ADMISSIONS

Department Information

Department Chair: Prof. Ajay Gopinathan, Chair
Department Contact: Linda Hirst, Admissions chair
Phone: (209) 228-3368
E-mail: lhirst@ucmerced.edu
Website: http://physics.ucmerced.edu/

Admission Contact Information

Address admission inquiries to: Graduate Division, University of California, Merced, 5200 N. Lake Road, SSB 310, Merced, CA 95343
Phone: (209) 228-3368
E-mail: gradadmissions@ucmerced.edu
Admissions website: https://graduatedivision.ucmerced.edu/

Application deadlines
Fall admission:
U.S. students: January 15
Int’l. students: January 15

Application fee
U.S. students: $120
Int’l. students: $140

Admissions information
For Fall of 2020:
Number of applicants: 77
Number admitted: 30
Number enrolled: 11

Admission requirements
Bachelor’s degree requirements: Bachelor’s degree in physics or a closely related field.
Minimum undergraduate GPA: 3.0

GRE requirements
The GRE is not required.
Not required this year due to COVID-19 disruptions, but normally required. No minimum cut-off is applied in reviewing scores. Official score reports are not needed. We consider applicants’ record of coursework and research experience, as shown in transcripts and GPA, statement of purpose, recommendation letters, and test scores, in making our decisions.

GRE Physics requirements
The GRE Physics is not required.
Not required this year due to COVID-19 disruptions, but normally required. No minimum cut-off is applied in reviewing scores. Official score reports are not needed.

TOEFL requirements
The TOEFL exam is required for students from non-English-speaking countries.
Minimum accepted TOEFL scores:
PBT score: 550
iBT score: 80
Either TOEFL or IELTS is required for students from non-English-speaking countries. See full information at https://graduatedivision.ucmerced.edu/prospective-students/how-apply/international-applicants.

Other admissions information
Undergraduate preparation assumed: Our preliminary exams test Quantum Mechanics at the level of “Introduction to Quantum Mechanics,” by D. J. Griffiths; Electrodynamics at the level of “Introduction to Electrodynamics,” by D. J. Griffiths; and Classical Mechanics at the level of “Classical Mechanics” by J. R. Taylor.

TUITION AND ASSISTANTSHIPS

Teaching Assistants, Research Assistants, and Fellowships

Number of first-year Teaching Assistants: 11
Average stipend per academic year
Teaching Assistant: $28,924
Research Assistant: $28,924
Fellowship student: $28,924
Five years of funding (including tuition and fees) are guaranteed for graduate students in good standing. This funding may take the form of TA positions, research positions, or fellowships. All students are required to TA for one semester, typically done in the first semester.

Tuition year 2020–2021:
Tuition for in-state residents
Full-time students: $5,721 per semester
Tuition for out-of-state residents
Full-time students: $13,272 per semester
All tuition for PhD students is covered by appointment as teaching assistant or graduate student researcher, or by fellowships.
Credit hours per semester to be considered full-time: 12
Deferred tuition plan: Yes
Health insurance: $3,222.78
Other academic fees: $882.50 total fees for student services, transportation, recreation, etc.
Academic term: Semester
Number of first-year students who received full tuition waivers: 11
FINANCIAL AID

Loans
Loans are available for U.S. students.
Loans are not available for international students.
GAPSFAS application required: No
FAFSA application required: Yes

For further information
Address financial aid inquiries to: University of California, Merced, ATTN: Graduate Division, 5200 N. Lake Road, SSB 310, Merced, CA 95343.
Phone: (209) 228-4622
E-mail: gradfunding@ucmerced.edu
Financial aid website: http://graduatedivision.ucmerced.edu/
financial-support

HOUSING

Availability of on-campus housing
Single students: No
Married students: No
Childcare Assistance: Yes

For further information
Address housing inquiries to: UC Merced Housing & Residential Life, 5200 N. Lake Road, Merced, CA 95343.
Phone: (209) 228-4663
E-mail: housing@ucmerced.edu
Housing aid website: http://housing.ucmerced.edu/

