2019
Department Welcome & First Tea

Physics @BERKELEY
Outline

• State of the Department
• 2018/19: Year in Review
• Faculty News, Faculty Awards
• New Appointments & Staff News
• New Postdocs and Visitors
• New Graduate Students
• 2019/20: A Look Ahead
By the numbers, in 2018/19

- **42** PhDs, **33** Masters, and **131** undergraduates completed their degrees.
- There were **305** undergraduate declared majors, **258** intended majors, and **279** graduate students.

Our professional ranks include

- **62** active faculty members
- **2** active Nobel Laureates
- **35** emeritus faculty
- **24** members of the National Academy of Science
- **41** staff members.
2018/19
Year in Review
New Faculty

Heather Gray
Asst. Professor
Particle Physics

Haichen Wang
Asst. Professor
Particle Physics
Faculty Promotions

Oskar Hallatschek to Associate Professor

Edgar Knobloch to Professor Above Scale
Faculty Retirements

Bernard Sadoulet
1985-2019
Emeritus Professor of Physics
Fall 2019

“Hawaii no ka oi”
Celebrations
March 2, 2019   University Club

Frontiers in Condensed Matter and Materials Physics:
Symposium in Honor of the 70th Birthday of Steven G. Louie

Organizers: Li Yang, Jeff Neaton, C. T. Chan, Jack Deslippe, Mark Hybertsen, C.-H. Park,
Angel Rubio, David Strubbe, David Vanderbilt, Felipe da Jornada, Diana Qiu,
Zhenglu Li, and Arica Chhay
Four UC Berkeley faculty have been selected as recipients of the 2019 Distinguished Teaching Award, the campus’s most prestigious honor for teaching. The award recognizes teaching that incites intellectual curiosity in students, engages them thoroughly in the enterprise of learning, and has a lifelong impact. The Academic Senate’s Committee on Teaching has selected:

Robert Littlejohn (https://physics.berkeley.edu/people/faculty/robert-littlejohn), Professor Emeritus, Physics
Faculty Awards 2018/19

Ehud Altman
Moore Foundation Award

Roger Falcone
Elected to the National Academy of Sciences

Heather Gray
Young Scientist Award by the International Union of Pure and Applied Physics

Barbara Jacak
2019 APS Tom W. Bonner Prize

Dan Kasen
2019 AAS Bruno Rossi Prize
2019 Simons Investigator

Dung-Hai Lee
Moore Foundation Award

Robert Littlejohn
2019 Distinguished Teaching Award

Steven Louie
Elected Fellow of the Materials Research Society
Faculty Awards 2018/19

Kam-Biu Luk
Elected Fellow, American Academy of the Arts and Sciences

Gabriel Orebi Gann
2019 Phi Beta Kappa Northern California Association Excellence in Teaching Award

Eliot Quataert
Elected Fellow, American Academy of the Arts and Sciences

Ramesh Ramamoorthy
2018 J.C. Bose Distinguished Lectureship

Uros Seljak
Elected to the National Academy of Sciences

Norman Yao
2018 David and Lucile Packard Fellowship
Nuh Gedik
Visiting Miller Professor
Fall 2019
Home Institution: MIT
Host: Prof. Joseph Orenstein
Laura Baudis
Visiting Miller Professor
Spring 2020
Home Institution: University of Zurich
Host: Prof. Yury Kolomensky

Michael Turner
Visiting Miller Professor
Spring 2020
Home Institution: The University of Chicago
Host: Prof. Emeritus Bernard Sadoulet
Yu He, Stanford  
**Miller Fellow 2019/22**  
Physics  
Host: Prof. Robert Birgeneau

Aavishkar Patel, Harvard  
**Miller Fellow 2019/22**  
Physics  
Host: Prof. Ehud Altman
In Memory Of...

Geoffrey Chew
1924-2019

Professor Emeritus

BA, Physics, George Washington University 1944
PhD, University of Chicago, 1948
UC Berkeley faculty, 1957-1993
UC Berkeley Emeritus Professor, 1993-2019

S-matrix approach to strong interactions
70 PhD students including
David Gross, John Schwarz
Member NAS, Fellow AAAS
In Memory Of...

