciplinary research focuses on elucidating mechanisms of bacterial energy conservation and survival when oxygen is scarce. Her training combines molecular microbiology and environmental science, giving her an appreciation for the importance of accurately characterizing the microenvironments that surround microbial populations and communities to understand the activities of cells within them. Dr. Newman started her independent career at Caltech in 2000 and is currently the Binder/Amgen Professor of Biology and Geobiology. Her honors include the National Academy of Science's Award in Molecular Biology and a MacArthur Fellowship, but she is most proud of her trainees, who have gone on to lead successful scientific careers in academia, industry, government, and the nonprofit sector. Dr. Newman is a member of the National Academy of Sciences and the American Academy of Arts and Sciences, and a Fellow of the American Academy of Microbiology and the American Geophysical Union.

Abstract: "Phenazines power an extremely slow bacterial maintenance state near life′s metabolic edge."

Microbial metabolism is breathtaking in its diversity, yet is unified by a core bioenergetic principle: electrons must flow in a manner that enables energy to be conserved. Bacteria are creative geniuses when it comes to implementing this principle, having invented ways to conserve energy by coupling the oxidation of a wide array of substrates--including gases, minerals, and sugars--to the reduction of many others. Their metabolic inventions have transformed the Earth and continue to sustain it and its inhabitants. While we understand in exquisite detail how certain metabolisms such as aerobic respiration and oxygenic photosynthesis work, most of our knowledge of these processes comes from studying bacteria growing quickly under nutrient-replete conditions. Yet the majority of microbes in nature are metabolically attenuated, a vital state about which we know far less. In this talk, I will explain how the opportunistic pathogen Pseudomonas aeruginosa fuels an extremely low power lifestyle by recycling self-generated redox-active ″antibiotics″ called phenazines. I will close with a discussion of how recent conceptual and technical advances have positioned us to better understand life in the slow lane, and the practical importance of this knowledge.

Rachel Pepper
Departments of Physics & Biophysics
University of Puget Sound
rpepper@pugetsound.edu

Dr. Rachel Pepper is a Professor of Physics and the William D. and Flora McCormick Chair in Biophysics at the University of Puget Sound where she studies problems at the intersection of fluid mechanics and biology.

Rachel received her Ph.D. in Physics from Harvard University. Rachel completed a postdoctoral fellowship at the University of Colorado at Boulder Department of Physics working in the Physics Education Research Group and was a Miller Fellow at UC Berkeley. At the University of Colorado, she studied student learning difficulties and helped transform upper-division physics courses. At UC Berkeley, she examined the interaction of marine larvae with Turbulence.

Abstract: "Hydrodynamic interactions of microscopic sessile suspension feeders with their environment."

Microscopic sessile suspension feeders live attached to surfaces and, by consuming bacteria-sized prey and by being consumed, they form an important part of aquatic ecosystems. Their impact is mediated by their feeding rate, which depends on a self-generated feeding current. Here I discuss two stories related to these feeding currents. First, I will discuss the interaction of organisms with ambient flow from the environment. Most previous work on feeding currents focused on organism in still water. However, ambient flow is nearly always present in their natural habitats. I will show that feeding rates depend on the interplay of ambient environmental flows and the orientation of the organism relative to the surface of attachment. I will then discuss work where my lab measured the full 3D orientations for Vorticella Convallaria, to determine if they avoid orientations found to be unfavorable for feeding. Next, I will discuss the impact of microscopic sessile suspension feeders on flow around sinking biological aggregates. Sedimentation of these aggregates plays a critical role in carbon sequestration in the ocean and in waste-water treatment plants. In both these contexts, the sinking aggregates are "active", since they are hot-spots of biological activity and are densely colonized by microorganisms, including sessile suspension feeders.