Table A—Faculty, Enrollments, and Degrees Granted

<table>
<thead>
<tr>
<th>Research Specialty</th>
<th>2020–2021 Faculty</th>
<th>2019–2020 Enroll.</th>
<th>Number of Degrees Granted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M.S.</td>
<td>Ph.D.</td>
<td>M.S.</td>
</tr>
<tr>
<td>Astrophysics</td>
<td>2</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Atomic, Molecular, &amp; Optical Physics</td>
<td>5</td>
<td>13</td>
<td>-4</td>
</tr>
<tr>
<td>Condensed Matter, Nanoscience and Energy</td>
<td>5</td>
<td>20</td>
<td>2(1)</td>
</tr>
<tr>
<td>Soft Matter and Biophysics</td>
<td>7</td>
<td>23</td>
<td>2(2)</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>58</td>
<td>-6</td>
</tr>
</tbody>
</table>

Full-time Grad. Stud. — — 70 — —
First-year Grad. Stud. — — 11 — —

GRADUATE DEGREE REQUIREMENTS

Master’s: Students are normally only admitted to the graduate program in Physics to work toward the Ph.D. degree. Requirements for the M.S. degree: Complete at least two semesters of full-time academic residence (12 units minimum) at UC Merced; Pass the preliminary examinations on undergraduate-level classical mechanics, quantum mechanics, and electromagnetism; Complete at least 24 semester hours of upper-division and graduate course work with a cumulative grade-point average of at least 3.0. At least 16 semester hours must be from regular, letter-graded lecture or discussion courses, while the remaining 8 hours may be research or similar courses; Pass a comprehensive oral examination administered by the faculty committee of at least 3 members. This examination will test the student’s understanding of the main concepts in the field at the graduate level.

Doctorate: The recipient of a Ph.D. degree is understood to possess thorough knowledge of a broad field of learning and to have given evidence of distinguished accomplishment in that field; the degree is a warrant of critical ability and powers of imaginative synthesis. The degree also signifies that the recipient has presented a doctoral dissertation containing an original contribution to knowledge in his or her chosen field of study. To complete a Ph.D. degree in physics at UC Merced students are required to: Complete at least four semesters of full-time academic residence (12 units minimum) at UC Merced; Complete the required courses with a letter grade of at least "B" in each course ("S" in seminar courses graded S/U); Serve as a teaching assistant for at least one semester; Pass the preliminary examinations on undergraduate-level classical mechanics, quantum mechanics, and electromagnetism; Pass the oral Ph.D. qualifying examination; Present and successfully defend a doctoral dissertation containing an original contribution to knowledge in the field. Required courses are classical mechanics, statistical mechanics, quantum mechanics, and electrodynamics. Electives include condensed matter, biophysics, soft matter, atomic physics, modern optics, and quantum information.

SPECIAL EQUIPMENT, FACILITIES, OR PROGRAMS

As the 10th campus of the University of California, UC Merced draws on the outstanding resources of the UC system, a world-renowned center for research and education. Physics graduate students have access to major facilities, such as state-of-the-art lasers, electron microscopes, a nanofabrication facility, a high-performance computing cluster, and an NMR on campus. Other large facilities, such as synchrotron light sources, are located at Stanford, Lawrence Livermore, and Lawrence Berkeley National Laboratories, which are within two hours’ drive and are routinely used by students and faculty members. We collaborate extensively with other nearby institutions such as UC Berkeley, Davis, Santa Cruz, and San Francisco. Students have access to the extensive library holdings and journal subscriptions of the UC system. Physics students work with several federally funded centers at UC Merced that the department leads or participates in, which promote education, research, and training for underrepresented minorities: the Center for Cellular and Biomolecular Machines (NSF), the Merced nAnomaterials Center for Energy and Sensing (NASA), an NSF Research Traineeship program in Interdisciplinary Computational Graduate Education, and the Consortium for High-Energy Density Science (NNSA).

Table B—Separately Budgeted Research Expenditures by Source of Support

<table>
<thead>
<tr>
<th>Source of Support</th>
<th>Departmental Research</th>
<th>Physics-related Research Outside Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal government</td>
<td>$1,368,000</td>
<td></td>
</tr>
<tr>
<td>State/local government</td>
<td>$553,000</td>
<td></td>
</tr>
<tr>
<td>Non-profit organizations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business and industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>$351,000</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$2,272,000</td>
<td></td>
</tr>
</tbody>
</table>

FACULTY

Professor

Ghosh, Sayantani, Ph.D., University of Chicago, 2003. Applied Physics, Atomic, Molecular, & Optical Physics, Condensed Matter Physics, Energy Sources & Environment, Low Temperature Physics, Nano Science and Technology, Optics. Ex-
perimental condensed matter physics; magnetism, strongly correlated systems, spintronics, quantum information.