Charles Kittel
1916-2019

Professor Emeritus

BA, Physics, University of Cambridge 1938
PhD, University of Wisconsin, Madison, 1941
UC Berkeley faculty, 1951-1978
UC Berkeley Emeritus Professor, 1978-2019

Oliver Buckley Prize
Oersted Medal of the AAPT
Berkeley Distinguished Teaching Award
Member NAS, Fellow AAAS
In Memory Of...

Professor Emeritus

Eyvind Wichmann
1928-2019

BA, Physics, Finland’s Institute of Technology, 1950
PhD, Columbia University, 1956
UC Berkeley faculty, 1957-1993
UC Berkeley Emeritus Professor 1993-2019

Quantum field theory, QED
Berkeley Distinguished Teaching Award
In Memory Of...

Frederick Reif
1927-2019

Professor Emeritus

BA, Columbia, 1948
PhD, Harvard University, 1953
UC Berkeley faculty, 1960-1989
UC Berkeley Emeritus Professor 1989-2019

Quantized vortices in superfluid He
Physics education, cognitive science
The Berkeley Physics Course

Inspired by Sputnik and the urgency it created over the state of science education in the US, funded by NSF, and published beginning in 1965, the Berkeley Physics Course (and the Feynman Lectures in Physics) helped educate a generation of physicists.

1. *Mechanics* by Charles Kittel, et al.\[1\]
2. *Electricity and Magnetism* by Edward M. Purcell
4. *Quantum Physics* by Eyvind H. Wichmann
5. *Statistical Physics* by Frederick Reif
Staff Recognition

Berkeley Achievement “STAR” Award

Claudia Trujillo: For her design and establishment of the Berkeley Physics International Education “semester abroad” program
Staff Recognition

2018/19 SPOT Awards

Melissa Barclay  
Amanda Dillon  
Amin Jazaeri  
Simon Leaver-Appelman  
Joelle Miles  
Sulamit Miranda-Ramirez  
Lavern Navarro  
Stephen Pride-Raffel  
Marissa Saraf  
Claudia Trujillo  
Brian Underwood  
Anthony Vitan

SPOT Awards are campus recognition for special contributions to specific projects or tasks beyond what is normally expected
Staff News

New Appointments

Marissa Dominguez, Academic Personnel Analyst
Simon Leaver-Apelman, Financial Analyst
Elizabeth Nakahama, Front Office Manager
Sarah Seiter, Lead Content Developer and Coordinator (Sense & Science & Sensibility Project)
Staff News - Retirements

Katalin Markus
Financial Analyst/Admin Support
16 years @ Cal

Rachel Winheld
Senior Analyst & Director of Science@Cal
21 years @ Cal
Staff News: Cheers to our ChaMPS

Thank you to the hard-working team that supports Physics!

Samantha Yee – Regional Director
Lekesha Ponde – RA Manager
Jerry Nazareta – HR Manager
David Wemhaner – Pre-Award RA Lead
Helen Vance – Post Award RA Lead
Taryn Goomishian – Post-Award RA
Ying Zhang – Post-Award RA
Erin McGee – Post-Award RA

Isabel Rogne – UC Path Payroll Lead
Olyn Riega Diaz – Purchasing & Reimbursement Supervisor
April Hamilton – Purchasing, Travel, and Entertainment
Veronica Potts – Sr. Lead HR Business Partner Lead
Christy Welden – HR Business Partner
German Moran – HR Generalist

New Interim Regional Associate Dean:
Philip Stark
New Postdocs and Visitors (~ since First Tea 2018)

**Analytis Group**  
Ella Lachman – Postdoc  
Eran Maniv – Postdoc

**Birgeneau Group**  
Yu He – Postdoc

**Commie Group**  
Peter Jacobse – Postdoc  
Wei Ruan – Postdoc  
Shaowei Li – Joint Postdoc  
(with Wang Group)

**DeWeese Group**  
Ji Hyun Bak – Postdoc

**BCTP**  
Hajime Fukuda – Postdoc  
Hugo Marrochio – Postdoc  
Masamichi Miyaji – Postdoc  
Masahiro Nozaki – RIKEN Postdoc  
Keith Olive – Visiting Scholar  
Miroslav Rapcak – Postdoc  
Nicholas Rodd – Postdoc  
David Shih – Visiting Scholar  
Ofri Telem – Postdoc  
Marija Tomasevic – Visiting Scholar  
Sokratis Trifinopoulos – Visiting Scholar  
James Unwin – Visiting Scholar  
Dan Waldram – Visiting Scholar  
Zhengkang Zhang – Postdoc
New Postdocs and Visitors