Jonas Peters
Department of Chemistry
Caltech
jpeters@caltech.edu

Jonas C. Peters is Bren Professor of Chemistry and Director of the Resnick Sustainability Institute at the California Institute of Technology. His research focuses on new concepts for catalysis (including electro- and photocatalysis) with applications in renewable solar fuel technologies, distributed nitrogen fixation for fertilizers and fuels, and chemical transformations fundamental to the synthesis of organic molecules. Peters earned his BSc degree at the University of Chicago ('93), spent a year as a Marshall Scholar at the University of Nottingham ('94), did his PhD at MIT ('98), and a postdoc as a Miller Fellow at UC Berkeley ('99). He has been on the faculty at Caltech since 1999, including a brief period on the faculty at MIT.

Abstract: "Avoiding Hydrogen and Getting Protons and Electrons to Where we Want Them Instead."

Electrons, and the protons with which they associate to make hydrogen atoms, are the fuel currency of life. They are the basis by which biology stores up food (photosynthesis), provides the world with high density energy (oil), and generates key ingredients we need to make biomolecules like protein and DNA (fertilizer). Simply put, hydrogen atoms decorate the key molecular building blocks of our world. Hydrogen gas (H_2) is readily made by combining protons and electrons, in fact so easily that it's hard to avoid. While this is great news if hydrogen is what you want (water electrolysis for the hydrogen economy), avoiding it presents a daunting challenge if you want other chemical products instead. Indeed, among the most fascinating challenges in catalysis today is to control proton/electron currency in a manner that avoids, or at least heavily mitigates, the production of hydrogen and efficiently directs it towards the reduction of other substrates (nitrogen, carbon dioxide, organic molecules) to make the hydrogen-rich molecules (ammonia, ethylene, alkanes) we need to feed and fuel the planet. As society aspires to shift to an increasingly renewably sourced energy supply, this challenge in catalytic selectivity becomes an exciting opportunity; if we can devise ways to manage hydrogen atoms, for example by shifting them from water (H_2O) to nitrogen or carbon dioxide, we will be able to feed and fuel the planet more sustainably. To build the fundamental science needed to address this challenge, our lab at Caltech, inspired by Nature, is devising new catalytic approaches for managing proton and electron currency. My lecture will walk you through our master plan, from the bottom up.

Mikhail Shapiro
Departments of Chemical Engineering &
Medical Engineering
Caltech
mikhail@caltech.edu

Mikhail Shapiro is the Max Delbrück Professor of Chemical Engineering and Medical Engineering, an HHMI Investigator, and Director of the Center for Molecular and Cellular Medicine at Caltech. The Shapiro laboratory develops biomolecular technologies allowing cells to be imaged and controlled inside the body using noninvasive methods such as ultrasound. These technologies enable the study of biological function in vivo and the development of cell-based and gene-based diagnostic and therapeutic agents. Mikhail received his PhD in Biological Engineering from MIT and his BSc in Neuroscience from Brown. He conducted post-doctoral research at the University of Chicago and the University of California, Berkeley, where he was a Miller Fellow. Mikhail's awards include the NIH Pioneer Award, the Packard Fellowship, the Pew Scholarship, the Vilcek Prize for Creative Promise, the Sontag Foundation Distinguished Scientist Award, the Mark Foundation Emerging Leader Award, the Camille Dreyfus Teacher-Scholar Award, the Carl Hellmuth Hertz Ultrasonics Award and the Roger Tsien Award for Excellence in Chemical Biology.

Abstract: "Talking to cells: biomolecular ultrasound for deep tissue cellular imaging and control."

The study of biological function in intact organisms and the development of targeted cellular therapeutics necessitate methods to image and control cellular function in vivo. Technologies such as fluorescent proteins and optogenetics serve this purpose in small, translucent specimens, but are limited by the poor penetration of light into deeper tissues. In contrast, most non-invasive techniques such as ultrasound and magnetic resonance imaging – while based on energy forms that penetrate tissue effectively – are not effectively coupled to cellular function. Our work attempts to bridge this gap by engineering biomolecules with the appropriate physical properties to interact with magnetic fields and sound waves. In this talk, I will describe our recent development of biomolecular reporters and actuators for ultrasound. The reporters are based on gas vesicles – a unique class of gas-filled protein nanostructures from buoyant photosynthetic microbes. These proteins produce nonlinear scattering of sound waves, enabling their detection with ultrasound. I will describe our recent progress in understanding the biophysical and acoustic properties of these biomolecules, engineering their mechanics and targeting at the genetic level, developing methods to enhance their detection in vivo, expressing them heterologously as reporter genes, and turning them into dynamic sensors of intracellular molecular signals. In addition to their applications in imaging, gas vesicles can be used to control cellular location and function by serving as receivers of acoustic radiation force or seeding localized bubble cavitation. Additional remote control is provided by thermal bioswitches – biomolecules that provide switch-like control of gene expression in response to small changes in temperature. This allows us to use focused ultrasound to remote-control engineered cells in vivo.