Mitchell, Kevin, Ph.D., University of California, Berkeley, 2000. Atomic, Molecular, & Optical Physics, Biophysics, Computational Physics, Fluids, Rheology, Nonlinear Dynamics and Complex Systems, Theoretical Physics. Nonlinear dynamics and chaos, with applications to AMO (atomic, molecular, and optical) physics and fluid dynamics.


Associate Professor

Scheibner, Michael, Ph.D., University of Würzburg, 2006. Applied Physics, Atomic, Molecular, & Optical Physics, Condensed Matter Physics, Low Temperature Physics, Nano Science and Technology, Optics, Quantum Foundations. Experimental quantum science and technology for applications in sensing, metrology, phononics, photonics, materials engineering, information processing, resource sustainability and extreme environments.


Xu, Jing, Ph.D., University of California, Santa Barbara, 2006. Biophysics, Condensed Matter Physics, Nonlinear Dynamics and Complex Systems. Experimental biophysics, soft condensed matter physics, and nonlinear dynamics and complex systems, with interest in biomaterials including molecular motors and microtubules; research methods include optical trapping, fluorescence microscopy, and Monte Carlo simulations.

Assistant Professor


Chien, Chih-Chun, Ph.D., University of Chicago, 2009. Chair of graduate group. Atomic, Molecular, & Optical Physics, Condensed Matter Physics, Nano Science and Technology. Theoretical atomic and molecular physics, theoretical condensed matter physics, geometrical and topological effects in physics, thermal transport, hybrid quantum systems.


Professor Emeritus

Chiao, Raymond, Ph.D., Massachusetts Institute of Technology, 1965. Atomic, Molecular, & Optical Physics, Condensed Matter Physics, Nano Science and Technology, Optics, Quantum Foundations, Relativity & Gravitation. Nonlinear and quantum optics, experiment, and theory; detection and generation of gravitational radiation via quantum mechanical systems, such as a pair of charged mini-magnets levitated above superconductors (in collaboration with Prof. Sharping).

Teaching Professor


Teaching Associate Professor

Theoretical


Atomic, Molecular, & Optical Physics. The ability to manipulate matter at the atomic scale and its interactions with light has led to transformative advances in atomic, molecular and optical physics (AMO). Research areas include theoretical nonlinear dynamics for atomic and molecular systems, and quantum optics and quantum information in nanoscale systems including superconducting quantum computing, semiconductor optics, and nanomechanics. Chien, Mitchell, Tian. Biophysics. Biophysics is by definition an interdisciplinary science where ideas and techniques from physics (including soft condensed matter physics) are utilized to understand biological systems and phenomena. The biophysics group at UC Merced collaborates extensively between theory and experiment, and with chemistry, biology, applied math, and bioengineering groups. Research areas include intrinsically disordered proteins, cell mechanics, intracellular transport, collective cellular motility, active matter, liquid crystals, fluids, self-organization and self-assembly. Beller, Dasbiswas, Gopinathan.

Condensed Matter Physics. Condensed matter physics investigates the physical, electronic, and magnetic properties of the various forms of solid and liquid matter, ranging from naturally occurring crystals to engineered micro- and nanostructures as well as more exotic condensed phases and phenomena such as superconductivity and the quantum Hall effect. Research areas include optoelectronic and photovoltaic materials, nanoscience, strongly correlated systems, quantum information processing and magneto-optical phenomena, optical properties of nanostructures, and theoretical and computational tools for condensed-matter physics. Chien, Strubbe, Tian.

Interdisciplinary studies with affiliated faculty. Physics students may also carry out their graduate research with one of these groups: Venkatraman Ayyaswamy: plasma physics (mechanical engineering); Mike Colvin: biomolecular simulation (chemistry and chemical biology); Arvind Gopinath: soft matter and biophysics (bioengineering); Shilpa Khati: fluid dynamics (applied mathematics); Elizabeth Nowadnick: computational materials (materials and biomaterials science and engineering); Aurora Pribram-Jones: theoretical chemistry (chemistry and chemical biology).

Nano Science and Technology. The ability to fabricate, control, and study matter on the nanometer scale has opened up new possibilities in science and technology. Research areas include optical properties of nanostructures, quantum optics and quantum information in nanoscale systems, superconducting quantum computing, semiconducting nanostructures, and nanomechanics. Chien, Strubbe, Tian.