**Haeffner Group**
Alberto Alonso – Postdoc
Sumanta Khan – Postdoc
Sara Mouradian – Postdoc

**Hallatschek Group**
Jonas Sebastian Denk – Postdoc
Takashi Okada - Visiting Scholar

**Haxton Group**
Baha Balantekin - Visiting Scholar
Jun Han – Postdoc
Chris Koerber – Humboldt Postdoc
Ermal Rrapaj – Postdoc
Manibrata Sen – Postdoc
Xilu Wang – Postdoc

**Hellman Group**
Neal Reynolds – Postdoc

**Ji Group**
Shuo Chen – Postdoc
Ryan Natan – Postdoc
Cristina Rodriguez – Postdoc

**Lanzara Group**
Claudia Fatuzzo - Postdoc

**Adrian Lee Group**
Aamir Ali – Postdoc
Kevin Crowley – Postdoc
Yuji Chinone – Staff Position

**Dung-Hai Lee Group**
Zi-Xiang Li – Postdoc
New Postdocs and Visitors

**Mckinsey Group**
Quentin Riffard – Postdoc

**Mueller Group**
Cris Panda – Postdoc

**Neaton Group**
Marina Filip – Postdoc
Jun-Ho Lee – Postdoc
Chenchen Song – Postdoc

**Orenstein Group**
Changmin Lee – Postdoc

**Pyle Group**
William Page – Postdoc
Bruno Serfass – Associate Research Physicist

**Qiu Group**
Peter Jacobse – Postdoc
Phillip Sonnenschein – Visiting Undergraduate Student
Nie Yuqi – Visiting Undergraduate Student

**Seljak Group**
He Jia – Volunteer
Francois Lanusse – Postdoc
Jia Liu – Postdoc
Marius Millea – Postdoc
George Stein – Postdoc
New Postdocs and Visitors

**Siddiqi Group**
Archan Banerjee – Postdoc
Alexis Morvan – Postdoc
Ravi Naik – Postdoc
Kasra Nowrouzi – Postdoc

**Stamper-Kurn Group**
Govind Unnikrishnan – Visiting Student Researcher
Johannes Zeiher – Postdoc

**Wang Group**
Shaowei Li – Joint Postdoc (with Crommie Group)
Yoseob Yoon – Postdoc
Zuocheng Zhang – Postdoc

**Wurtele Group**
Eugene Kur – Postdoc

**Zaletel Group**
Nick Bultinck – Postdoc
Jung Pyo Hong – Visiting Student Researcher
Ryan V Mishmash – Postdoc

**Zettl Group**
Amin Azizi – Postdoc
Kyunghoon Lee – Postdoc
Hu Long – Postdoc
Wu Shi – Staff Scientist
Sign up on the postdoc email list (vspa@berkeley.edu) to hear about special events—for networking, career, education, family, and fun—hosted by VSPA and its affiliated programs.
Undergraduate Physics Declared Majors

Current Declared Physics Majors: 305
Undergraduate Physics Degrees

2019 Physics BAs: 131
## State of the Department: Instruction

### PHYS Students Headcount 2014 - 2019

#### 23% Growth

<table>
<thead>
<tr>
<th>Year</th>
<th>Declared Majors</th>
<th>Intended Majors</th>
<th>Grad Students</th>
<th>Concurrent Headcount</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>350</td>
<td>125</td>
<td>258</td>
<td>17</td>
</tr>
<tr>
<td>2015</td>
<td>386</td>
<td>150</td>
<td>263</td>
<td>41</td>
</tr>
<tr>
<td>2016</td>
<td>352</td>
<td>200</td>
<td>240</td>
<td>40</td>
</tr>
<tr>
<td>2017</td>
<td>344</td>
<td>230</td>
<td>260</td>
<td>48</td>
</tr>
<tr>
<td>2018</td>
<td>336</td>
<td>275</td>
<td>282</td>
<td>60</td>
</tr>
<tr>
<td>2019</td>
<td>363</td>
<td>208</td>
<td>278</td>
<td>82</td>
</tr>
</tbody>
</table>
State of the Department: Instruction

