UNIVERSITY
OF
CALIFORNIA
MERCED

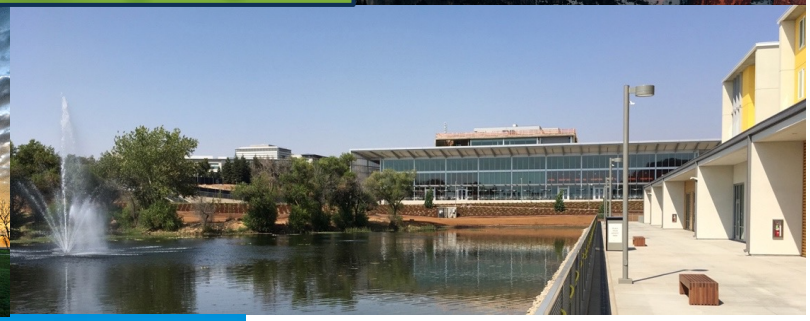
PHYSICS PHD PROGRAM OVERVIEW, FALL 2025

University of California, Merced

Prof. David Strubbe (Physics Graduate Program Chair)
Prof. Chih-Chun Chien (Physics Graduate Admission Chair)

http://physics.ucmerced.edu/

Where We Are



Founded 2005
10th campus of the University of California
First US research university of the 21st century
City of Merced population about 100,000
Campus doubled in size in recent “2020 Project”

Nearby universities and labs:
Stanford
UC Berkeley
UC Davis
UC Santa Cruz
UC Lick Observatory
Lawrence Livermore Lab
Lawrence Berkeley Lab
NASA Ames Research Center

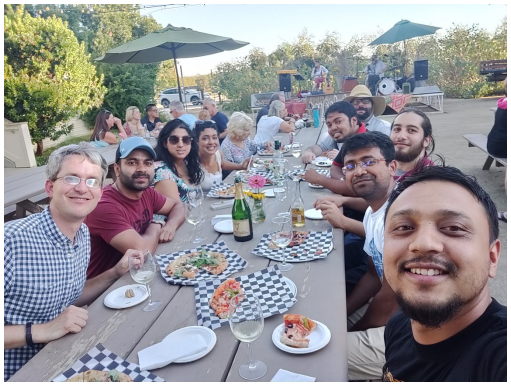
Announcement in the spring:
Carnegie Classification of Institutions of Higher Education
“R1: Doctoral Universities – Very high research activity”

Ranked “R2: Doctoral Universities – High research activity” 2018-2025.

The R1 classification is based on rigorous criteria, including research activity and the number of doctoral degrees conferred.
Less than 10% of the nation’s eligible public and private colleges and universities claim the R1 designation.

Who We Are

- 20 faculty members (6 women)
- 16 affiliated faculty in other departments
- Around 60 graduate students (1/4 women) from the Central Valley, San Francisco Bay Area, Southern California, Ohio, Maryland, Iran, India, Nepal, Switzerland, Philippines, Nigeria, Cuba, Bangladesh …
- Around 65 undergraduate physics majors
- 9100 undergraduates (55% Hispanic, 75% first-generation)



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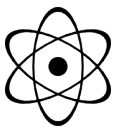
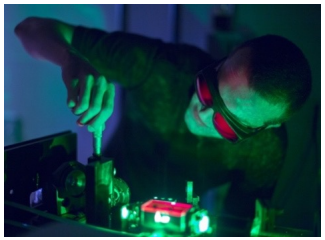


[Rn]5f³6d¹7s²

$$\sqrt{\frac{E}{m}\,\frac{F}{a}}$$

Physics Research Areas

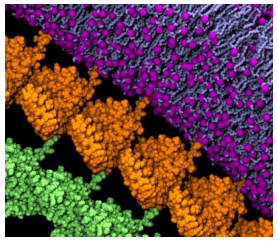
http://physics.ucmerced.edu/research1



Atomic, Molecular, and Optical Physics

Experiment
Sayantani Ghosh
Michael Scheibner
Jay Sharping
Jing Xu

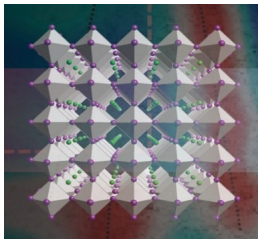
Theory
Chih-Chun Chien
Kevin Mitchell
Lin Tian



