General University Information
President: Bruce Benson
Dean of Graduate School: Ann Schmiesing
University website: http://www.colorado.edu/
School Type: Public
Setting: Urban
Total Faculty: 1,658
Total number of Students: 33,246
Total number of Graduate Students: 5,581

Department Information
Department Chairman: Prof. John Cumalat, Chair
Department Contact: Jeanne Nijhowne, Graduate Program Assistant
Total full-time faculty: 73
Total number of full-time equivalent positions: 54
Full-Time Graduate Students: 266
Female Full-Time Graduate Students: 42
First-Year Graduate Students: 52
Female First-Year Students: 8
Total Post Doctorates: 99

Department Address
2000 Colorado Avenue
Boulder, CO 80309
Phone: (303) 735-0519
Fax: (303) 492-3352
E-mail: jeanne.nijhowne@colorado.edu
Website: http://www.colorado.edu/physics/

Admissions Contact Information
Address admission inquiries to: Jeanne Nijhowne, Graduate Program Assistant, 390 UCB, University of Colorado, Department of Physics, Boulder, CO 80309
Phone: (303) 735-0519
E-mail: jeanne.nijhowne@colorado.edu
Admissions website: http://www.colorado.edu/physics/admissions/graduate-application-info-and-deadlines

Application deadlines
Fall admission:
U.S. students: December 15
Int’l. students: December 15
Application fee
U.S. students: $60
Int’l. students: $80

Admissions information
For Fall of 2018:
Number of applicants: 802
Number admitted: 201
Number enrolled: 55

Admission requirements
Bachelor’s degree requirements: A 4 year Bachelors degree is required.
Minimum undergraduate GPA: 3.0

GRE requirements
The GRE is required.
Mean GRE score range (25th–75th percentile): 320-335
There are no minimum score requirements.

Subjective GRE requirements
The Subjective GRE is required.
Mean Advanced GRE score range (25th–75th percentile): 830-960
There are no minimum score requirements. Applicants to the Geophysics program are not required to submit physics GRE scores.

TOEFL requirements
The TOEFL exam is required for students from non-English-speaking countries.
iBT score: 85

Other admissions information
Additional requirements: The average GRE scores for admitted (matriculating) students for 2018 from the USA were 163 (161), 165 (165), and 848 (825) for verbal, quantitative, and physics, respectively. The corresponding values for international students were 158 (159), 168 (169), and 937 (945) for verbal, quantitative, and physics, respectively. The lowest scores of students admitted for 2018 were 140, 146, and 520 for verbal, quantitative, and physics, respectively.

Undergraduate preparation assumed: An undergraduate program for students entering graduate study in physics should typically include the following: Physics; 3 Semesters Introductory Physics; 1 Semester Advanced Classical Mechanics; 1 Semester Quantum Mechanics; 1 Semester Statistical Mechanics; 2 Semesters Advanced Electricity and Magnetism; 2 Semesters Advanced Laboratory Course/Project Work; 1 Semester Advanced Course in modern Physics such as Condensed Matter, Geophysics; Atomic, Nuclear, or Particle Physics; Math: 3 Semesters Calculus; 1 Semester Linear Algebra; 1 Semester Differential Equations; Computing: General knowledge.

Tuition
Tuition year 2018–19:
Tuition for in-state residents
Full-time students: $5,742 per semester
Tuition for out-of-state residents
Full-time students: $15,192 per semester
Tuition is for 9 credits per semester. Tuition is covered by the department for all students in the Ph.D. program.
Credit hours per semester to be considered full-time: 6
Deferred tuition plan: Yes
Health insurance: Available at the cost of $4000 per year.
Other academic fees: $1,762 graduate student fees for AY 2018–19 assuming 9 credit hours per semester.
Academic term: Semester
Number of first-year students who received full tuition waivers: 52

Teaching Assistants, Research Assistants, and Fellowships
Number of first-year
Teaching Assistants: 35
Research Assistants: 17
Average stipend per academic year
Teaching Assistant: $21,451.45
Research Assistant: $23,148
Fellowship student: $23,148
Stipends are for 9 months. During the 3 months of summer, the total RA stipend ranges from $7716 to $15432. RA salaries increase by 3% after admission to candidacy.

