UNIVERSITY
OF
CALIFORNIA
MERCED

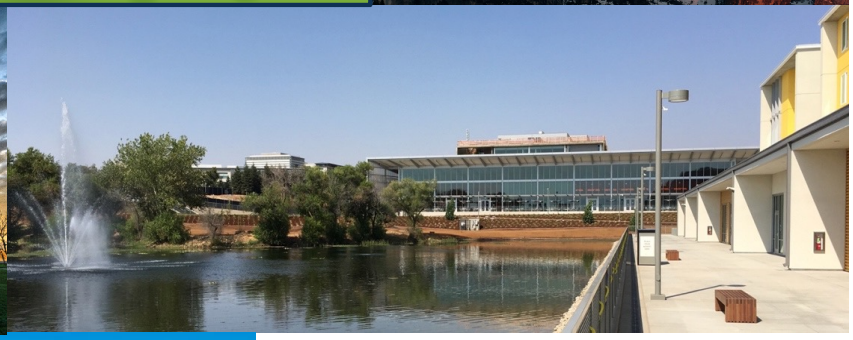
PHYSICS PHD PROGRAM, FALL 2021

University of California, Merced

Prof. David Strubbe (admissions committee member)

http://physics.ucmerced.edu/

Where We Are

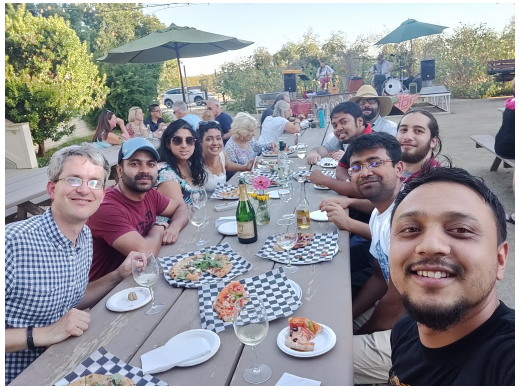


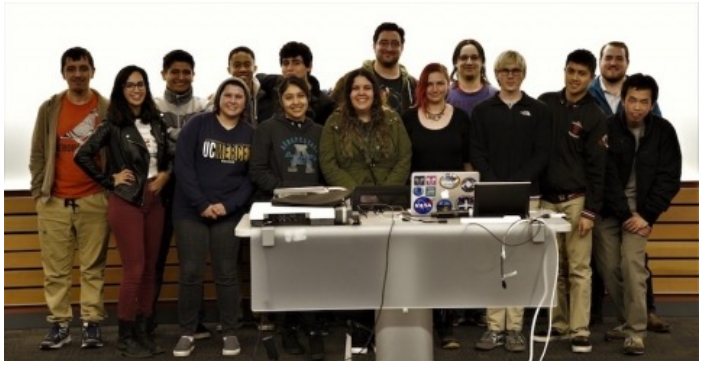
Founded 2005
10th campus of the University of California
First US research university of the 21st century
City of Merced population about 80,000
Just finished "2020 Project,"
doubling size of campus

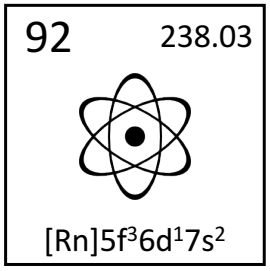
Nearby universities and labs:
Stanford
UC Berkeley
UC Davis
UC Santa Cruz
UC Lick Observatory
Lawrence Livermore Lab
Lawrence Berkeley Lab
NASA Ames Research Center

Who We Are

- 21 faculty members (7 women)
- 14 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 …
- 50 undergraduate physics majors
- 9000 undergraduates (55% Hispanic, 75% first-generation)