May 31 - June 2, 2024
Symposium Agenda

Friday, May 31

3 - 6 pm	Arrival and Registration	Lobby/Reception
4:30 - 6 pm	Welcome Reception	Redwood Dining Hall
6 - 7 pm	Dinner	Redwood Dining Hall
7:30 - 11 pm	Miller Fellow Posters + visual aids ; social time	Buck Hall

Saturday, June 1

7:30 - 8:30 am	Breakfast	Redwood Dining Hall
8:40 - 9:20 am	**Mikhail Shapiro, "Talking to cells: biomolecular ultrasound for deep tissue cellular imaging and control."**	Buck Hall
9:20 - 9:50 am	Discussion	
9:50 - 10:10 am	Break	
10:10 - 10:50 am	**Dianne Newman,"Phenazines power an extremely slow bacterial maintenance state near life's metabolic edge."**	Buck Hall
10:50 - 11:20 am	Discussion	
11:20 - 12:30 pm	Group Photo followed by Lunch	Redwood Dining Hall
1 - 1:40 pm	**Jonas Peters, "Avoiding Hydrogen and Getting Protons and Electrons to Where we Want Them Instead."**	Buck Hall
1:40 - 2:10 pm	Discussion	
2:10 - 2:40 pm	Break	
2:40 - 3:20 pm	**Harmit Malik,"Rules of engagement: molecular arms races between host and viral genomes."**	Buck Hall

May 31 - June 2, 2024
Symposium Agenda Continued

3:20 - 3:50 pm	Discussion	Buck Hall
3:50 - 4:20 pm	Break	
4:20 - 5 pm	**Nicholas Swanson-Hysell, "The onset of Neoproterozoic Snowball Earth and the drivers of long-term climate change."**	Buck Hall
5 - 5:30 pm	Discussion	
5:30 - 6 pm	Free Time	
6 - 7 pm	Dinner	Redwood Dining Hall
7:30 - 8:30 pm	**Special Presentation: Mike Bostock, "Never the right abstraction."**	Buck Hall
8:30 - 11 pm	Stargazing and social time	Buck Hall

<u>Sunday, June 2</u>

7:30 - 8:30 am	Breakfast	Redwood Dining Hall
9 - 9:40 am	**Rachel Pepper, "Hydrodynamic interactions of microscopic sessile suspension feeders with their environment."**	Buck Hall
9:40 - 10:10 am	Discussion	
10:10 - 10:30 am	Break	
10:30 - 11:10 am	**Eric Neuscamman, "Losing electrons in crowds to predict a molecule's color."**	Buck Hall
11:10 - 11:40 am	Discussion	
12 pm - 1 pm	Lunch and close of Symposium	Redwood Dining Hall

Nicholas Swanson-Hysell
Department of Earth and Planetary Science
UC Berkeley
swanson-hysell@berkeley.edu

Nicholas Swanson-Hysell is an Associate Professor of Earth and Planetary Science at UC Berkeley. He is a geologist with a field-based research program focused on integrating geological, geophysical, and geochemical data to reconstruct long-term global change. A major focus of his research program is leveraging the remanent magnetization of rocks to reconstruct ancient plate tectonic motions. These Earth history investigations have led him to conduct field research on all seven continents.

Abstract: "The onset of Neoproterozoic Snowball Earth and the drivers of long-term climate change."