FINANCIAL AID

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

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

For further information
Address financial aid inquiries to: University of Colorado Boulder Office of Financial Aid, 556 UCB, Boulder, Colorado 80309-0556.
Phone: (303) 492-5091 E-mail: finaid@colorado.edu  Financial aid website: http://www.colorado.edu/finaid/grad.html

HOUSING

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

For further information
Address housing inquiries to: University of Colorado Housing and Dining Services, 159 UCB, Boulder, CO 80309-0159.
Phone: (303) 492-6384 E-mail: familyhousing@colorado.edu  Housing aid website: http://housing.colorado.edu/residences/graduate-family

Table A—Faculty, Enrollments, and Degrees Granted

<table>
<thead>
<tr>
<th>Research Specialty</th>
<th>Faculty</th>
<th>Enrollment Fall 2018</th>
<th>Number of Degrees Granted 2017–18 (2013–18)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Master’s</td>
<td>Doctorate</td>
</tr>
<tr>
<td>Total</td>
<td>–</td>
<td>265</td>
<td>–</td>
</tr>
<tr>
<td>Full-time Grad. Stud.</td>
<td>–</td>
<td>265</td>
<td>–</td>
</tr>
<tr>
<td>First-year Grad. Stud.</td>
<td>–</td>
<td>52</td>
<td>–</td>
</tr>
</tbody>
</table>

GRADUATE DEGREE REQUIREMENTS

Master’s: We do not generally admit students intending to just pursue a Masters degree. Graduate students are admitted directly into the Ph.D. program and generally obtain a Masters degree en route to the Ph.D.

Doctorate: Students must complete five of the six required Comps I courses with a “B-” or better. Five additional graduate courses are needed to complete the 30 hours of required coursework of which at least 27 must be physics courses. Students must maintain a 3.0 GPA. All students are required to take the Comps II examination. When students are ready, they take a Comps III examination and are admitted into candidacy. They then write a doctoral thesis that they must defend. Students have six years to complete their doctorate, although this limit may be extended.

Other Degrees: There are programs in geophysics, applied physics, chemical physics, materials science, and interdisciplinary quantitative biology that have different requirements.

SPECIAL EQUIPMENT, FACILITIES, OR PROGRAMS

Two large centers are led by CU physicists: the Soft Material Research Center (SMRC) and the Center on Read-Time Functional Imaging (STROBE). There are many interdisciplinary programs with physics participation: Geophysics, Materials Science and Engineering (MSE), Chemical Physics, and Integrated Quantitative Biology (IQBio). Professional Research Experience Program (PREP) is a special partnership with the National Institute of Standards and Technology (NIST) that places undergraduates, graduate students and post-doctoral researchers in NIST labs to gain research experience alongside NIST scientists and applicable majors include most engineering departments, biochemistry, chemistry and physics. There are many institutes with a physics presence: JILA, Renewable and Sustainable Energy Institute (RASEI), the Cooperative Institute for Research in Environmental Sciences (CIRES), and the Institute for Modeling Plasma Atmospheres and Cosmic Dust (IMPACT); the last one hosts a unique 3 MV dust accelerator. Other facilities in the physics building include multiple shops, an optical metrology lab, and a micro and nanofabrication lab. Experimental and theoretical research opportunities are also available in Boulder at JILA, the National Institute for Standards & Technology (NIST), the Laboratory for Atmospheric and Space Physics (LASP), the High Altitude Observatory (HAO), the National Center for Atmospheric Research (NCAR), the National Solar Observatory (NSO), and the U.S. Geological Survey (USGS), as well as the National Renewable Energy Laboratory (NREL) in nearby Golden. Groups additionally work at facilities around the world including CERN, JPARC, Fermilab, Brookhaven, Spallation Neutron Source, and Advanced Photon Source.