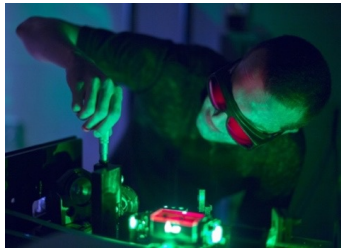




$$\sqrt{\frac{E}{m}\,\frac{F}{a}}$$

Physics Research Areas and Centers

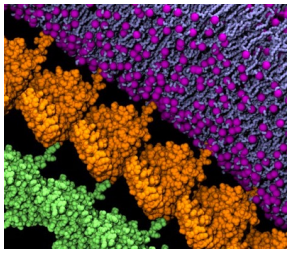
http://physics.ucmerced.edu/research1



Atomic, Molecular, and Optical Physics

Experiment
Sayantani Ghosh
Michael Scheibner
Jay Sharping
Roland Winston
Jing Xu

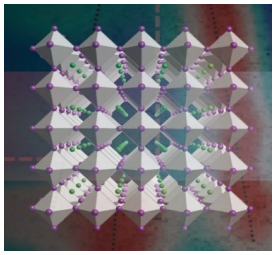
Theory
Chih-Chun Chien
Kevin Mitchell
Lin Tian



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
Ray Chiao
Sayantani Ghosh
Linda Hirst
Michael Scheibner
Roland Winston

Theory
Chih-Chun Chien
David Strubbe
Lin Tian

Astrophysics and Astronomy

Observation
Anna Nierenberg

Theory
Sarah Loebman

Center for Chemical Computation and Theory

CCBM
NSF-CREST
CENTER FOR CELLULAR AND BIOMOLECULAR MACHINES

MACES
MERCED NANOMATERIALS CENTER FOR ENERGY AND SENSING

UC Solar
University of California Advanced Solar Technologies Institute

Other affiliated faculty

Mechanical Engineering
Venkattraman Ayyaswamy: plasma physics
Mehmet Baykara: tribology and surface science

Chemistry and Chemical Biology
Mike Colvin: biomolecular simulation
Hrant Hratchian: electronic structure
Aurora Pribram-Jones: electronic structure
Tao Ye: bio/nano interfaces

Bioengineering
Arvind Gopinath: biophysics
Victor Muñoz: biophysics
Anand Subramaniam: biophysics

Applied Mathematics
Shilpa Khatri: fluid dynamics

Materials and Biomaterials Science and Engineering
Sarah Kurtz: solar energy
Jennifer Lu: material synthesis
Elizabeth Nowadnick: condensed matter theory

Lawrence Livermore Nat'l Lab
Alex Noy: biomaterials

Merced nAnomaterials Center for Energy and Sensing (MACES)

MACES
MERCED NANOMATERIALS CENTER FOR ENERGY AND SENSING

http://maces.ucmerced.edu

- NASA-funded center for interdisciplinary research and education
- Involves physics, chemistry, applied mathematics, and materials and mechanical engineering
- Research topics for space technology include: photovoltaics, fuel cells, surface science, biosensors

Benefits for graduate students:

- Fellowships and research/travel funding
- Internships at NASA research centers
- Collaborations with NASA and UC Santa Cruz
- Field trips, training, and outreach events
- Networking opportunities with NASA and industry

NSF-CREST Center for Cellular and Biomolecular Machines (CCBM)

ccbm.ucmerced.edu

Interdisciplinarity

- **physical,**
- **biological**
- **chemical**
- **engineering**

Research Focus

- **multi-scale assemblies of biomolecules and cells**
- **natural and synthetic**

Research Objectives

- **understand** biological function
- **develop** design principles
- **implement** bioinspired nanomachines

Education and Training

- enhance education **graduate undergraduate**
- biophysics, biochemistry, and bioengineering

Outreach

- **develop K-12 STEM** activities
- students and teachers
- Merced area

Dr. Victor Muñoz, Bioengineering, PI/Co-Director
Dr. Ajay Gopinathan, Physics, Co-PI/Co-Director
Dr. Sayantani Ghosh, Physics, Co-PI
Dr. Kara McCloskey, Materials and Biomaterials Science and Engineering, Co-PI

This work is supported by funding from the National Science Foundation: NSF-CREST: Center for Cellular and Biomolecular Machines (CCBM) at the University of California, Merced (NSF-HRD-1547848).

