

UNIVERSITY OF OKLAHOMA

HOMER L. DODGE DEPARTMENT OF PHYSICS AND ASTRONOMY

Norman, Oklahoma 73019

<http://www.nhn.ou.edu/>

General University Information

President: David L. Boren
Dean of Graduate School: T. H. Lee Williams
University website: <http://www.ou.edu/>
Control: Public
Setting: Urban
Total Faculty: 1,531
Total Graduate Faculty: 1,463
Total number of Students: 27,278
Total number of Graduate Students: 5,745

Department Information

Department Chairman: Prof. Gregory A. Parker, Chair
Department Contact: Rhonda George, Program Coordinator
Total full-time faculty: 32
Total number of full-time equivalent positions: 32
Full-Time Graduate Students: 90
First-Year Graduate Students: 21
Female First-Year Students: 7
Total Post Doctorates: 13

Department Address

440 West Brooks St
Norman, OK 73019
Phone: (405) 325-3961
Fax: (405) 325-7557
E-mail: grad@nhn.ou.edu
Website: <http://www.nhn.ou.edu/>

ADMISSIONS

Admission Contact Information

Address admission inquiries to: Graduate Recruiting and Selection Committee, Homer L. Dodge Department of Physics and Astronomy, University of Oklahoma, 440 West Brooks St., Norman, OK 73019.

Phone: (405) 325-3961
E-mail: grad@nhn.ou.edu
Admissions website: http://www.nhn.ou.edu/graduate-students/apply_OU_PhAst

Application deadlines

Fall admission:
U.S. students: February 1 *Int'l. students:* February 1
Spring admission:
U.S. students: September 1 *Int'l. students:* September 1

Application fee

There is no application fee required.
YOU CAN APPLY IN TWO DIFFERENT WAYS. OPTION 1 (FEE BASED). Use the official online application and pay the application fee (\$50 for US applicants and \$100 for international applicants). OPTION 2 (NO FEE). Send all of your materials directly to our department. This is the no-fee application option. (See the Department's web page for Prospective Students for instructions.)

Admissions information

For Fall of 2015:
Number of applicants: 207
Number admitted: 21
Number enrolled: 21

Admission requirements

Bachelor's degree requirements: Bachelor's degree in Physics and/or astronomy is required.

Minimum undergraduate GPA: 3.0

GRE requirements

The GRE is recommended.

Although not strictly required, we ask for the GRE because it is an objective and standardized way for us to compare you with other applicants; it forms part of an overall picture of you. If you do not have a GRE score, this will put you at a disadvantage compared with other applicants.

Advanced GRE requirements

The Advanced GRE is recommended.

Although not strictly required, we ask for the physics subject GRE because it is an objective and standardized way for us to compare you with other applicants; it forms part of an overall picture of you. If you do not have a physics GRE score, this will put you at a disadvantage compared with other applicants.

TOEFL requirements

The TOEFL exam is required for students from non-English-speaking countries.

PBT score: 600

iBT score: 100

Our department has a stated minimum TOEFL of 600/250/100 for paper/computer/IB or IELTS of 7.0. There is some flexibility for candidates who are exceptional in other areas. However, applicants who do not meet the Graduate College's minimum scores of 550/213/79 or 6.5 will not be considered.

Other admissions information

Undergraduate preparation assumed: Marion, Classical Dynamics of Particles and Systems; French, Vibrations and Waves; Griffiths, Introduction to Electrodynamics; Saxon, Elementary Quantum Mechanics; Kittel, Thermal Physics.

TUITION

Tuition year 2014–2015:

Tuition for in-state residents

Full-time students: per semester

Our students are typically supported on teaching and research assistantships that include a tuition waiver for up to 90 hours.

Credit hours per semester to be considered full-time: 9

Deferred tuition plan: No A student health plan is provided as part of TA and RA support.

Other academic fees: \$2000/semester.