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>$25,782,085</td>
<td>$31,722,611</td>
</tr>
<tr>
<td>State/local government</td>
<td>$4,938</td>
<td>$226,756</td>
</tr>
<tr>
<td>Non-profit organizations</td>
<td>$1,680,194</td>
<td>$2,199,805</td>
</tr>
<tr>
<td>Business and industry</td>
<td>$627,765</td>
<td>$837,299</td>
</tr>
<tr>
<td>Other</td>
<td>$151,546</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$28,426,528</td>
<td>$34,989,471</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>–</td>
<td>$29,630,286</td>
</tr>
<tr>
<td>Biophysics</td>
<td>–</td>
<td>$597,231</td>
</tr>
<tr>
<td>Condensed Matter Physics</td>
<td>–</td>
<td>$5,409,293</td>
</tr>
<tr>
<td>Geophysics</td>
<td>–</td>
<td>$654,780</td>
</tr>
<tr>
<td>Nuclear Physics</td>
<td>–</td>
<td>$701,971</td>
</tr>
<tr>
<td>Professional Research Experience Program</td>
<td>–</td>
<td>$13,169,804</td>
</tr>
<tr>
<td>Particles and Fields</td>
<td>–</td>
<td>$1,908,556</td>
</tr>
<tr>
<td>Physics and other Science Education</td>
<td>–</td>
<td>$2,876,933</td>
</tr>
<tr>
<td>Plasma and Fusion</td>
<td>–</td>
<td>$8,278,145</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>–</strong></td>
<td><strong>$63,235,999</strong></td>
</tr>
</tbody>
</table>

FACULTY

Professor

United States: Geographic Listing of Graduate Programs

**Colorado**


**Beale, Paul D., Ph.D., Cornell University, 1982.** *Condensed Matter Physics, Theoretical Physics.* Theoretical Physics, thermodynamics and statistical mechanics of condensed matter systems.

**Becker, Andreas, Ph.D., Bielefeld University, 1997.** JILA fellow. *Atomic, Molecular, & Optical Physics, Theoretical Physics.* Analysis and simulation of ultrafast phenomena in atoms, molecules and clusters, in particular attosecond electron dynamics, coherent control and molecular imaging.

**Betterton, Meredith D., Ph.D., Harvard University, 2000.** *Biophysics, Chemical Physics.* Theoretical and experimental biophysics; systems biology; bioinformatics; pattern formation.

**Cao, Gang, Ph.D., Temple University, 1993.** *Condensed Matter Physics, Crystallography, Materials Science, Metallurgy.* Research program combines a methodical search for novel quantum materials in single-crystal form, and a systematic effort to elucidate the underlying physics of these materials.

**Cary, John, Ph.D., University of California, Berkeley, 1979.** *Computational Physics, Electromagnetism, Physics of Beams, Plasma and Fusion.* Theoretical and computational physics of plasmas, nonlinear dynamics, and electromagnetics.

**Clark, Noel A., Ph.D., Massachusetts Institute of Technology, 1970.** Director of Soft Materials Research Center. *Chemical Physics, Condensed Matter Physics, Crystallography.* Understanding and using the properties of Research on condensed phases, ranging from experiments on the fundamental physics of phase transitions, such as melting, to the development of liquid crystal electro-optic light valves.

**Cumalat, John P., Ph.D., University of California, Santa Barbara, 1977.** Department chair. *High Energy Physics, Particles and Fields.* Experimental particle physics (CMS experiment).

**de Alwis, Senarath P., Ph.D., University of Cambridge, 1969.** *High Energy Physics, Particles and Fields, Theoretical Physics.* Theoretical particle physics with interests in string theory, supersymmetry breaking, and cosmology.

**DeGrand, Thomas A., Ph.D., Massachusetts Institute of Technology, 1976.** *High Energy Physics, Particles and Fields, Theoretical Physics.* Study of the properties of strongly-interacting systems, most of which appear in the context of elementary particle physics, with a combination of analytic and numerical techniques.

**Dessau, Daniel, Ph.D., Stanford University, 1992.** *Condensed Matter Physics, Materials Science, Metallurgy.* Experimental condensed matter interests center around using femtosecond optics and electron spectroscopic tools for the study of the electronic structure, magnetic structure, and phase transitions of novel materials systems such as high temperature superconductors (HTSCs or cuprates) and colloidal magnetoresistive oxides (CMRs or manganites).