2016-2019 TOTAL ENROLLMENTS
16% GROWTH

<table>
<thead>
<tr>
<th>Year</th>
<th>Enrollments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>8,282</td>
</tr>
<tr>
<td>2018</td>
<td>8,267</td>
</tr>
<tr>
<td>2017</td>
<td>7,665</td>
</tr>
<tr>
<td>2016</td>
<td>7,117</td>
</tr>
</tbody>
</table>

Physics @BERKELEY
Student Organizations

Society of Physics Students (SPS) is a professional, national organization for all physics undergraduate students.

The Career Development Initiative for the Physical Sciences (CDIPS) aims to expose graduate and postgraduate students to careers outside academia and strengthen ties between academic science and industry.

IGenSpectrum aims to strengthen a sense of community for LGBT+ physicists and reach out to future generations of students.

ULAB is committed to individually helping new undergraduate students find research on campus, developing student-lead research projects, and connecting & supporting students already involved in research.

Society of Women in the Physical Sciences (SWPS) encourages women and minorities to study the physical sciences and creates a friendly, supportive environment.

Physics Graduate Student Association (PGSA) is a governing and advocacy body for graduate students.

The Compass Project supports diversity, community, and pedagogy in the physical sciences.

Respect is Part of Research provide in-person gender bias and sexual harassment prevention and awareness education to fellow graduate students.

STEMinist Chronicles shares the stories of womxn in STEM and use these narratives to highlight diversity within STEM fields and foster a more inclusive environment for all.
Respect is Part of Research

Providing peer-led sexual violence/sexual harassment (SVSH) training for incoming first year graduate students with a goal to create a respectful, positive working environment where everyone can do their best science.

- **RPR was launched in 2014 as the first peer-led SVSH program on campus** and integrated into Campus’ mandatory training requirement in 2016
- **2019 represented the sixth workshop** for incoming grad students (and our fourth with Astronomy)
- **The RPR training model is now used by six departments across campus:** Chemistry, Chemical Engineering, Materials Science & Engineering, Math, Neuroscience, and MCB
- **2019-20 RPR Coordinators** – Micah Brush (Physics) & Wren Suess (Astronomy)
- **2019-20 RPR Facilitators** – Ella Banyas, Simca Bouma, Micah Brush, Jonny Cookmeyer, Lance Corbett, Tom Dauer, Steven Giacalone, Charles Goullaud, Gwen Hanley, Andrea Herman, Sam Kohn, Sylvia Lewin, Maya Lewin-Berlin, Aashrita Mangu, Robert McGehee, Greg Meyer, Pratick Sachdeva, Wren Suess

Thank you to RPR for their steadfast leadership and vision!
Welcome New Graduate Students!

Tylor Adkins, University of Wisconsin-Madison
Abhineet Agarwal, Columbia University
Burhan Ahmed, Clark University
Nicolas Aldana, Yale University
Sajant Anand, Wake Forest University
Omar Ashour, Texas A&M
Madeline Bernstein, Harvard University
Reggie Caginalp, University of Pittsburgh
Shao-Wen Chang, Natl Taiwan University
Larry Chen, University of Chicago
Mario D'Andrea, University of California, Davis
Jeske Dioquino, University of California, Davis
Welcome New Graduate Students!

Stefan Divic, University of Toronto
Elizabeth Donoway, Cornell University
James Egelhoff, Case Western Reserve University
Kai Ellers, Amherst College
Stephen Gant, Ohio State University
Claire Gasque, Dartmouth College
Isaac Harris, University of Chicago
Jordan Hines, Massachusetts Institute of Technology
Emily Hollingworth, Georgia Institute of Technology
Chao Ju, Minerva Schools at KGI
Jonathan Kruppe, University of Chicago
Avik Laha, Columbia University
Welcome New Graduate Students!

Kevin Langhoff, University of Wisconsin-Madison
Katie Latimer, University of California, Berkeley
Malcolm Lazarow, Northwestern University
Elise LePage, Hamilton College
Alex Liebman-Pelaez, Reed College
Leon Lu, Peking University
Brian Marinelli, Harvard University
Carl Marth, University of Texas-Austin
Madeline Monroy, California State University, East Bay
Nam Nguyen, State University of New York at Stony Brook
Aditya Prasad, Harvard University
Benjamin Roberts, Cornell University
Welcome New Graduate Students!