Earth's climate has transitioned between intervals of non-glacial climate with no significant land ice on Earth, glacial climates like today with polar ice caps, and snowball Earth climates when ice extends to all latitudes. I will highlight our ever improving constraints on two snowball Earth episodes that resulted in ice sheets extending into the tropics during the Cryogenian Period between 717 and 635 million years ago. Subsequent to Cryogenian global glaciation, there have been three major non-glacial to glacial transitions over the past 500 million years with ice sheets restricted to high latitudes. The most recent transition resulted in Earth being in its current glacial climate regime with ice caps in both hemispheres. While we understand long-term climate change to be controlled by sources of CO_2 from the solid Earth and CO_2 sinks through the weathering of silicate rocks and organic carbon burial, reconstructing how changes in these sources and sinks have resulted in climatic shifts is a major challenge of Earth science. I will present our work developing and evaluating the hypothesis that the process of arc-continent collision is a major lever for cooling Earth's climate on long timescales when it occurs near the equator. Such mountain building leads to the uplift of rocks with a high potential to sequester carbon particularly when they are located in the warm-wet tropics. These mountains can lower atmospheric CO_2 concentrations on million-year timescales and enable the onset of glacial climate states.

Special Presention, Saturday night

Presenter: Mike Bostock
Co-CEO and founder
Observable
https://bost.ocks.org
mike@ocks.org

Mike Bostock is the co-CEO and founder of Observable, a data app and computational notebook platform. Mike is also the creator of D3.js and Observable Plot, popular open-source libraries for interactive data visualization. Mike was formerly a graphics editor for The New York Times, studied information visualization as a PhD student at Stanford, and earned a BSE in computer science from Princeton.

Abstract: "Never the right abstraction."

Why are data visualization tools so hard to use? Some tools do too much, imposing constraints on how we solve problems and limiting the tool's usefulness. Others seemingly do too little, offering endless possibilities but making even basic tasks a struggle. This talk will consider various approaches to designing visualization software, evaluating expressiveness and efficiency, and reflect on ways we can design tools that are easier to use and have lasting value.

Introducing the 2024 - 2027 Miller Research Fellows

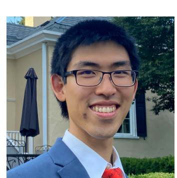
Mark Carrington
Kathy Day Fellow
Chemistry
Host: F. Dean Toste
PhD: Univ. of Cambridge

Mohammad Farhat
Astronomy, EPS
Hosts: Eugene Chiang, Bruce Buffet
PhD: Sorbonne University

Katherine Fraser
Physics
Host: Benjamin Safdi
PhD: Harvard

Matthew Kustra
IB
Host: Christopher Martin
PhD: UCSC

Calvin Leung
Astronomy, Physics
Hosts: Aaron Parsons, Wenbin Lu and Liang Dai
PhD: MIT



Kate Reidy
MSE, Physics
Hosts: Andrew Minor, Michael Crommie
PhD: MIT

Ryan Unger
Mathematics
Host: Sung-Jin Oh
PhD: Princeton

Thuy-Duong (June) Vuong
EECS
Host: Alistair Sinclair
PhD: Stanford

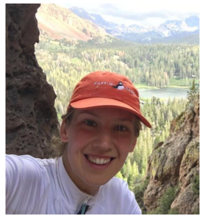
Ian Waudby-Smith
Statistics
Host: Michael Jordan
PhD: Carnegie Mellon

Jonathan Wolf
EPS
Hosts: Weiqiang Zhu, Barbara Romanowicz
PhD: Yale

Sarah Zeichner
PMB
Host: Patrick Shih
PhD: Caltech

Miller Research Fellows

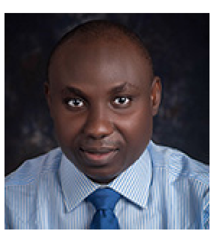
Anna Barth
2021-2024
EPS
Host: Michael Manga
PhD: Columbia
barthac@berkeley.edu



Lijie Chen
2022-2025
EECS
Hosts: Avishay Tal, Umesh Vazirani
PhD: MIT
wjmzbmr@berkeley.edu