Application process

Apply online at **graduatedivision.ucmerced.edu**.
> **PRIORITY DEADLINE:** December 15, 2021 *(applications will receive priority review)*
> **GENERAL DEADLINE:** January 15, 2022 *(later applications will be reviewed on a rolling basis if space available)*

- Required: bachelors or masters degree in physics or a closely related field
- 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), personal statement (how you got interested)
- TOEFL or IELTS 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. Linda Hirst, or automatically for students who have participated in certain programs such as Cal-Bridge, UC LEADS, or SACNAS
- 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.

B. Electives: To be completed at any time

- An elective from the physics courses: *e.g.* condensed matter physics (introductory or advanced), biophysics, soft matter physics, nonlinear dynamics, computational physics, computation and modeling in the biosciences, quantum information science, atomic/molecular/optical physics, quantum optics, machine learning for physics/astro, etc.
- A second elective, from physics (outside primary research area) or any other science or engineering graduate course

C. Other:

- Introduction to Graduate Research
- Responsible Conduct of Research
- 4 semesters of physics colloquium

Degree requirements

A. Preliminary examinations ("prelims")

- Written test of undergraduate knowledge of physics
- 3 parts: classical mechanics, electricity and magnetism, quantum mechanics
- Offered at the beginning of each semester, strongly recommended to take right when you arrive
- Pass all 3 parts before the start of the 3rd year (we are revising how exactly prelims work)

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
- Answer oral questions about your subfield of physics and about your research and plan
- Advance to candidacy before the end of the 3rd year

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

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

Typical timeline

A. YEAR 1

- Pass preliminary exam
- Take core classes
- TA
- Explore research topics and decide on PhD advisor by end of YR 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

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

BENCHMARKS EXPECTED

- Publications
- Conference presentations
- Outreach activities
- Mentoring undergraduate students

Funding support

TEACHING ASSISTANTSHIP (TA)

- Physics discussion or lab classes, sometimes math classes

GRADUATE STUDENT RESEARCHER (GSR)

- Grant funding (NSF, NASA, Dept of Energy, etc.)

CENTER/RESEARCH FELLOWSHIPS

- CCBM and MACES fellowships
- Internal fellowships from Graduate Division
- NSF Research Trainee fellowships (*e.g.* CONDESA)
- NIH G-RISE fellowship
- Summer fellowships through physics graduate group
- Travel funding through physics graduate group and centers

All admitted students receive 5-year funding guarantee (typical time to PhD)

Stipend around $27,000 per year, tuition paid for

Source: livingwage.mit.edu; 2020

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

	Merced	Berkeley	Davis	Los Angeles	Irvine	Riverside	Santa Barbara	Santa Cruz	San Diego
Living Wage (per hour)	$10.26	$15.92	$12.54	$13.41	$14.45	$12.10	$13.85	$13.36	$13.69
Cost of Housing (per year)	$6,204	$16,560	$10,368	$11,972	$13,932	$9,576	$12,780	$11,868	$12,480

Where are our alumni? Some examples

Postdoctoral research:

Caltech, Stanford, Brandeis, Princeton Universities

Lawrence Berkeley, Lawrence Livermore, Sandia National Laboratory

Industry:

Apple, Intel, KLA Tencor, DigiLens Inc., Lumentum, ATT Government Solutions, Sberbank

Faculty positions:

Merced College, Fresno City College (community colleges)

Southern University of Science and Technology, China

Mills College, Benedictine College

Government:

Defense Threat Reduction Agency

Learn more

video

brochure

flyer

website

AIP GradSchoolShopper

Contact faculty of interest: ask about whether they are taking new students, fit of your research interests and background with the work in their lab, etc.

For application questions: contact Prof. Hirst, lhirst@ucmerced.edu

Take a virtual tour of campus: https://admissions.ucmerced.edu/visit-us/virtual-tour