Josue Rodriguez, UC Riverside
Benjamin Saarel, University of Colorado at Boulder
Noah Sailer, Cornell University
Jamie Simon, Virginia Polytechnic Institute & State University
Ashwin Singh, University of Sydney
Jose Soria, University of California, Berkeley
Molly Wakeling, Air Force Institute of Technology
Tianle Wang, Peking University
Zack Weinstein, Washington University
Adrianne Zhong, University of California, Berkeley
Jian Zhong, USTC University of Science and Tech of China
Get involved!
Opportunities for public science outreach:
❖ Science Cafes
❖ Lectures
❖ Bay Area Science Festival
❖ CalDay & more...

Email: scienceatcal@berkeley.edu
FB + Twitter: @scienceatcal

(Provost has renewed for next 3 years)
Emilio Segrè Lecture
Wednesday, November 7, 2018

Presented by Ziaowei Zhuang, Harvard University, representing Howard Medical Institute

“Illuminating Biology at the Nanoscale Systems Scale by Imaging”

Chevron Auditorium, I-House
Emilio Segrè Lecture
Wednesday, November 7, 2018

Presented by Ziaowei Zhuang, Harvard University, representing Howard Medical Institute

“Illuminating Biology at the Nanoscale Systems Scale by Imaging”
J Robert Oppenheimer Lecture
Wednesday, March 13, 2019
Chevron Auditorium, I-House

Presented by Helen R. Quinn,
Professor Emerita at SLAC National Accelerator Laboratory

“Teaching for learning”
J Robert Oppenheimer Lecture
Wednesday, March 13, 2019
Chevron Auditorium, I-House

Presented by Helen R. Quinn, Professor Emerita at SLAC National Accelerator Laboratory

“Teaching for learning”
2019 Segrè Interns

Nathan Aguilar | Titus Amza | Karen Yu
Events: CalDay April 13, 2019

Approximately 100 Physics volunteers!
Events: CalDay April 13, 2019

Thank you Brian and Eleanor
Events: Undergrad Poster Session
Events: 2019 Berkeley Grand Slam Competition

Physics grad student QinQin Yu awarded People’s Choice winner for her talk title “Predicting Unpredictability in Evolution”

April 3, 2019

Sponsor: Graduate Division
Outstanding GSRs

• ELLA BANYAS
• DANIEL EILBOTT
• SHANNON HALEY
• SYED IMAM
• JAEWON KIM
• NATHANIEL LESLIE
• JAMES PARKES
• KARTHIK SIVA
• ALEXANDER SMITH
• HAOYU SUN
• KENNETH VETTER
• BYEONGHEE YU
• YUYANG ZHOU

2019 Citation Award

• SIJIA ZHAO

Student Service Award

• EMILY GLAZER
• MAYIA VRANAS
• STEPHANIE MACK

Lars Commins Award Exp. Physics

• S. MATTHEW GILBERT
• VICTORIA XU

Jackson Kos Award in CM Physics

• LEIGH MARTIN
Events: Commencement 2019

May 21, 2019, Zellerbach Auditorium
Events: Commencement 2019

May 21, 2019, Zellerbach Auditorium
Events: Commencement 2019

May 21, 2019, Zellerbach Auditorium
Events: Commencement 2019

May 21, 2019, Zellerbach Auditorium
Events: Commencement 2019

Sijia Zhao, Citation Winner

May 21, 2019, Zellerbach Auditorium
2018/19 Construction Projects/Renovation

Le Conte Annex
Corridor Illuminated
Exit signs

Le Conte Annex attic clean out leaves potential for future build out of space

Lecture Hall Annex elevator modernization
The Physics Machine Shop

2019: New student shop supervisor, funding of new CNC for student shop, workstations

2020: Modernization of the professional shop a top priority
Physics Department Research

ASTROPHYSICS

ATOM. MOLECULAR AND OPTICAL PHYSICS

BIOPHYSICS

CONDENSED MATTER PHYSICS AND MATERIALS SCIENCE

NUCLEAR PHYSICS

PARTICLE PHYSICS

PLASMA AND NONLINEAR DYNAMICS
Physics Research Grants and Contracts
Stuart D. Bale’s group at the Space Sciences Lab (SSL)
- experimental space physics
- coronal heating and plasma turbulence
- plasma physics with astro applications

Highlights of past year:

• Launch of NASA Parker Solar Probe
  • Berkeley instrument payload
  • 2 perihelia complete at 35 Rs
  • Spectacular results – 70+ ApJ papers coming...

