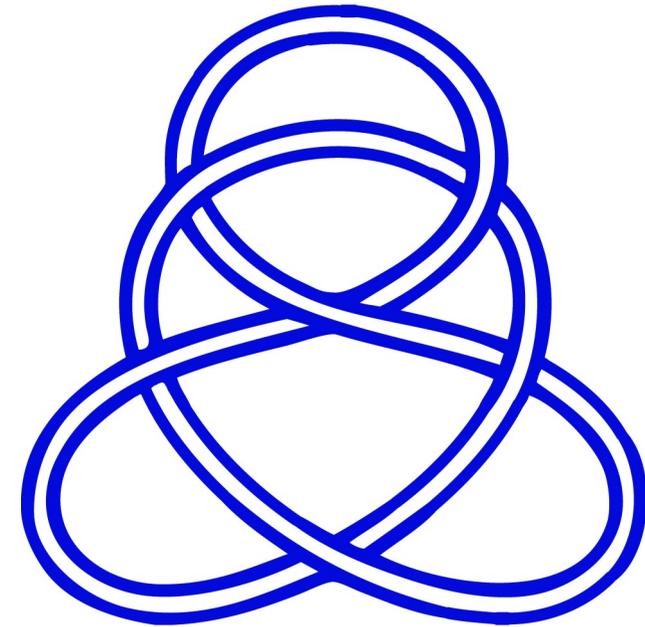


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Miller Institute For Basic Research In Science



First annual fall retreat

October 1, 2021
Berkeley City Club

University of California, Berkeley

THE MILLER INSTITUTE A BRIEF HISTORY

The Miller Institute 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 for additional 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. After its 50+ year history the Institute has hosted over 1,000 scientists in its programs. For a period of time in the 1980s the Visiting Miller Professorship program did not exist but it resumed in 1985 and has grown considerably since that time.

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: <http://miller.berkeley.edu/>



NICOLE KING

DEPARTMENT OF MOLECULAR AND CELL BIOLOGY

Nicole King first became fascinated with the natural world as a young girl, when she spent weekends collecting sharks’ tooth fossils from her neighborhood creek in Gainesville, Florida. While her research in college and grad school focused on genetics and biochemistry, she never lost her interest in evolution. In her current research, she and members of her laboratory use approaches from genomics, biochemistry, and cell biology to investigate the origin of animals. She is a professor at the University of California, Berkeley and an Investigator in the Howard Hughes Medical Institute. Prof. King was Miller Institute Professor from 2018 – 2019.

ABSTRACT: “A History of Hypotheses on the Origin of Animals”

The evolution of animals from their protozoan ancestors marks one of the most pivotal, and poorly understood, events in life’s history. As the closest living relatives of animals, choanoflagellates offer unique windows into animal origins and core features of animal cell biology. I will first provide a historical retrospective on choanoflagellate research, from their discovery in the 1800s to their recent establishment as experimentally tractable model organisms. From there, I will describe how the study of choanoflagellates has enriched our understanding of the first animals. Finally, I will describe our recent discovery of a multicellular choanoflagellate that undergoes rapid inversion in response to light/dark transitions. The cellular details of this process are conserved in animals, suggesting that cellular mechanisms underlying gastrulation and neurulation predate the origin of animals.

MICHAEL I. JORDAN

DEPARTMENTS OF EECS AND STATISTICS

Michael I. Jordan is the Pehong Chen Distinguished Professor in the Department of Electrical Engineering and Computer Sciences and the Department of Statistics. His research interests bridge the computational, statistical, cognitive and biological sciences, and have focused in recent years on Bayesian nonparametric analysis, optimization theory, probabilistic graphical models, diffusion processes and applications to problems in distributed computing systems, natural language processing, signal processing and statistical genetics. His work has contributed to the theoretical foundations of statistical machine learning and has yielded algorithmic innovations that have had significant impact on applied problems in industry and science.

ABSTRACT: “On Dynamics-Informed Blending of Machine Learning and Game Theory”

Statistical decisions are often given meaning in the context of other decisions, particularly when there are scarce resources to be shared. Managing such sharing is one of the classical goals of microeconomics, and it is given new relevance in the modern setting of large, human-focused datasets, and in data-analytic contexts such as classifiers and recommendation systems. I’ll discuss several recent projects that aim to explore the interface between machine learning and microeconomics, including the study of exploration-exploitation tradeoffs for bandit learning algorithms that compete over a scarce resource, leader/follower dynamics in strategic classification, and the robust learning of optimal auctions.