**Finkelstein, Noah, Ph.D., Princeton University, 1998.** Director of the Physics Education Research group Director of the Center for STEM Learning. *Physics and other Science Education.* Physics Education Research that focuses on studying the conditions that support students’ interest and ability in physics – developing models of context. These research projects range from the specifics of student learning particular concepts, to the departmental and institutional scales of sustainable educational transformation.


**Goldman, Martin, Ph.D., Harvard University, 1965.** *Plasma and Fusion, Solar Physics.* Plasma physics research centered around linear and nonlinear wave phenomena excited in plasmas (ionized gases) by electron and radiation beams.


**Hasenfratz, Anna, Ph.D., Lorand Eotvos University, 1982.** *High Energy Physics, Particles and Fields, Theoretical Physics.* Theoretical particle physics (lattice gauge theory).

**Holland, Murray, Ph.D., University of Oxford, 1994.** JILA fellow. *Atomic, Molecular, & Optical Physics, Theoretical Physics.* Theoretical research on properties of quantum gases with a focus on transport in optical lattices and on strongly interacting superfluids. Also, research on superradiant cavity QED with group-II elements to develop a mHz linewidth “laser”.

**Horanyi, Mihaly, Ph.D., Lorand Eotvos University, Budapest, 1982.** Laboratory for Atmospheric and Space Physics (LASP). *Atmosphere, Space Physics, Cosmic Rays, Plasma and Fusion.* Theoretical and experimental investigations of space and laboratory complex (dusty) plasmas.

**Kagan, Henry, Ph.D., University of California, Berkeley, 1979.** JILA fellow. *Atomic, Molecular, & Optical Physics, Chemical Physics, Optics.* Ultrafast laser technology, ultrafast dynamics in molecular and materials systems, and development of tabletop coherent x-ray sources.

**Kinney, Edward R., Ph.D., Massachusetts Institute of Technology, 1988.** *Nuclear Physics.* Experimental nuclear physics research focused on the elucidation of how the basic constituents of the nucleus, quarks, are bound in a gluonic field.

**Munsat, Tobin, Ph.D., Princeton University, 2001.** Associate Chair for Graduate Studies. *Atmosphere, Space Physics, Cosmic Rays, Plasma and Fusion.* Experimental plasma physics research follows several lines of study, including fluctuation measurements in plasmas, the relationship of turbulent quantities to cross-field plasma transport, and the microphysics of dust impacts which drive the dusty plasma equilibria.

**Murnane, Margaret, Ph.D., University of California, Berkeley, 1989.** JILA fellow. *Atomic, Molecular, & Optical Physics, Chemical Physics, Optics.* Ultrafast laser and x-ray science, ultrafast femtosecond-to-attosecond dynamics in molecular and materials systems, development of tabletop coherent x-ray sources and their application in science and technology.

**Nagle, Jamie, Ph.D., Yale University, 1996.** *Nuclear Physics.* Research is in the field of experimental high-energy heavy ion physics. Studying the quark-gluon plasma with the PHENIX experiment at RHIC and working on the upgraded detector sPHENIX.

**Parker, Scott, Ph.D., University of California, Berkeley, 1990.** *Plasma and Fusion.* Research in the area of the kinetic theory and simulation of plasmas, currently in the area of direct numerical simulation of tokamak plasma turbulence on large massively parallel computers.


**Pollock, Steven, Ph.D., Stanford University, 1987.** *Physics and other Science Education.* Physics Education Research, including issues of teacher preparation, large-scale classes, and upper-division classes.

**Price, John C., Ph.D., Stanford University, 1986.** *Condensed Matter Physics, Low Temperature Physics, Nano Science and Technology.* Experimental condensed matter physics including low temperature physics, molecular electronics, and molecular crystals.

**Radzihovsky, Leo, Ph.D., Harvard University, 1993.** *Condensed Matter Physics, Theoretical Physics.* Theoretical physics research that spans a broad spectrum of condensed matter, rang-
ing from liquid crystals, colloids, membranes, rubber and other "soft" matter to degenerate atomic gases, superconductors, and quantum Hall systems. The unifying theme is the collective universal behavior that emerges at long scales and low energies, driven by a combination of strong interactions, fluctuations, and/or local heterogeneity.