Biophysics and Soft Matter

Experiment
Linda Hirst
Dustin Kleckner
Bin Liu
Jay Sharping
Jing Xu

Theory
Kinjal Dasbiswas
Ajay Gopinathan



Condensed Matter and Solar Energy

Experiment
Hui Cai
Sayantani Ghosh
Linda Hirst
Michael Scheibner
Ray Chiao (emeritus)

Theory
Chih-Chun Chien
David Strubbe
Lin Tian

Astrophysics and Astronomy

Observation
Anna Nierenberg
Gillian Wilson

Theory
Sarah Loebman

Red = interested in taking new students in fall 2026

CCBM NSF-CREST
CENTER FOR CELLULAR AND BIOMOLECULAR MACHINES

Center for Chemical Computation and Theory

IMOD

VISION: NSF Partnership for Research and Education in Materials (PREM), with IMOD/Univ of Washington

Other affiliated faculty

Mechanical Engineering
Venkattraman Ayyaswamy: plasma physics
Mehmet Baykara: atomic force microscopy, surface physics
Yanbao Ma: thermal science, X-rays

Chemistry and Biochemistry
Mike Colvin: biomolecular simulation
Hrant Hratchian: electronic structure
Henrik Larsson: theoretical chemistry and AMO physics
Aurora Pribram-Jones: electronic structure
Tao Ye: bio/nano interfaces

Bioengineering
Arvind Gopinath: biophysics
Victor Muñoz: biophysics
Anand Bala Subramaniam: soft matter

Applied Mathematics
Shilpa Khatri: fluid dynamics
Tomas Rube: computational biology

Materials Science and Engineering
Jennifer Lu: material synthesis
Elizabeth Nowadnick: condensed matter theory

Lawrence Livermore National Laboratory
Alex Noy: biomaterials

Application criteria

- Excellence in their coursework, potential for future research accomplishments (generally shown through previous research experiences), developed research interests, a strong motivation for graduate study, a record of working hard and overcoming obstacles, and a good fit with UC Merced faculty research.
- Degree choice: We are only admitting students for the PhD, not for a masters.
- Coursework: bachelors or masters degree in physics or a closely related field. Essential to have taken these courses at a level beyond the first year, or will take them in the coming spring:
  - classical mechanics
  - electricity and magnetism
  - quantum mechanics
  - thermodynamics/statistical mechanics.

  Exceptions will be made rarely. Most non-physics majors will not have sufficient background.
- Research: Show understanding, interest, and accomplishments. Doesn't necessarily have to be in the same subfield that you are interested in pursuing in your PhD.

Application process

> PRIORITY DEADLINE: December 1, 2025 *(applications will receive priority review)*
> GENERAL DEADLINE: January 9, 2026 *(later applications will be reviewed on a rolling basis if space available)*
Notifications in January or February, sometimes March or April.

- The general GRE and physics GRE scores are not required and not expected. Applicants may choose to submit their scores if they wish.
- Transcripts from college, masters, community college. GPA > 3.0 on US scale (we will convert, by e.g. WES)
- 3 letters of recommendation from research supervisors, professors, etc.
- CV, statement of purpose (scientific interests, future plans, previous research, and definitely list faculty of interest), personal statement (how you got interested)
- TOEFL, IELTS, or Duolingo exam scores for foreign applicants (unless attended English-speaking institution)
- Other work can be optionally submitted: *e.g.* masters thesis, research papers published
- Application is to the program, not specific faculty, but contacting faculty of interest is encouraged
- Application fee waivers: request to Prof. Chih-Chun Chien (cchien5@ucmerced.edu), or automatically for domestic students who have participated in certain programs such as Cal-Bridge, UC LEADS, or SACNAS
- **Please read and follow info on our webpage: https://physics.ucmerced.edu/academics/graduate-studies**

Graduate courses

A. Core Course Requirements: To be completed within the first four semesters.

- PHYS 237, Quantum Mechanics I
- PHYS 210, Electrodynamics
- PHYS 212, Statistical Mechanics
- PHYS 205, Classical Mechanics

May be waived if you have taken comparable graduate courses elsewhere.