Kelian Dascher-Cousineau
2022-2025
EPS
Host: Roland Burgmann
PhD: UCSC
kdascher@berkeley.edu

Olatubosun Fasipe
2023-2026
CEE
Host: Evan Variano
PhD: Univ. of Benin
fasipeoa@berkeley.edu



Dimitrios Fraggedakis
2021-2024
CBE
Host: Bryan McCloskey
PhD: MIT
dfrag@berkeley.edu

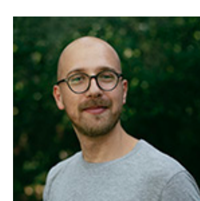
Shashank Gandhi
2021-2024
MCB
Hosts: Richard Harland, Megan Martik
PhD: Caltech
shashank.gandhi@berkeley.edu

Augusto Ghiotto
2023-2026
Physics
Host: James Analytis
PhD: Columbia
augusto.ghiotto@berkeley.edu

Boryana Hadzhiyska
2022-2025
Physics
Host: Martin White
PhD: Harvard
boryanah@berkeley.edu

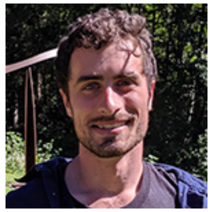
Aaron Joiner
2021-2024
MCB
Hosts: James Hurley, Roberto Zoncu
PhD: Cornell
amj85@berkeley.edu

Ioannis (Yanni) Kipouros
2023-2026
Chemistry
Host: Michelle Chang
PhD: Stanford
kipouros@berkeley.edu



Miller Research Fellows Continued

Ethan Lake
2023-2026
Physics
Hosts: Ehud Altman, Mike Zalatel
PhD: MIT
elake@berkeley.edu

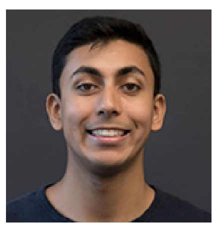


Chadi Saad-Roy
2022-2025
IB
Host: Michael Boots
PhD: Princeton
csaadroy@berkeley.edu

Molly McFadden
2023-2026 *Kathy Day Fellow*
Chemistry
Host: John Hartwig
PhD: Caltech
molly_mcfadden@berkeley.edu

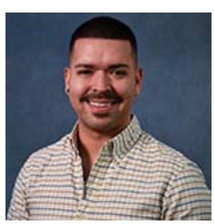
James Santangelo
2023-2026
IB
Host: Rasmus Nielsen
PhD: University of Toronto
james.santangelo@berkeley.edu

Rohil Prasad
2023-2026
Mathematics
Host: Michael Hutchings
PhD: Princeton
rrprasad@berkeley.edu



Carly Schissel
2022-2025
Chemistry
Host: Alanna Schepartz
PhD: MIT
schissel@berkeley.edu

Raul Ramos
2022-2025 *Kathy Day Fellow*
MCB
Hosts: Ellen Lumpkin, Diana Bautista
PhD: Brandeis
rramos@berkeley.edu

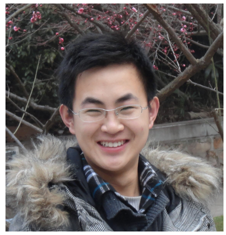


Ewin Tang
2023-2026
EECS
Host: Umesh Vazirani
PhD: Univ. of Washington
ewin@berkeley.edu

Andrew Rosen
2021-2024
MSE
Host: Kristin Persson
PhD: Northwestern
asrosen@berkeley.edu

Georgios Varnavides
2022-2025
MSE
Hosts: Mary Scott, Joel Moore
PhD: MIT
gvarnavides@berkeley.edu

Miller Research Fellows Continued



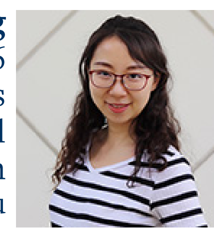
Yao Yang
2021-2024
Chemistry
Host: Peidong Yang
PhD: Cornell
yyang1@berkeley.edu

Elena Zavala
2022-2025
MCB
Host: Priya Moorjani
PhD: University of Leipzig
ezavala9@berkeley.edu