Academic term: Semester

Number of first-year students who received full tuition waivers: 20

Teaching Assistants, Research Assistants, and Fellowships

Number of first-year

Teaching Assistants: 19

Research Assistants: 2

Average stipend per academic year

Teaching Assistant: \$21,600

Research Assistant: \$21,600

Fellowship student: \$26,000

FINANCIAL AID

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

Phone: 405-325-4521
 Financial aid website: <http://www.ou.edu/financialaid.html>

HOUSING

Availability of on-campus housing

Single students: Yes
Married students: Yes

For further information

Address housing inquiries to: Housing Office, 1406 Asp Ave.,
 Norman, OK 73019.
 Phone: (405) 325-2511
 E-mail: housinginfo@ou.edu
 Housing aid website: <http://www.ou.edu/housingandfood.html>

Table A—Faculty, Enrollments, and Degrees Granted

Research Specialty	2015–16 Faculty	Enrollment Fall 2015		Number of Degrees Granted 2014–15 (2010–15)		
		Mas-ter's	Doc-torate	Mas-ter's	Terminal Master's	Doc-torate
Astrophysics	8	–	22	3(10)	2(5)	3(7)
Atomic, Molecular, & Optical Physics	6	1	20	2(6)	1(1)	8(15)
Condensed Matter Physics	8	3	23	6(8)	1(4)	2(8)
Engineering						
Physics/Science	6	–	–	3(4)	–(1)	1(1)
High Energy Physics	8	–	20	4(15)	–	4(13)
Physics and other Science Education	1	–	–	–	–	–
Total	31	4	85	18(43)	4(11)	18(34)
Full-time Grad. Stud.	–	4	85	–	–	–
First-year Grad. Stud.	–	–	21	–	–	–

GRADUATE DEGREE REQUIREMENTS

Master's: A student must complete 30 hours of coursework with a thesis or 32 hours of coursework without a thesis taken in accordance with the general rules of the graduate college. The allowable minimum number of credits in physics and astronomy is 18 hours, 6 hours of which must be at the 5000 level or above.

Doctorate: The student must complete a minimum of 36 hours of coursework at the 5000 level or above, excluding the credit hours granted for preparation of the thesis or dissertation describing original research. These hours include 21 hours of specific required courses. Another 54 hours of graduate coursework is required as appropriate for the student's field of research specialization, including research hours. The qualifying examination is offered semiannually and is usually taken at the end of the first year of graduate study. The general examination for the Ph.D. degree consists of a written report and an oral examination, including a presentation of a topic related to the field of specialization and a probing of the student's knowledge of general principles, and is taken before the student begins dissertation research. The Ph.D. in Physics may include an emphasis in astronomy or astrophysics.

Other Degrees: An advanced degree (M.S.) in Engineering Physics is also offered. Specialization areas include astrophysics; atomic, molecular, and optical physics; condensed-matter physics; high-energy physics; and others.

Thesis: Thesis and dissertation may be written in absentia.

SPECIAL EQUIPMENT, FACILITIES, OR PROGRAMS

The Homer L. Dodge Department of Physics and Astronomy has access to many well-equipped facilities for experimental research in atomic, molecular, and optical physics; condensed-matter physics; and materials characterization. These include UHV chambers for laser cooling and trapping, laser spectrometers, molecular beam epitaxy systems, a clean room for nanofabrication and characterization, thin-film deposition and characterization facilities, optical and electron beam lithography, atomic force microscopes, scanning tunneling microscopes, infrared spectrometers, systems for transport and magneto-optic measurements at high magnetic field and low temperature, and an independent facility for scanning and transmission electron microscopy.

Our experimental research programs regularly make use of external facilities such as the National High Magnetic Field Laboratory, Los Alamos National Laboratory, the ATLAS detector for the Large Hadron Collider at CERN, the DØ detector at Fermilab, and Oak Ridge National Laboratories. OU is a Tier 2 Data Collection Center for ATLAS.

OU is a leasing member of the Astrophysical Research Consortium, which includes the 3.5-m and 0.5-m telescopes at Apache Point Observatory. In addition, our astrophysics group routinely has access to Kitt Peak Observatory, the Very Large Array, the MDM Observatory, Subaru, Keck, Gemini, and the Cerro Tololo Inter-American observatories, as well as data from the Hubble Space Telescope, the Spitzer Space Telescope, and the Chandra X-ray telescope.

An instrument and machine shop within the Department with three full-time machinists also supports the experimental research efforts.

Theoretical work is supported by departmental computing resources and the OU Supercomputing Center for Education and Research. For astronomical research, AIPS, IRAF, and IDL software are available.