RON COHEN

DEPARTMENTS OF CHEMISTRY AND EARTH AND PLANETARY SCIENCE

Ronald C. Cohen, Ph.D. is Professor of Atmospheric Chemistry at the University of California, Berkeley. He was Director of the Berkeley Atmospheric Science Center from 2006-2016. Cohen is known for his work on the atmospheric nitrogen cycle, the temperature dependence of ozone and urban emissions of greenhouse gases. He is a fellow of the American Association for the Advancement of Science and the American Geophysical Union. Cohen has mentored over 50 PhD students and postdoctoral fellows and is co-author of over 280 peer-reviewed scientific papers.

ABSTRACT: “Mapping urban emissions with neighborhood resolution”

Most people on Earth live in cities and they are responsible for the majority of greenhouse gas emissions. Cities are also where exposure to poor air quality is most frequent and most variable. Understanding and managing the path to net-zero greenhouse gas emissions, improved public health and lower public health inequities requires a view into the emissions and atmospheric chemistry of cities with the fine grained detail that allows evaluation of specific processes and variations from one neighborhood to another. In this talk, I'll describe the development of the Berkeley Environment, Air Quality and CO₂ Network (BEACO₂N <http://beacon.berkeley.edu/about/>), a dense network for mapping urban CO₂, NO_x, CO, O₃ and aerosol. Integration of the BEACO₂N maps with simple Gaussian plume models and sophisticated Bayesian inversions employing high resolution weather models provide unique observational constraints on spatial and temporal patterns of CO₂ and other emissions. Examples from the COVID shelter-in-place and testing models of fuel efficiency vs. vehicle speed in the SF Bay Area will be described along with prospects for further extension to other cities and other chemicals.

NORMAN YAO

DEPARTMENT OF PHYSICS

Norman Yao joined the physics department as an assistant professor in the summer of 2016. After completing his Ph.D. at Harvard in 2014, was a Miller fellow from 2014-2017, where he was advised by Dung-Hai Lee and Joel Moore. His group's research interests lie at the interface between atomic, molecular and optical physics, condensed matter, and quantum information science. A major thrust of his experimental work -- on high-pressure quantum sensing -- started from a Miller lunch conversation with Raymond Jeanloz.

ABSTRACT: “What is a time crystal?”

The defining feature of a time crystal is that it oscillates, but so do many things in nature. In this talk, my main goal is to sharpen the question surrounding time crystals, and to provide some answers in the context of quantum many-body systems. Particular care will be taken to contextualize modern results on time crystals with subharmonic oscillations that are commonplace in non-linear dynamical systems. Time permitting, I will also try to survey recent experiments demonstrating the observation of time crystalline order in a variety of quantum simulation platforms.

Executive Committee

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Earth & Planetary Science

Professor Marla Feller
Executive Director, Miller Institute
Molecular & Cell Biology: Neurobiology

Professor Chung-Pei Ma
Astronomy

Professor Yun Song
EECS / Statistics / Integrative Biology

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Theresa Ajari
Events Specialist (Summer and Fall 2021)

**MILLER INSTITUTE
2021 RETREAT SPEAKERS**

Ron Cohen

Chemistry and Earth & Planetary Science
UC Berkeley
Miller Professor (2015-2016)

Norman Yao

Physics
UC Berkeley
Miller Fellow (2014-2017)

Nicole King

Molecular and Cell Biology
UC Berkeley
Miller Professor (2018-2019)

Michael I. Jordan

Computer Science and Statistics
UC Berkeley
Miller Professor (2008, 2017-2018)
Miller Senior Fellow (2019-Present)

**MILLER INSTITUTE RETREAT
OCTOBER 1, 2021**

AGENDA:

9 - 9:30am: Arrival; coffee and tea on the terrace

9:30am: Welcome remarks

9:40 - 10:20am: Speaker Ron Cohen - "Mapping urban emissions with neighborhood resolution"

10:20 - 10:40am: Q&A

10:40 - 11am: Break

11 - 11:40am: Speaker Norman Yao - "What is a time crystal?"

11:40 - 12pm: Q&A

12 - 1:15pm: Lunch on the terrace

1:20 - 2:00pm: Speaker Nicole King - "A History of Hypotheses on the Origin of Animals"

2:00 - 2:20pm: Q&A

2:20 - 2:30pm: Break

2:30 - 3:10pm: Speaker Michael I. Jordan - "On Dynamics-Informed Blending of Machine Learning and Game Theory"

3:10 - 3:30pm: Q&A

3:30 - 3:45pm: Break

3:45 - 5pm: Miller Fellow poster session

5 - 7pm: Reception on the terrace