**Ritzwoller**, Michael H., Ph.D., University of California, San Diego, 1987. Director of Center for Imaging the Earth’s Interior (CIEI). *Geophysics*. Observational seismology concentrated on developing methods to focus seismic models derived from surface wave dispersion information to tectonic scales, particularly in the US and China. Recent emphasis has focused on developing methods for exploiting ambient noise and earthquakes in surface wave tomography and combining this information to produce 3-D models of the crust and uppermost mantle.


**Smalyukh**, Ivan, Ph.D., Kent State University, 2003. *Chemical Physics, Condensed Matter Physics, Materials Science, Metallurgy, Nano Science and Technology*. Experimental soft condensed matter physics studying the organizing principles of mesoscale self-assembly phenomena that lead to creation of artificial materials and structures with emergent physical behavior and properties arising from the patterning of molecular order combined with the organization of nano- and micro-sized particles into precisely controlled configurations.

**Zhong**, Shijie, Ph.D., University of Michigan, 1994. *Geophysics*. Geophysics research aimed at understanding the physical processes that control the evolution of terrestrial planets (Earth, Moon, Mars, . . .). Present affiliation with CCLDAS.


**Associate Professor**

**DeWolfe**, Oliver, Ph.D., Massachusetts Institute of Technology, 2000. *High Energy Physics, Particles and Fields, Theoretical Physics*. Theoretical particle physics focusing on string theory and supergravity and their applications to other phenomena via holography, particle physics, cosmology and quantum field theory.


**Hermele**, Michael, Ph.D., University of California, Santa Barbara, 2005. *Condensed Matter Physics, Theoretical Physics*. Theoretical condensed matter physics focused on strongly correlated quantum systems. These are systems, occurring both in solid state materials and ultracold atomic gases, where quantum mechanics and interactions among the constituent particles combine to give rise to striking collective behavior. Study is done using modern techniques of quantum field theory and other tools to study the collective behavior of correlated systems.

**Kempf**, Sascha, Ph.D., Friedrich Schiller University, Jena, 1999. *LASP. Atmosphere, Space Physics, Cosmic Rays, Plasma and Fusion*. Dusty plasmas, specializing in dust detectors and analysis with CCLDAS.

**Lewandowski**, Heather, Ph.D., University of Colorado, Boulder, 2002. Associate Chair of Engineering Physics. JILA fellow. *Atomic, Molecular, & Optical Physics, Physics and other Science Education*. Experimental study of collisions and reactions of simple cold molecules to understand the quantum-mechanical processes involved in making and breaking a chemical bond. We aim to control the reacting molecules external and internal degrees of freedom in the quantum regime. To accomplish this control, we slow down a supersonically cooled molecular beam using time-varying inhomogeneous electric fields (Stark deceleration). The cold (~100 mK) molecules are then loaded into an electrostatic trap for study.

**Marino**, Alysia, Ph.D., University of California, Berkeley, 2004. *High Energy Physics, Particles and Fields*. Experimental particle physics studying the properties of neutrinos with the T2K experiment at JPARC, the NA61/Shine experiment at CERN, and the DUNE experiment at Fermilab/Homestake.

**Regal**, Cindy, Ph.D., University of Colorado, Boulder, 2006. JILA fellow. *Atomic, Molecular, & Optical Physics*. Engineering and exploring isolated quantum systems for quantum information and quantum optics with a focus on manipulating single and few neutral atoms and the quest to control single phonons in mesoscopic mechanical oscillators. This experimental work relies on low-loss optical interfaces and laser cooling and trapping techniques.

**Reznik**, Dmitry, Ph.D., University of Illinois at Urbana-Champaign, 1993. *Condensed Matter Physics, Materials Science, Metallurgy*. Experimental condensed matter and materials physics focusing on using neutron, x-ray, and Raman scattering to investigate the physics of correlated electrons and electron-phonon coupling in perovskite oxides (including high Tc superconductors, manganites, etc.) and other exotic materials.


**Stenson**, Kevin, Ph.D., University of Wisconsin, Madison, 1998. *High Energy Physics, Particles and Fields*. Experimental par-
particle physics with the CMS experiment at the CERN LHC searching for physics beyond the standard model (for example supersymmetry) and working on upgrades to the detector.