• NASA selection of Berkeley payload for a lunar lander mission

FIELDS instrument: electric & magnetic fields, plasma waves, solar radio emission, ...
SWEAP: solar e, alpha, p
Some recent results from the Budker lab

Quantitative measurements of non-covalent interactions with diamond-based magnetic imaging

Metin Kayci,1 Sean Lourette,1 Tao Wang,1 Lykourgos Bougas,2 and Dmitry Budker1,2

Diamond-based measurements of forces between biomolecules

Towards a new type of hybrid sensor for fundamental-physics experiments

Meissner effect:
Nearly frictionless suspension of a spin -> potential for ultra-sensitive precession, torque measurements
Collaboration puts together the 'heart' of LUX-ZEPLIN dark matter detector

July 26, 2019: Sanford Underground Lab
Dan McKinsey and friends

Video: https://vimeo.com/351464450
Photocurrent is a topological invariant in a chiral Weyl crystal

Theoretical prediction (Moore group) for photocurrent in a chiral Weyl semimetal

Experimental observation

Joel Moore and Joe Orenstein

Video: https://vimeo.com/351464450
Ahmet Yildiz

What makes bimolecular motors unidirectional?

Protein engineering to make such motors “moonwalk”

Observation of Chiral Polar Skyrmions

\[ F = \int (f_{\text{bulk}} + f_{\text{grad}} + f_{\text{elas}} + f_{\text{elec}}) dV \]

\[ N_{sk} = \frac{1}{4\pi} \int \int d^2r \ \tilde{n} \cdot \left( \frac{\partial \tilde{n}}{\partial x} \times \frac{\partial \tilde{n}}{\partial y} \right) \]

Room-temperature polar skyrmion bubbles found in lead titanate layers: new class of 3D structures

Das, ... Ramesh, Nature 568, 365-372 (2019)
Coupling of the Higgs Boson to Fermions

- Two major milestones in probing the Yukawa coupling of the Higgs boson by the ATLAS collaboration
  - Observation of the production of the Higgs boson in association with top quarks
    - Observed (expected) significance: 6.3 (5.1) $\sigma$
  - Observation of the decay of the Higgs boson to $b$-quarks
    - Observed (expected) significance of 5.3 (4.8)
- UCB contributors: Jennet Dickinson (PhD), Heather Gray, Marjorie Shapiro, Haichen Wang
2019/20
Looking Ahead...
SYMPOSIUM FOR MARY K. GAILLARD

Saturday, September 21, 2019 – 9:00am to Sunday, September 22, 2019 – 5:00pm

FROM CHARM TO STRINGS

Organizing Committee: Chair Lawrence Hall, co-Chair Hitoshi Murayama, + BCTP and many of its friends
New Faculty Searches

• AMO / CM Experiment (NT)

• Astrophysics Experiment or Theory and Associated Data Science (NT)

• Quantum Information, Quantum Sensing and Quantum Computing - Experiment or Theory (NT)
Events: Annual Finance & Business Services/ChaMPS Open House

October 1, 2019
11:00AM – 1:00PM
1 LeConte

Please join us to discuss time- and cost-saving tips to ease the Bearbuy, travel, and reimbursement processes and explore the latest news from Research Administration and Human Resources.

The inaugural 2018 Finance and Business Services/ChaMPS open house was a great success, bringing Faculty, students, and administrative partners together to learn from one another.
Infrastructure

Campus Funding approved:
Birge chiller replacement design
Birge Hall full building sprinkler system
“If we assume we've arrived: we stop searching, we stop developing.”
Our First Colloquium of 2019/20

Andrea J. Liu
Hepburn Professor of Physics, University of Pennsylvania
September 9, 2019

“Exploiting the Malleability of Disorder to Design Biologically-Inspired Function”
Berkeley Physics: Have a great year!
(refreshments in the courtyard)