General University Information
President: Joyce McConnell
Dean of Graduate School: Mary Stromberger, Vice Provost for Graduate Affairs and Dean of the Graduate School
University website: http://www.colostate.edu
School Type: Public
Setting: Urban
Total Faculty: 1,846
Total Graduate Faculty: No separate graduate faculty
Total number of Students: 33,877
Total number of Graduate Students: 4,311

Department Information
Department Chair: Prof. Jacob Roberts, Chair
Department Contact: Kristin McLaughlin, Administrative Assistant II
Total full-time faculty: 22
Total number of full-time equivalent positions: 22
Full-Time Graduate Students: 68
Female Full-Time Graduate Students: 7
First-Year Graduate Students: 15
Female First-Year Students: 2
Total Post Doctorates: 6

Department Address
Campus Delivery 1875
Fort Collins, CO 80523
Phone: (970) 491-6206
Fax: (970) 491-7947
E-mail: physics_grad_admissions@mail.colostate.edu
Website: http://www.physics.colostate.edu

ADMISSIONS

Admission Contact Information
Address admission inquiries to: Graduate Admissions Committee, Department of Physics, 1875 Campus Delivery, Colorado State University, Fort Collins, CO 80523
Phone: (970) 491-6207
E-mail: physics_grad_admissions@mail.colostate.edu
Admissions website: http://www.physics.colostate.edu/graduate-program/how-do-i-apply/

Application deadlines
Fall admission:
U.S. students: February 1
Int'l. students: February 1

Application fee
U.S. students: $60
Int'l. students: $70
Initial application (no fee until after admissions notification).
Late applications can be considered until all positions are filled.

Admissions information
For Fall of 2019:
Number of applicants: 188
Number admitted: 32
Number enrolled: 12

Admission requirements
Bachelor’s degree requirements: Bachelor’s degree in Physics or a related field is required.
Minimum undergraduate GPA: 3.0

GRE requirements
The GRE is required.
Mean GRE score range (25th–75th percentile): 314-325

GRE Physics requirements
The GRE Physics is not required.

TOEFL requirements
The TOEFL exam is required for students from non-English-speaking countries.
Minimum accepted TOEFL scores:
PBT score: 600
iBT score: 100

Other admissions information

TUITION AND ASSISTANTSHIPS

Teaching Assistants, Research Assistants, and Fellowships
Number of first-year
Teaching Assistants: 15
Average stipend per academic year
Teaching Assistant: $18,810
Research Assistant: $18,810
The stipends listed are for 9 months. Most students are able to secure 12 month salaries, which equal $25,080.00 annually.

Tuition year 2019–2020:
Tuition for in-state residents
Full-time students: $810.3 per credit
Part-time students: $810.3 per credit
Tuition for out-of-state residents
Full-time students: $1,658.7 per credit
Part-time students: $1,658.7 per credit
These figures include the student fees.
Credit hours per semester to be considered full-time: 9
Deferred tuition plan: No
Health insurance: Available.
Academic term: Semester
Number of first-year students who received full tuition waivers: 15

FINANCIAL AID

Application deadlines
Fall admission:
U.S. students: February 15
Int'l. students: February 15

Loans
Loans are available for U.S. students.
Loans are not available for international students.
GAPSFA application required: Yes
FAFSA application required: Yes

For further information
Address financial aid inquiries to: Colorado State University, Student Financial Services, Campus Delivery 1065, Fort Collins, CO 80523.
Phone: (970) 491-6321
E-mail: FinancialAid@colostate.edu
Colorado

Financial aid website: http://sfs.colostate.edu

HOUSING

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

For further information
Address housing inquiries to: CSU - Housing, Palmer Center, 1005 W. Laurel St., Fort Collins, CO 80523-8032.
Phone: (970) 491-6511
E-mail: housing@colostate.edu
Housing aid website: http://www.housing.colostate.edu/

Table A—Faculty, Enrollments, and Degrees Granted

<table>
<thead>
<tr>
<th>Research Specialty</th>
<th>2018–2019 Faculty</th>
<th>Enrollment Fall 2018</th>
<th>Number of Degrees Granted 2018–2019</th>
<th>Master’s</th>
<th>Doctorate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atomic, Molecular, &amp; Optical Physics</td>
<td>5</td>
<td>24</td>
<td>4(15)</td>
<td>(1)</td>
<td>27</td>
</tr>
<tr>
<td>Condensed Matter Physics</td>
<td>11</td>
<td>28</td>
<td>6(20)</td>
<td>(5)</td>
<td>3(11)</td>
</tr>
<tr>
<td>High Energy and Particle Astrophysics</td>
<td>5</td>
<td>16</td>
<td>1(6)</td>
<td>(1)</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>21</td>
<td>68</td>
<td>11(31)</td>
<td>1(7)</td>
<td>52(27)</td>
</tr>
</tbody>
</table>