Uzdensky, Dmitri A., Ph.D., Princeton University, 1998. Director of Center for Integrated Plasma Studies (CIPS). Astrophysics, Atmosphere, Space Physics, Cosmic Rays, Plasma and Fusion, Solar Physics. Theoretical plasma physics, including both basic plasma physics and its applications to understand various natural phenomena, usually those involving magnetized plasmas far beyond Earth. Main interests lie in the realm of plasma astrophysics, including high-energy astrophysics, but I am also strongly interested in various topics in space physics and solar physics, as well as certain areas of magnetic fusion.

Assistant Professor


Hough, Loren E., Ph.D., University of Colorado, Boulder, 2007. Biophysics. Currently studying intrinsically disordered proteins using solution NMR. Proteins containing disordered domains perform many important cellular functions. The aggregations of this family of proteins is implicated in neurodegenerative diseases such as Alzheimer’s and Parkinson’s diseases. In-cell nuclear magnetic resonance techniques are used to study the disordered proteins that form the selective barrier of the nuclear pore complex. This is being extended to study similar proteins, especially those involved in transcriptional regulation.

Lee, Minhyea, Ph.D., University of Chicago, 2004. Condensed Matter Physics. Experimental condensed matter and materials physics research focusing on understanding collective behavior in condensed matter systems via electrical and thermal transport properties, under the control parameters of high pressure and magnetic field. The systems of interest include anomalous Hall effect materials, itinerant magnetic systems, novel superconductivity in the vicinity of other ground states, and high thermoelectric materials. We also use nanofabrication and microwave measurements to develop novel probes for correlated electron systems based on shot noise.


Nandkishore, Rahul, Ph.D., Massachusetts Institute of Technology, 2012. Condensed Matter Physics, Theoretical Physics. Theoretical condensed matter physics focusing on the search for new emergent phenomena in quantum many body systems with strong interactions and/or strong randomness in systems both in and out of equilibrium. Particular topics of interest include: non-equilibrium quantum statistical mechanics, many-body localization and thermalization, field theory of correlated systems, Dirac fermions, unconventional superconductors, and the interplay of disorder and interactions.


Perrepsilta, Dennis, Ph.D., Columbia University, 2014. Nuclear Physics. Experimental nuclear physics. Study of phenomena of heavy ion collisions using the ATLAS detector at CERN.

Smith, Graeme, Ph.D., California Institute of Technology, 2006. JILA associate fellow. Atomic, Molecular, & Optical Physics, Quantum Foundations, Theoretical Physics. Theory of quantum information and quantum computing. Identification of the fundamental limits that physics places on communication, information processing, and sensing and understand the implications of these limits both in terms of practical technologies and fundamental physics. This involves finding new ways to think about information and computation, and new ideas for analyzing them. Past work includes error correction, quantum channel capacities, additivity questions, characterization of quantum annealers, and mathematical properties of entropy.

Ulmer, Keith, Ph.D., University of Colorado, Boulder, 2007. High Energy Physics, Particles and Fields. Experimental particle physics with the CMS experiment at the CERN LHC searching for physics beyond the standard model (for example supersymmetry) and working on upgrades to the detector.

Wilcox, Bethany, Ph.D., University of Colorado, 2015. Physics and other Science Education.


Research Professor

Bohn, John, Ph.D., University of Chicago, 1995. JILA fellow. Atomic, Molecular, & Optical Physics, Theoretical Physics. Theory of cold collisions and few-body physics.

Research Associate Professor

Jaron-Becker, Agnieszka, Ph.D., Warsaw University Institute of Theoretical Physics, 2000. JILA associate fellow. Atomic, Molecular, & Optical Physics, Theoretical Physics. Theoretical atomic physics.

Research Assistant Professor

D’Incao, Jose, Ph.D., University of Sao Paulo, Institute of Physics Sao Carlos - Brazil, 2002. Atomic, Molecular, & Optical Physics, Theoretical Physics. Theoretical atomic physics.