Yuhan Yao
2023-2026
Astronomy
Hosts: Wenbin Lu, Raffaella Margutti
PhD: Caltech
yuhanyao@berkeley.edu

Lingfu Zhang
2022-2025
Statistics
Host: Shirshendu Ganguly
PhD: Princeton
lfzhang@berkeley.edu

Mengshan Ye
2022-2025
Chemistry
Host: Jeffrey Long
PhD: MIT
msye@berkeley.edu



Xueyue (Sherry) Zhang
2023-2026
EECS/Physics
Host: Alp Sipahigil
PhD: Caltech
x.sherry.zhang@berkeley.edu

All current Miller Fellows and their detailed research descriptions can be found on the Institute's website here:

THE MILLER INSTITUTE: A BRIEF HISTORY

The Miller Institute for Basic Research in Science at the University of California, Berkeley was established in 1955 after Adolph C. Miller and his wife, Mary Sprague Miller, donated just over $5 million dollars to the University. It was their wish that the donation be used to establish an institute "dedicated to the encouragement of creative thought and conduct of pure science." The gift was made in 1943 but remained anonymous until after the death of the Millers.

Adolph Miller was born in San Francisco on January 7, 1866. He entered UC in 1883 and was active throughout his Cal years. After graduation he went to Harvard for Graduate School and then to study in Paris and Munich. He returned to the United States and taught Economics at Harvard until he was appointed Assistant Professor of Political Science in Berkeley in 1890. After just one year he moved to Cornell. A year later he moved on to Chicago as a full professor of Finance.

He married Mary Sprague in 1885. She was the eldest child of a prosperous Chicago businessman and perhaps the source of much of the Millers' wealth. In 1902 Miller returned to Berkeley as Flood Professor of Economics and Commerce. He established the College of Commerce, which has grown into the Haas School of Business today.

After 11 years at UC, Miller resigned to become the US Assistant Secretary to the Interior. The following year the Federal Reserve system was established and President Wilson appointed Miller to its Board of Governors. He held that position for 22 years under 5 different presidents.

The Miller Institute has sponsored Miller Professors, Visiting Miller Professors and Miller Research Fellows at different times throughout its history. The first appointments of Miller Professors were made in January 1957. The first Fellows were appointed in 1960. Throughout its 65+ year history the Institute has hosted over 1,200 scientists in its programs.

In 2008 the Institute created the Miller Senior Fellowship Program and appointed its first recipient. Miller Senior Fellows serve as mentors to the Miller Fellows by leading discussions and participating in Institute events. They are awarded an annual research grant to use at their discretion in support of their research.

The Institute is governed by the Advisory Board, which is comprised of the Chancellor of the University, four outside members, and the Executive Committee. The Advisory Board meets once a year to assist the Executive Committee in selecting Miller Professors and the Visiting Miller Professors. The Executive Committee alone selects the Miller Fellows and the Miller Senior Fellows.