Full-time Grad. Stud. | – | – | 68 | – | – |
First-year Grad. Stud. | – | – | 15 | – | – |

GRADUATE DEGREE REQUIREMENTS

Master’s: Two options. Thesis Option: A student must complete a minimum of 30 semester credits. These must include 18 credits in physics classroom courses at the 500 level or higher and two credits of PH692 (Seminar). The student must also perform research and prepare a thesis. The final examination for the Plan A M.S. Degree is the thesis defense. Non-Thesis Option: A student must complete a minimum of 32 semester credits. These must include 21 credits in physics classroom courses at the 500 level or higher, three additional credits in the physics classroom courses at the 500 level or higher or in PH693 (Current Topics in Physics Research), and two credits of PH692 (Seminar). The final examination for the Plan B M.S. degree is the seminar/examination.

Doctorate: Seventy-two credits in course work and research in an approved program, 24 credits in core physics courses with another 6 in 500-level physics courses or above; a minimum of 32 credits must be earned at Colorado State University; one-year residency required; no language requirement. Oral examination to determine mastery of specialized field of proposed dissertation required. Dissertation and dissertation defense required.

Thesis: Thesis may be written in absentia.

SPECIAL EQUIPMENT, FACILITIES, OR PROGRAMS

Research programs in our department have received the designation of Programs of Research and Scholarly Excellence (PRSE) from Colorado State University because they have achieved great distinction and set a standard for excellence in research, teaching and service. PRSE programs are High Energy Physics and Particle Astrophysics, Center for Advanced Magnetics, and Center for Extreme Ultraviolet Science and Technology.

Faculty members in particle physics, particle astrophysics and nuclear physics are actively involved in large external collaborations such as DUNE, T2K, NOvA, Auger, EXO-200 and nExO, for the search for fundamental neutrino properties and dark matter. Faculty in AMO physics are collaborators in the CERN-ATRAP antihydrogen experiment. Condensed matter and AMO faculty have developed joint research program with Argonne National Laboratory, the National Institute of Standards and Technology, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, the National Renewable Energy Laboratory, and many other American and international universities and research institutions.

The department is well equipped to conduct state-of-the-art research in atomic, molecular and optical physics, condensed matter physics, particle and particle astrophysics, nuclear physics and theoretical physics. In addition, major research facilities for condensed matter and materials research include conventional and superconducting magnets, microwave spectrometer for ferromagnetic-resonance studies, ESR spectrometers, vibrating-sample magnetometer, facilities for semiconductor fabrication and analysis, microelectronic fabrication, thin film deposition systems, and high-speed workstations. Other facilities available on campus include state-of-the-art transmission and scanning electron microscopes, X-ray diffraction instrumentation, a SQUID magnetometer, and nuclear magnetic resonance.

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>$2,700,000</td>
<td></td>
</tr>
<tr>
<td>State/local government</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-profit organizations</td>
<td>$204,000</td>
<td></td>
</tr>
<tr>
<td>Business and industry</td>
<td>$160,000</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$3,064,000</td>
<td></td>
</tr>
</tbody>
</table>

Table C—Separately Budgeted Research Expenditures by Research Specialty

<table>
<thead>
<tr>
<th>Research Specialty</th>
<th>No. of Grants</th>
<th>Expenditures ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atomic, Molecular, &amp; Optical Physics</td>
<td>5</td>
<td>$750,000</td>
</tr>
<tr>
<td>Condensed Matter Physics</td>
<td>18</td>
<td>$1,000,000</td>
</tr>
<tr>
<td>High Energy Physics</td>
<td>5</td>
<td>$1,200,000</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>$3,010,000</td>
</tr>
</tbody>
</table>

FACULTY

Professor


Harton, John L., Ph.D., Massachusetts Institute of Technology, 1988. Society of Physics Students Faculty Sponsor. Astrophysics, Atmosphere, Space Physics, Cosmic Rays, High En-
United States: Geographic Listing of Graduate Programs

Colorado

Energy Physics, Particles and Fields. Experimental particle physics, high energy cosmic rays, dark matter searches.


Associate Professor


Gelfand, Martin P., Ph.D., Cornell University, 1990. Department of Physics Associate Chair. Undergraduate Key Advisor. Computational Physics, Condensed Matter Physics, Statistical & Thermal Physics, Theoretical Physics. Condensed matter theory.

Assistant Professor

Breuer, Samuel, Ph.D., University of Maryland, 2012. Atomic, Molecular, & Optical Physics. Precision laser spectroscopy of trapped highly charged ions for test of fundamental physics.


Mooney, Michael, Ph.D., Princeton University, 2014. Accelerator, Astrophysics, Computational Physics, High Energy Physics, Particles and Fields. Liquid argon time projection chamber (LArTPC), MicroBooNE (Micro Booster Neutrino Experiment), the SBN (Short-Baseline Neutrino) program, and DUNE (Deep Underground Neutrino Experiment).