Nonlinear Dynamics and Complex Systems. Most processes encountered in nature are inherently nonlinear. Nonlinear dynamics and statistical physics find applications across a wide range of disciplines from mathematics and physics to chemistry, biology, and engineering. Research areas include chaotic dynamics, thermal transport, collective phenomena in swarming and foraging, anomalous transport in complex environments, and fundamental studies of topological dynamics. Beller, Chien, Dasbiswas, Gopinathan, Mitchell.

Soft Matter. Soft condensed matter is the study of materials that are neither crystalline solids, nor simple liquids — they are somewhere in between. Everyday examples of soft matter include soaps, paints, gels, plastics, liquid crystals, and most of your own body and the food you eat. Research areas include liquid crystals, active matter, and polymer physics and elasticity. Beller, Dasbiswas, Gopinathan.

Experimental

Astrophysics. Observational astrophysics: strong gravitational lensing constraints of dark matter, low-mass galaxy formation and evolution. Nierenberg. Atomic, Molecular, & Optical Physics. The ability to manipulate matter at the atomic scale and its interactions with light has led to transformative advances in atomic, molecular and optical physics (AMO). Research areas include photonic and electronic coupling for applications in quantum information, non-imaging optics, laboratory research at the boundary between relativity and quantum mechanics, ultrafast laser systems and their applications, and use of optical traps to manipulate nature’s nano-machines: molecular motors. Ghosh, Scheibner, Sharping, Winston, Xu.

Biophysics. Biophysics is by definition an interdisciplinary science where ideas and techniques from physics (including soft condensed matter physics) are utilized to understand biological systems and phenomena. The biophysics group at UC Merced collaborates extensively between theory and experiment, and with chemistry, biology, applied math, and bioengineering groups. Research areas include single-molecule biophysics, molecular motors, bacterial motility, biomaterials, biopolymers, soft nanocomposites, active matter, liquid crystals, mechanical metamaterials, colloids and complex fluids. Hirst, Liu, Sharping, Xu.

Condensed Matter Physics. Condensed matter physics investigates the physical, electronic, and magnetic properties of the various forms of solid and liquid matter, ranging from naturally occurring crystals to engineered micro- and nanostructures as well as more exotic condensed phases and phenomena such as superconductivity and the quantum Hall effect. Research areas include optoelectronic and photovoltaic materials, nanoscience, strongly correlated systems, quantum information processing and magneto-optical phenomena, optical properties of nanostructures, and theoretical and computational tools for condensed-matter physics. Chien, Strubbe, Tian.

Interdisciplinary studies with affiliated faculty. Physics students may also carry out their graduate research with one of these groups: Mehmet Z. Baykarra: tribology and surface science (mechanical engineering); Sarah Kurtz: solar energy (materials and biomaterials science and engineering); Jennifer Lu: functional material synthesis (materials and biomaterials science and engineering); Victor Muñoz: biophysics of proteins (bioengineering); Alex Noy: biomaterials (Lawrence Livermore National Laboratory); Anand Subramanian: biomaterials (bioengineering); Tao Ye: bio/nano interfaces (chemistry and chemical biology).

Nano Science and Technology. The ability to fabricate, control, and study matter on the nanometer scale has opened up new possibilities in science and technology. Research areas include directed assembly of nanostructures for information and energy transfer, optical properties of nanostructures, and combination of physics and biochemistry methodologies to tune the nano-machinery of molecular motors. Cai, Ghosh, Hirst, Scheibner, Xu.

Soft Matter. Soft condensed matter is the study of materials that are neither crystalline solids, nor simple liquids — they are somewhere in between. Everyday examples of soft matter include soaps, paints, gels, plastics, liquid crystals, and most of your own body and the food you eat. Research areas include liquid crystals, active matter, polymer physics and elasticity,
fluid dynamics and granular systems, membranes, and experiments on geometry and topology in soft matter and fluids. Hirst, Kleckner, Liu, Utter.

Solar and Energy Sciences. As the first new research university in the 21st century, UC Merced was established with the mission to address new challenges facing humanity, including development of inexpensive renewable energy. Research areas include design of novel optics for light energy collection and development of novel materials for energy conversion. The University of California Advanced Solar Technologies Institute (UC Solar) is a multi-campus research institute across the UC system. Headquartered at UC Merced, UC Solar conducts cross-disciplinary research that leads to new and improved solar energy generation technologies and educates the energy industry and the next generation of energy scholars. Ghosh, Hirst, Strubbe, Winston.

View additional information about this department at www.gradschoolshopper.com. Check out the “Why Choose Us?” section, find out more about the department's culture and get links to social media networks.