Table B—Separately Budgeted Research Expenditures by Source of Support

Source of Support	Departmental Research	Physics-related Research Outside Department
Federal government	\$4,397,778	
State/local government		
Non-profit organizations		
Business and industry		
Other		
Total	\$4,397,778	

Table C—Separately Budgeted Research Expenditures by Research Specialty

Research Specialty	No. of Grants	Expenditures (\$)
	1	\$26,559
Astrophysics	15	\$402,365
Atomic, Molecular, & Optical Physics	12	\$678,904
Condensed Matter Physics	20	\$1,681,910
Particles and Fields	15	\$1,608,040
Total	63	\$4,397,778

FACULTY**Professor**

- Abbott**, Braden, Ph.D., Purdue University, 1994. *High Energy Physics, Particles and Fields*. Experimental high-energy physics; Fermilab DØ experiment; CERN-ATLAS experiment.
- Baer**, Howard, Ph.D., University of Wisconsin, 1984. *Astrophysics, Cosmology & String Theory, Particles and Fields, Theoretical Physics*. High-energy theory; supersymmetry; dark matter; LHC physics.
- Baron**, Edward A., Ph.D., Stony Brook University, 1985. *Astrophysics, Computational Physics*. Radiative transfer; stellar evolution; supernovae; numerical astrophysics; parallel algorithms.
- Furieux**, John E., Ph.D., University of California, Berkeley, 1979. *Atomic, Molecular, & Optical Physics, Optics*. Precision molecular spectroscopy.
- Gutierrez**, Phillip, Ph.D., University of California, Riverside, 1983. *High Energy Physics*. Experimental high-energy physics; Fermilab DØ experiment; CERN-ATLAS experiment.
- Henry**, Richard C., Ph.D., University of Michigan, 1983. *Astrophysics*. Chemical evolution of galaxies; chemical abundances in nebulae; evolution of intermediate mass stars.
- Johnson**, Matthew B., Ph.D., California Institute of Technology, 1989. *Condensed Matter Physics, Engineering Physics/Science, Nano Science and Technology, Solid State Physics*. Experimental semiconductor and surface physics; scanning tunneling microscopy.
- Kantowski**, Ronald, Ph.D., University of Texas, Austin, 1966. *Relativity & Gravitation*. Gravitational lens theory.
- Kao**, Chung, Ph.D., University of Texas, Austin, 1990. *Astrophysics, Cosmology & String Theory, Particles and Fields, Theoretical Physics*. Particle theory; electroweak symmetry breaking; supersymmetry and unification; CP violation; dark matter; extra dimensions.
- Leighly**, Karen, Ph.D., Montana State University, 1991. *Astronomy, Astrophysics*. Active Galactic Nuclei (AGN); spectral synthesis.
- Milton**, Kimball, Ph.D., Harvard University, 1971. *High Energy Physics, Particles and Fields, Theoretical Physics*. High-energy theory, particularly the development of non-perturbative methods to be applied to quantum chromodynamics and other field theories; physics of the quantum vacuum.
- Mullen**, Kieran, Ph.D., University of Michigan, 1989. *Condensed Matter Physics, Low Temperature Physics, Solid State Physics, Statistical & Thermal Physics, Theoretical Physics*. Theoretical solid-state physics.
- Parker**, Gregory, Ph.D., Brigham Young University, 1976. *Atomic, Molecular, & Optical Physics, Chemical Physics, Computational Physics, Theoretical Physics*. Theoretical molecular physics specializing in rearrangement collisions.
- Santos**, Michael, Ph.D., Princeton University, 1992. *Applied Physics, Condensed Matter Physics, Engineering Physics/Science, Materials Science, Metallurgy, Nano Science and Technology, Solid State Physics*. Experimental semiconductor and surface physics; MBE growth of narrow gap systems.
- Shaffer**, James P., Ph.D., University of Rochester, 1999. *Atomic, Molecular, & Optical Physics, Computational Physics, Low Temperature Physics, Optics*. Atomic, molecular, and optical physics; hybrid quantum systems; quantum gases; laser cooling and trapping; atom-based sensing.
- Skubic**, Patrick, Ph.D., University of Michigan, 1977. *High Energy Physics, Particles and Fields*. Experimental high-energy physics; Fermilab DØ experiment; CERN-ATLAS experiment.
- Strauss**, Michael, Ph.D., University of California, Los Angeles, 1988. *High Energy Physics, Particles and Fields*. Experimental high-energy physics; Fermilab DØ experiment; CERN-ATLAS experiment.
- Watson**, Deborah K., Ph.D., Harvard University, 1977. *Atomic, Molecular, & Optical Physics, Theoretical Physics*. Theoretical atomic and molecular physics; many-body systems; group theory methods; Bose-Einstein condensates; ultracold Fermi systems.