Adjunct Professor


Professor Adjunct

Cornell, Eric, Ph.D., Massachusetts Institute of Technology, 1990. JILA fellow. Atomic, Molecular, & Optical Physics. Experimental precision measurements and Bose-Einstein condensation and related topics in ultracold atoms. Current projects include an experiment to put an improved limit on the electron electric dipole moment and developing technology for extracting electricity from waste heat.

Diddams, Scott, Ph.D., University of New Mexico, 1996. NIST physicist. Atomic, Molecular, & Optical Physics, Optics. Experimental laser physics; femtosecond lasers and ultrafast phenomena; nonlinear optics; precision spectroscopy; optical frequency combs; metrology.

Hall, John, Ph.D., Carnegie Institute of Technology, 1961. JILA fellow. Atomic, Molecular, & Optical Physics, Optics. Development of laser stabilization and measurement techniques that lead toward the creation of phase-stable optical frequency sources and their application to precision tests of fundamental principles.
Colorado

Lehnert, Konrad, Ph.D., University of California, Santa Barbara, 1999. JILA fellow. Atomic, Molecular, & Optical Physics, Nano Science and Technology. Studying quantum coherence in macroscopic mechanical oscillators, developing quantum-coherent networks of microwave signals for control and measurement, and implementing quantum-limited measurements in astrophysics and condensed matter experiments.


Wineland, David, Ph.D., Harvard University, 1970. NIST physicist. Atomic, Molecular, & Optical Physics. Laser-cooled trapped ions in the areas of high-resolution spectroscopy, basic plasma physics, and quantum information.


Associate Professor Adjunct
Thompson, James K., Ph.D., Massachusetts Institute of Technology, 2003. JILA fellow. Atomic, Molecular, & Optical Physics, Low Temperature Physics. Ultracold atoms, quantum optics, and precision measurements.

Assistant Professor Adjunct

Professor Attendant Rank


Associate Professor Attendant Rank
Perkins, Katherine, Ph.D., Harvard University, 2000. Director of PhET Interactive Simulations Project and CU’s Science Education Initiative. Physics and other Science Education. Physics education research with a focus on the use of interactive simulations for teaching and learning physics, students’ beliefs about physics (and chemistry), and sustainable course reform.

Instructor

Dubson, Michael, Ph.D., Cornell University, 1984. Associate Chair of Arts and Sciences Undergraduate Physics. Physics and other Science Education. Physics education research.


West, Colin, Ph.D., C.N. Yang Institute for Theoretical Physics, Stony Brook University, 2016. Physics and other Science Education. Quantum information theory; physics education research.


Lecturer
Cundiff, Steven, Ph.D., University of Michigan, 1992. Professor of physics at University of Michigan. Optics. Telecommunications; fiber optics; ultrafast optical studies of semiconductors.


Leibrandt, David, Ph.D., Massachusetts Institute of Technology, 2009. NIST physicist. Atomic, Molecular, & Optical Physics.


Simmonds, Raymond W., Ph.D., University of California, Berkeley, 2002. NIST physicist. Atomic, Molecular, & Optical Physics, Optics.


Senior Research Scientist
Wieman, Carl E., Ph.D., Stanford University, 1977. Senior advisor to PhET. Atomic, Molecular, & Optical Physics, Physics and other Science Education. Bose-Einstein condensation; AMO physics; physics education research.

DEPARTMENTAL RESEARCH SPECIALTIES AND STAFF

Theoretical
Astrophysics. Astrophysics is concentrated in the Department of Astrophysical and Planetary Sciences, but many of our Ph.D. students work with faculty at APS, JILA, CASA, and LASP. Hamilton.


Atomic, Molecular, & Optical Physics. Our AMO physics is concentrated in JILA, one of the leading research institutes in the world in this area. Research at JILA includes high-precision spectroscopy and precision measurement, ultracold cold atoms and molecules, ultrafast and ultra-high-power lasers, and micron- and nanometer-scale optics. Becker, Bohn, D’Incao, Holland, Jaron-Becker, Knill, Rey, Smith.

Biophysics. Molecular motors and motors that can change their track; DNA-protein interactions; self-assembly of cytoskeletal materials; liquid crystalline aggregates. Betterton, Glaser.

Chemical Physics. Theory of ultracold chemical reactions; chemical reaction dynamics. Bohn.