C. Other Classes:

- PHYS 202, Foundations of Physics
- PHYS 251, Introduction to Graduate Research
- QSB 294, Responsible Conduct of Research
- PHYS 293 (4 semesters), Physics Colloquium

Graduate elective courses

1. An elective from the physics courses
2. A second elective, from physics or any other science or engineering graduate course

- PHYS 204, Biophysics
- PHYS 209, Soft Matter Physics
- PHYS 227, Machine Learning and Statistics for Physics and Astronomy
- PHYS 230, Computation and Modeling for Interdisciplinary Biophysical Sciences, Biomaterials and Biotechnology
- PHYS 231, Imaging and Spectroscopy for Interdisciplinary Biophysical Sciences, Biomaterials and Biotechnology
- PHYS 234, Frontiers of Molecular and Cellular Biotechnology
- PHYS 239, Nano-Fabrication for Interdisciplinary Materials Sciences
- PHYS 241, Condensed Matter Physics
- PHYS 242, Advanced Condensed Matter Physics
- PHYS 244, Modern Atomic, Molecular, and Optical Physics
- PHYS 248, Quantum Optics
- PHYS 265, Solar Cells, Modules, and Systems
- PHYS 272, Quantum Information Science
- PHYS 274, Advanced Quantum Computing
- PHYS 280, Nonlinear Dynamics
- PHYS 281, Computational Physics
- PHYS 292, Special Topics in Physics (e.g. Scientific Writing)
- UC Santa Cruz classes taken remotely: Astrophysics I, Astrophysics II, Stars and Planets, etc.

Degree requirements

A. PHYS 202, Foundations of Physics

- Review of undergraduate knowledge of physics
- 3 parts: classical mechanics, electricity and magnetism, quantum mechanics
- Offered in the fall semester and required for all incoming graduate students.
- Grading is completion-based, straightforward to pass.
- May also take the corresponding undergraduate courses to fulfill the requirement.

B. Qualifying examination ("qual")

- Write a proposal summarizing research so far and giving plan for PhD thesis
- Present research and plan to committee of 3 or more faculty members
- Do "pre-qual" meeting one month before, to get feedback from faculty
- Answer oral questions about your subfield of physics and about your research and plan
- Advance to candidacy before the end of the 3rd year
- Passing lets you apply for the "masters along the way" degree

What to expect in the first semester

A. RESEARCH

- ***Rotation:*** Not required to select advisor right away.

We will assign you to an initial research advisor based on your preferences.
Introduction to Graduate Research seminar class to learn about faculty research areas

B. TEACHING ASSISTANTSHIP

- ***Lead*** undergraduate discussion or labs for intro classes, sometimes upper-division.

We offer TA training sessions during orientation week.

C. MENTORING

- ***Peer mentor:*** everyone is assigned a mentor from among the current graduate students.
- ***Faculty mentor:*** 'rotation' faculty serve as mentors until you find a permanent advisor.

D. SUMMER BEFORE YOU START

- ***Optional Summer Bridge program:*** domestic students can participate. Stipend, professional development, getting started exploring research with a faculty member.
- Other students can contact potential advisors about getting started on research early.

Typical PhD timeline

A. YEAR 1

- Pass PHYS 202 for undergraduate review
- Take core classes
- TA
- Explore research topics and decide on PhD advisor by end of Year 1

B. YEAR 2

- Begin research
- Form thesis committee
- Take elective classes

C. YEAR 3

- Focus primarily on research
- Advance to candidacy (qualifying exam)

D. YEAR 4 - YEAR 5 or YEAR 6

- Research
- Sometimes internships (e.g. at national labs)
- Write thesis

BENCHMARKS EXPECTED

- Publishing research articles
- Presenting at conferences

Funding support

TEACHING ASSISTANTSHIP (TA)

GRADUATE STUDENT RESEARCHER (GSR)

- Grant funding (National Science Foundation, NASA, Department of Energy, National Institutes of Health, University of California Office of the President, Department of Defense, etc.)