Ross, Kathryn, Ph.D., McMaster University, 2012. CIFAR Global Scholar. Vice-Chair of the SNS-HFIR User Group Executive Committee. Chemical Physics, Condensed Matter Physics, Materials Science, Metallurgy, Nano Science and Technology. Quantum magnetism, frustrated magnetism, correlated electron systems; Research specialties include inelastic neutron scattering, crystal growth, magnetic thermodynamic characterizations.


Professor Emeritus

Culver, Roger B., Ph.D., Ohio State University, 1971. Astronomy, Astrophysics. Astronomy; experimental astrophysics.


Robinson, Raymond S., Ph.D., Colorado State University, 1979. Applied Physics, Plasma and Fusion. Low-density plasmas; space electric propulsion; ion-beam applications, including surface microtexturing.

She, Chiao-Yao, Ph.D., Stanford University, 1964. Atomic, Molecular, & Optical Physics, Climate/Atmospheric Science, Optics. Lidar study of the atmosphere.

DEPARTMENTAL RESEARCH SPECIALTIES AND STAFF

Theoretical

Theoretical Condensed Matter Physics. Pattern formation in systems driven far from equilibrium; nanoscale pattern formation induced by ion bombardment of solid surfaces; ion beam assisted deposition of thin films; non-linear dynamical systems; chaos and fractals; mathematical physics; novel materials and phases; statistical and computational physics. Bradley, Chen, Eykholt, Gelfand.

Experimental

Atomic, Molecular, & Optical Physics. The research in the experimental atomic, molecular and optical physics group range from fundamental studies to applications. Research topics include exploration of novel non-evaporative cooling tech-
niques for ultra-cold atom gases; experimental investigations of ultra-cold plasmas; studies of radiation trapping and transport in ultracold gases; laser cooling/slowing of atomic hydrogen; precision UV laser development; UV and VUV laser development for cooling anti-hydrogen (CERN-ATRAP collaboration), development of Si-based quantum computer; laser cooled single atom on demand source for ion deposition; new techniques for quantum information; Na fluorescence Li dar for both day and night measurements of temperature, zonal wind and meridional wind in the upper atmosphere; studies of atmospheric wave and global changes; fast beam high-precision laser-RF spectroscopy of Rydberg atoms; ultra-sensitive single-atom detection for tagging Ba+ ion in the neutrinoless double-beta decay (EXO collaboration); EUV research includes x-ray laser development and applications to nanolithography and ultra-high resolution imaging; high power optical laser development; studies of ultra-intense laser matter interactions. The Center for EUV Science and Technology has been designated a Colorado State University Program of Research and Scholarly Excellence. Brewer, Fairbank, Krueger, Roberts, Rocca, Yost.

Condensed Matter Physics. The experimental condensed matter physics group has strong programs in magnetism, photovoltaics, and superconductivity. The Center for Advanced Magnet ics is a Program of Research and Scholarly Excellence at Colorado State University. Current research topics include thin-film semiconductors, semiconductor surfaces, solar cells; magnetic thin films, multi-ferroics, nanomagnetism; quantum magnetism, frustrated magnetism, correlated electron system, study of emergence in quantum phases of matter, spin liquids; neutron scattering, crystal growth; vortex physics in magnetic nanodots, spintronics, magnetic recording physics and materials, ferrite materials, magnetodynamics and magnetic relaxation, magnon Brillouin light scattering, chaos and solitons in magnetic films, surface plasmon resonance and exchange bias; low temperature physics, superconducting vortex dynamics, scanning Hall probe microscopy. Kristen Buchanan, de la Venta, Field, Gelfand, Ross, Sites, Wu.

High Energy Physics and Particle Astrophysics. Members of the CSU High Energy Physics and Particle Astrophysics research group work on several forefront experiments to explore the fundamental properties of neutrinos: the Deep Underground Neutrino Experiment (DUNE), T2K, NOvA, Fermilab Short-Baseline Neutrino (SBN) program, EXO-200 and nEXO. DUNE, T2K, SBN and NOvA study neutrino flavor oscillations, neutrino interactions and evidence for sterile neutrinos, while EXO searches for neutrinoless double beta decay. Particle astrophysics experiments include dark matter searches (DRIFT) and study of ultra-high energy cosmic rays (Auger). The T2K, DRIFT, EXO and Auger collaborations are analyzing data. Major components for the T2K Near Detector in Japan and the Pierre Auger Observatory in Argentina were constructed at CSU and the group hosts remote operation centers for the NOvA and EXO experiments. R&D on technologies for neutrino detection in liquid argon for DUNE and for a new 1200 square-meter cosmic ray tagger for the world’s largest liquid argon detector are underway at CSU. Towards next generation experiments, single atom Ba tagging research and nucleon decay studies for EXO are being conducted at CSU. The HEPPA program has been designated a Colorado State University Program of Research and Scholarly Excellence. Norm Buchanan, Harton, Mooney, Toki, Wilson.

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.