Geophysics. Physics of earth dynamics, including both gravitational and magnetic fields and tectonics and volcanism. Ritzwoller, Zhong.

History & Philosophy of Physics/Science. History and philosophy of 20th-century physics, especially high-energy physics.


Particles and Fields. Non-perturbative QCD lattice gauge theories; grand unified theories; supersymmetry; string theory. de Alwis, DeGrand, DeWolfe, Hasenfratz, Neil.

Physics and other Science Education. Uses of technology in physics education; assessments (conceptual, epistemological, and belief oriented); curricular and classroom materials at the middle- and upper-division levels; theoretical models of students learning physics; social and contextual foundations of student learning; examination of successful educational reforms and replication studies of such reforms; student problem-solving in physics. Finkelstein, Hodby, West, Wilkinson.

Plasma and Fusion. Theory of space and laboratory plasmas; plasma turbulence; magnetic reconnection. The Center for Integrated Plasma Studies is used. Cary, Goldman, Horanyi, Parker, Uzdensky.

Experimental

Applied Physics. Research in materials science; nanomechanical systems; nano-optics; ultrafast, and ultra-high-power lasers. Anderson, Kapteyn, Lehnert, Levine, Murnane, Papp, Price, Rogers, Schibli, Ulloam, Yin.

Astrophysics. Astrophysics is concentrated in the Department of Astrophysical and Planetary Science, but many of our Ph.D. students work with faculty at APS, JILA, CASA, and LASP. Glenn, Halverson.


Atomic, Molecular, & Optical Physics. Our AMO physics is concentrated in JILA, one of the leading research institutes in the world in this area. Research at JILA includes high-precision spectroscopy and precision measurement, ultracold cold atoms and molecules, ultrafast and ultra-high-power lasers, and micron- and nanometer-scale optics. Anderson, Cornell, Cundiff, Diddams, Gopinath, Hall, Kapteyn, Kaufman, Lehnert, Leibrandt, Levine, Lewandowski, Murnane, Papp, Pietun, Raschke, Regal, Schibli, Simmonds, Thompson, Ulloam, Wineland, Ye.


Condensed Matter Physics. Soft condensed-matter and liquid crystal physics; femtosecond optical, electron, and neutron spectroscopy on materials; nanoscale electronic structure studies of surfaces; electrical and mechanical properties of nanofabricated materials; low-temperature properties of exotic materials. Cao, Clark, Dessau, Lee, Lehnert, Maclean, Price, Raschke, Reznik, Rogers, Schibli, Shaheen, Smalyukh, Yin.

Geophysics. Physics of earth dynamics, including both gravitational and magnetic fields and tectonics and volcanism. Calcins.

High Energy Physics. The high-energy physics experimentalists are members of the CMS experiment at CERN, the T2K neutrino experiment at JPARC, the DUNE project at Fermilab/Homestake, and the NA61/Shine experiment at CERN. Cumalat, Marino, Rankin, Stenson, Ulmer, Wagner, Zimmerman.


Particles and Fields. The particle physics experimentalists are members of the CMS experiment at CERN, the T2K neutrino experiment at JPARC, the DUNE project at Fermilab/Homestake, and the NA61/Shine experiment at CERN. Cumalat, Marino, Rankin, Stenson, Ulmer, Wagner, Zimmerman.

Physics and other Science Education. Uses of technology in physics education; assessments (conceptual, epistemological, and belief oriented); curricular and classroom materials at the middle- and upper-division levels; theoretical models of students learning physics; social and contextual foundations of student learning; examination of successful educational reforms and replication studies of such reforms; student problem-solving in physics. Dubson, Lewandowski, Katherine Perkins, Pollock, Wieman.

Physics of Beams. Theoretical and experimental development of advanced beams, primarily through plasma wakefield acceleration. Cary, Litos.

Plasma and Fusion. Laboratory and space plasmas; measurement and assessment of turbulence and cross-field transport in magnetically confined plasmas; solar plasma observations; dusty plasmas; lunar surface environment. The Center for Integrated Plasma Studies, Colorado Center for Lunar Dust and Atmospheric Studies, is used. Baker, Goldman, Horanyi, Kempf, Litos, Munsat.

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