CENTER/RESEARCH FELLOWSHIPS

- CCBM fellowships (biophysics)
- PREM fellowships (condensed matter)
- Internal fellowships from Graduate Division
- Summer fellowships through physics graduate group
- Travel funding through physics graduate group and centers

All admitted students receive 5-year funding guarantee

Stipend typically at least $37,000 per year

Tuition and fees paid for

Source: livingwage.mit.edu; 2025

Merced's cost of living much less than some parts of California: most affordable in the UC

	Merced	Berkeley (Alameda)	Davis (Yolo)	Los Angeles	Irvine (Orange)	Riverside	Santa Barbara	Santa Cruz	San Diego
Living Wage (per hour)	$23.07	$29.95	$26.92	$27.81	$32.20	$28.76	$30.98	$38.99	$30.71
Cost of Housing (per year)	$12,906	$23,325	$19,304	$17,568	$28,342	$22,017	$25,269	$36,826	$25,848

Where are our alumni? Some examples

Postdoctoral research:

Berkeley, Caltech, Stanford, Brandeis, Princeton, Yale, UC Merced, Germany,
Lawrence Berkeley, Lawrence Livermore, Sandia, Oak Ridge, Los Alamos, Jefferson National Labs

Industry:

Bosch, Apple, Intel, KLA Tencor, DigiLens Inc., Lumentum, ATT Government Solutions, Sberbank, HSBC, Chicago Stock Exchange, Caelux, Epic Systems

Faculty positions:

California State Polytechnic University, Humboldt
Merced College, Fresno City College (community colleges)
Southern University of Science and Technology, China
Mills College
Benedictine College

Government:

Defense Threat Reduction Agency, California Department of Food and Agriculture

https://physics.ucmerced.edu/alumni-graduate

CCBM
NSF-CREST
CENTER FOR CELLULAR AND BIOMOLECULAR MACHINES

Interdisciplinary NSF biophysics center

THRUST 1: PROTEIN METAMORPHOSIS AND RESPONSIVE NANODEVICES

THRUST 2: ADAPTIVE AND RESPONSIVE MESOSCALE ASSEMBLIES

THRUST 3: ADAPTIVE CELLULAR COMMUNICATION

- Interdisciplinary graduate training emphasis in Interdisciplinary Biophysical Sciences, Biomaterials and Biotechnology (IB3)
- Training modules in nanobiofabrication, imaging and spectroscopy, and computation and modeling
- Networking and professional development opportunities, center meetings and events, career skills workshops
- Entrepreneurship and K-12 school outreach opportunities
- Academic year and summer stipends, travel fellowships and more

Departments: physics, bioengineering, chemistry, mechanical engineering, materials science, applied mathematics, molecular and cellular biology

Co-Directors: Ajay Gopinathan and Victor Muñoz

Other physics faculty: Colvin, Dasbiswas, Ghosh, Gopinath, Hirst, Liu, Mitchell, Rube, Subramanian, Ye

Resources

- Overview of UC Merced physics graduate program: https://physics.ucmerced.edu/graduate-studies
- Detailed information on UC Merced physics application requirements and process: https://physics.ucmerced.edu/academics/graduate-studies/apply-graduate-program
- General advice on applying to grad school in physics from David Wittman at UC Davis: https://wittman.physics.ucdavis.edu/gradadvice.html

Learn more

video, brochure, flyer, website, AIP GradSchoolShopper

- Contact faculty of interest: ask about whether they are taking new students, current projects, fit of your research interests and background with the work in their lab, etc.
- Check out recorded colloquium videos from David Strubbe, Bin Liu, Beth Nowadnick, Tomas Rube, Hui Cai, Anna Nierenberg, Sarah Loebman, Chih-Chun Chien, and others: https://physics.ucmerced.edu/events/previous-physics-colloquia
- For application questions – contact Prof. Chih-Chun Chien: cchien5@ucmerced.edu or UC Merced Graduate Admissions: grad@ucmerced.edu
- Take a virtual tour of campus: https://admissions.ucmerced.edu/visit-us/virtual-tour

- Ask some questions now!