More at: miller.berkeley.edu

2024 Symposium Participants

Name	Institution	Department	Email address
Hillel Adesnik	UC Berkeley	Neuroscience	hadesnik@berkeley.edu
Anna Barth	UC Berkeley	EPS	barthac@berkeley.edu
Josh Bloom	UC Berkeley	Astronomy	joshbloom@berkeley.edu
Mike Bostock	Observable		mike@ocks.org
R. David Britt	UC Davis	Chemistry	rdbritt@ucdavis.edu
Justin Brown	USC Information Sciences Institute		brown@isi.edu
Michael Celentano	OpenAI	Technical Staff	mvcelentano@gmail.com
Grayson Chadwick	UC Berkeley	MCB	chadwick@berkeley.edu
Lijie Chen	UC Berkeley	EECS	wjmzbmr@berkeley.edu
Thomas Cline	UC Berkeley	MCB	sxlcline@berkeley.edu
Kelian Dascher-Cousineau	UC Berkeley	EPS	kdascher@berkeley.edu
Clara Duman	UC Berkeley	Miller Institute	millerevents@berkeley.edu
Olatubosun Fasipe	UC Berkeley	CEE	fasipeoa@berkeley.edu
Alex Filippenko	UC Berkeley	Astronomy	afilippenko@berkeley.edu
Shashank Gandhi	UC Berkeley	MCB	shashank.gandhi@berkeley.edu
Boryana Hadzhiyska	UC Berkeley	Physics	boryanah@berkeley.edu
Hilary Jacobsen	UC Berkeley	Miller Institute	millerinstitute@berkeley.edu
Raymond Jeanloz	UC Berkeley	EPS	jeanloz@berkeley.edu
Yanni Kipouros	UC Berkeley	Chemistry	kipouros@berkeley.edu
Michelle Lam		Entrepreneur	michelleklam@gmail.com
Calvin Leung	UC Berkeley	Astronomy & Physics	calvin_leung@berkeley.edu
Jeff Long	UC Berkeley	Chemistry	jrlong@berkeley.edu
Chung-Pei Ma	UC Berkeley	Astronomy & Physics	cpma@berkeley.edu
Harmit Malik	Fred Hutch	Basic Sciences	hsmalik@fredhutch.org
Michael Manga	UC Berkeley	EPS	manga@seismo.berkeley.edu
Molly McFadden	UC Berkeley	Chemistry	molly_mcfadden@berkeley.edu
Barbara Meyer	UC Berkeley	MCB	bjmeyer@berkeley.edu

2024 Symposium Participants Continued

Name	Institution	Department	Email address
Eric Neuscamman	UC Berkeley	Chemistry	eneuscamman@berkeley.edu
Dianne Newman	Caltech	Biology & Geobiology	dkn@caltech.edu
Rachel Pepper	Univ. of Puget Sound	Physics & Biophysics	rpepper@pugetsound.edu
Jonas Peters	Caltech	Chemistry	jpeters@caltech.edu
Rohil Prasad	UC Berkeley	Math	rrprasad@berkeley.edu
Raul Ramos	UC Berkeley	MCB	rramos@berkeley.edu
Ken Ribet	UC Berkeley	Math	ribet@math.berkeley.edu
Jasper Rine	UC Berkeley	MCB	jrine@berkeley.edu
Joshua Ruderman	NYU	Physics	ruderman@nyu.edu
Chadi Saad-Roy	UC Berkeley	IB	csaadroy@berkeley.edu
Bob Sanders	UC Berkeley	Campus journalism	rlsanders@berkeley.edu
James Santangelo	UC Berkeley	IB	james.santangelo@berkeley.edu
Carly Schissel	UC Berkeley	Chemistry	schissel@berkeley.edu
Mikhail Shapiro	Caltech	Chemical Engineering & Medical Engineering	mikhail@caltech.edu
Veronika Sunko	UC Berkeley	Physics	vsunko@berkeley.edu
Nicholas Swanson-Hysell	UC Berkeley	EPS	swanson-hysell@berkeley.edu
George Varnavides	UC Berkeley	Materials Science	gvarnavides@berkeley.edu
June Vuong	Stanford	EECS	duongvuong17@gmail.com
Melissa Wilson	ASU	Life Sciences	mwilsons@asu.edu
Yao Yang	UC Berkeley	Chemistry	yaoyang1@berkeley.edu
Yuhan Yao	UC Berkeley	Astronomy	yuhanyao@berkeley.edu
Mengshan Ye	UC Berkeley	Chemistry	msye@berkeley.edu
Elena Zavala	UC Berkeley	MCB	ezavala9@berkeley.edu
Yi Zhang	NYU	Math	y.zhang@nyu.edu
Lingfu Zhang	UC Berkeley	Statistics	lfzhang@berkeley.edu
Xueyue (Sherry) Zhang	UC Berkeley	EECS & Physics	x.sherry.zhang@berkeley.edu
Alfred Zong	UC Berkeley	Chemistry	alfredz@berkeley.edu

Notes

Miller Institute for Basic Research in Science
University of California, Berkeley
468 Donner Lab
Berkeley, CA 94720-5190

millerinstitute@berkeley.edu
miller.berkeley.edu
510-642-4088