



Physics

GRADUATE STUDIES AT UNIVERSITY OF CALIFORNIA, MERCED (M.S., Ph.D.)

PROGRAM HIGHLIGHTS: Our research program is highly interdisciplinary, which allows us to focus on both established research areas such as condensed matter physics; atomic, molecular and optical (AMO) physics; astrophysics; and statistical physics and nanoscience, while pursuing emerging fields such as soft matter, metamaterials, quantum information, renewable energy and biophysics.

The researchers in our group have access to excellent core facilities on campus, including ultra-fast laser systems, computing clusters, a state-of-the-art electron microscopy facility, a nanofabrication facility and NMR. Other large facilities, such as the synchrotron light sources at Stanford and Berkeley, and the UC Lick Observatory, are a short drive away and are routinely used by our students and faculty members. We also have extensive collaborations with nearby institutions, including Lawrence Livermore and Lawrence Berkeley National Labs, and other UC campuses.

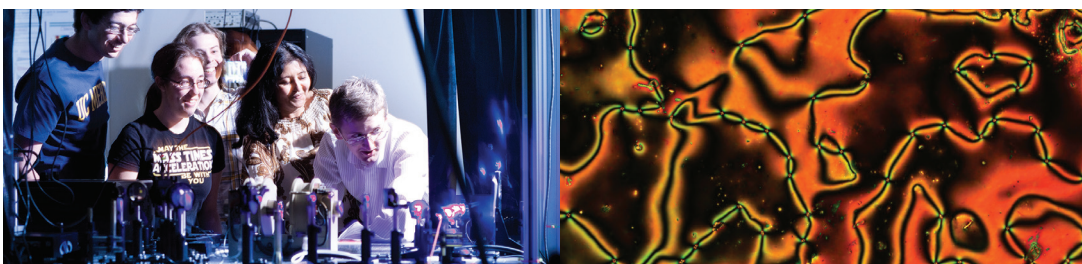
RESEARCH AREAS

UC Merced offers a unique academic atmosphere that fosters interdisciplinary research – connecting physical sciences research to life sciences, materials science and engineering. Our graduate students have the opportunity to pursue doctoral degrees while working on a broad range of research topics:

- > Experimental condensed matter: optoelectric and photovoltaic materials, quantum sensing, nanoparticles, metamaterials, strongly correlated systems, magneto-optical phenomena
- > Theoretical condensed matter and atomic physics: optoelectronic and photovoltaic materials, superfluids, superconductivity, ultra-cold atoms, quantum optics, quantum computing, nanomechanics
- > Experimental atomic, molecular and optical physics: photonic and electronic quantum information systems, ultrafast lasers
- > Experimental biophysics and soft matter: single-molecule biophysics, molecular motors, bacterial motility, biomaterials, biopolymers, soft nanocomposites, active matter, liquid crystals, mechanical metamaterials, colloids and complex fluids
- > Theoretical biophysics and soft-matter: intrinsically disordered proteins, mechanobiology, intracellular transport, collective cellular motility, active matter, liquid crystals, fluids, self-organization and self-assembly.
- > Theoretical statistical physics and nonlinear dynamics: non-equilibrium systems, swarming, chaos
- > Thermodynamically efficient solar energy conversion: non-imaging optics, energy materials
- > Astrophysics: Observational -- strong gravitational lensing constraints of dark matter, low-mass galaxy formation and evolution; Computational -- galaxy evolution, dark matter, and chemo-dynamics in the Local Universe, using high-resolution galaxy simulations, survey data and Big Data.

AFFILIATED RESEARCH CENTERS AND INSTITUTES

- > [NSF-CREST Center for Cellular and Biomolecular Machines \(CCBM\)](#)
- > [Merced nAnomaterials Center for Energy and Sensing \(MACES\)](#)
- > [University of California Advanced Solar Technologies Institute \(UC Solar\)](#)
- > [Health Sciences Research Institute \(HSRI\)](#)
- > [Center for Chemical Computation and Theory \(ccCAT\)](#)



FUNDING OPPORTUNITIES: All doctoral students in good standing are guaranteed five years of full financial support, including payment of fees and tuition. Teaching assistantships normally provide initial funding that can be supplemented by research assistantships, fellowships or other forms of financial assistance including travel awards.

Application fee waivers are available in cases of financial need, upon request.

TO APPLY: Apply online at graduatedivision.ucmerced.edu.

- > **PRIORITY DEADLINE:** December 15, 2021 (*applications will receive priority review*)
- > **GENERAL DEADLINE:** January 15, 2022 (*any applications after this date will be reviewed on a rolling basis if space is available*)
- > The general GRE and physics GRE scores are not required and not expected. Applicants may choose to submit their scores if they wish.
- > We will hold zoom webinars this Fall for prospective students to present information and answer questions about our program and the application process. For details go to <https://physics.ucmerced.edu/academics/graduate-studies>

FOR MORE INFORMATION: Visit physics.ucmerced.edu and contact Chih-Chun Chien, graduate group chair, or Prof. Linda Hirst, admissions chair.



Faculty

PHYSICS

HUI CAI

Experimental condensed matter and materials science, synthesis, electronic and optical properties of quantum materials and 2D materials

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CHIH-CHUN CHIEN

Theoretical atomic and molecular physics, theoretical condensed matter physics, geometrical and topological effects in physics, thermal transport, hybrid quantum systems.

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RAYMOND CHIAO

Nonlinear and quantum optics, experiment and theory; detection of gravitational radiation via quantum mechanical systems, such as a pair of charged mini-magnets levitated above superconductors (in collaboration with Prof. Jay Sharping).

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KINJAL DASBISWAS

Theoretical biological physics and soft condensed matter: cell and tissue physics, mechanobiology, pattern formation, active matter and biological materials.

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SAYANTANI GHOSH

Experimental condensed matter physics, magnetism, metamaterials, nanoscience and quantum systems.

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AJAY GOPINATHAN

Theoretical biophysics: molecular motors, disordered proteins, bacterial physics, swarming, and soft condensed matter physics.

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LINDA HIRST

Experimental soft condensed matter physics and biophysics: liquid crystals, soft nanocomposites, biopolymers, membranes and active matter.

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DUSTIN KLECKNER

Experiments on geometry and topology in soft matter and fluids.

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BIN LIU

Experimental soft condensed matter physics, biophysics, biological transport, non-Newtonian fluids, and mechanical metamaterials.

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SARAH LOEBMAN

Computational astrophysics: galaxy evolution, dark matter, and chemo-dynamics in the Local Universe, using high-resolution galaxy simulations, survey data, and Big Data.

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KEVIN MITCHELL

Nonlinear dynamics and chaos, with applications to AMO (atomic, molecular and optical) physics and fluid dynamics.

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ANNA M. NIERENBERG

Observational astrophysics: strong gravitational lensing constraints of dark matter, low-mass galaxy formation and evolution

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MICHAEL SCHEIBNER

Experimental quantum science & technology for sensing, metrology, phononics, photonics, materials engineering, information processing, resource sustainability & extreme environments

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JAY SHARPING

Ultrafast laser technology and applications in physics, chemistry and biology.

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DAVID STRUBBE

Theoretical condensed matter and materials science, electronic and optical properties, amorphous materials, photovoltaics, nanoscience, high-performance computing.

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LINTIAN

Theoretical questions in solid-state quantum computing, quantum simulation, hybrid quantum systems, optomechanics, decoherence, and noise models

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ROLAND WINSTON

Solar power and renewable energy, elementary particle physics, nonimaging optics.

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JING XU

Experimental biophysics, soft condensed matter physics, and nonlinear dynamics and complex systems: biomaterials, molecular motors, microtubules, optical trapping, fluorescence microscopy, Monte Carlo simulations.

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AFFILIATED FACULTY:

Venkatraman Ayyaswamy, plasma physics

Mehmet Baykara, tribology and surfaces

Mike Colvin, biomolecular simulation

Arvind Gopinath, soft matter and biophysics

Hrant Hratchian, computational chemistry

Shilpa Khatri, fluid dynamics

Sarah Kurtz, solar energy

Jennifer Lu, functional materials synthesis

Victor Muñoz, biophysics of proteins

Elizabeth Nowadnick, computational materials science

Alex Noy, biomaterials

Aurora Pribram-Jones, theoretical chemistry

Anand Subramaniam, biomaterials

Tao Ye, bio/nano interfaces