Associate Professor

- Abraham**, Eric, Ph.D., Rice University, 1996. *Atomic, Molecular, & Optical Physics, Chemical Physics, Low Temperature Physics, Optics*. Experimental atomic, molecular, and optical physics: ultracold atoms and molecules; ultracold collisions; atomic clocks; quantum degenerate gases.
- Bumm**, Lloyd A., Ph.D., Northwestern University, 1991. *Applied Physics, Condensed Matter Physics, Engineering Physics/Science, Materials Science, Metallurgy, Nano Science and Technology, Surface Physics*. Experimental condensed-matter physics; nanophysics; surface physics and chemistry; self-assembly; scanning tunneling microscopy; surface spectroscopy; molecular plasmonics; development of novel instrumentation.
- Mason**, Bruce A., Ph.D., University of Maryland, 1985. *Physics and other Science Education*. Educational digital libraries; technology for physics education; faculty and teacher development.
- Murphy**, Sheena, Ph.D., Cornell University, 1991. *Condensed Matter Physics, Nano Science and Technology, Solid State Physics*. Experimental semiconductor and superconductor physics; low-temperature physics.

Assistant Professor

- Dai**, Xinyu, Ph.D., Pennsylvania State University, 2004. *Astronomy, Astrophysics*. Observational cosmology; gravitational lensing; galaxy clusters; galaxy evolution; high-energy astrophysics; X-ray astronomy; AGNs; gamma-ray bursts.
- Kaib**, Nathan, Ph.D., University of Washington, 2010. *Astronomy, Astrophysics, Computational Physics, Mechanics, Planetary Science*. Extrasolar planets; small bodies of the solar system (comets & asteroids); solar system dynamics; dynamics of binary star systems.
- Kilic**, Mukremin, Ph.D., University of Texas, Austin, 2006. *Astronomy, Astrophysics*. Observational astronomy; supernovae Ia progenitors; white dwarfs; merger systems; gravitational waves; planets; debris disks; galactic cosmochronology.
- Marino**, Alberto, Ph.D., University of Rochester, 2006. *Atomic, Molecular, & Optical Physics, Optics, Quantum Foundations*. Quantum optics; atomic physics; quantum information; quantum metrology.
- Schwettmann**, Arne, Ph.D., The University of Oklahoma, 2012. *Atomic, Molecular, & Optical Physics, Computational Physics, Low Temperature Physics, Optics*. Experimental atomic, molecular, and optical physics; ultracold atomic gases; Bose-Einstein condensates; cold collisions; matter-wave quantum optics; laser cooling and trapping.
- Sellers**, Ian, Ph.D., University of Sheffield, 2004. *Condensed Matter Physics, Energy Sources & Environment, Engineering Physics/Science, Nano Science and Technology, Solid State Physics*. Next-generation photovoltaics; optical and optoelectronic spectroscopy of semiconductor quantum dots; magneto-photoluminescence; solar cell physics.
- Uchoa**, Bruno, Ph.D., State University of Campinas, 2004. *Condensed Matter Physics*. Quantum critical systems; physics of

graphene; low-dimensional systems; unconventional quasi-particles; strongly correlated systems.

Wisniewski, John P., Ph.D., University of Toledo, 2005. *Astronomy*. Circumstellar disks; extrasolar planets; astronomical polarimetry.

Professor Emeritus

Branch, David, Ph.D., University of Maryland, 1969. Spectroscopic astrophysics; supernovae.

Cowan, John J., Ph.D., University of Maryland, 1976. Stellar evolution and nucleosynthesis; supernovae; cosmology.

Doezema, Ryan E., Ph.D., University of Maryland, 1971. Experimental solid-state physics; 2D electron systems in semiconductors; superconductivity.

Morrison, Michael, Ph.D., Rice University, 1976. Theoretical atomic and molecular physics, particularly electron and positron collisions and near-threshold excitations.

Romanishin, William, Ph.D., University of Arizona, 1980. Extragalactic astronomy; clusters of galaxies; active galactic nuclei.

Ryan, Stewart, Ph.D., University of Michigan, 1971. Applied physics; materials characterization.

Adjunct Professor

Beasley, William, Ph.D., University of Texas, Dallas, 1974. Meteorology.

Crompton, Robert, Ph.D., University of Adelaide, 1954. Electron and ion diffusion.

Feldt, Andrew N., Ph.D., University of Oklahoma, 1980. Atomic and molecular theory.

MacGorman, Donald, Ph.D., Rice University, 1978. Atmospheric electricity.

Rust, David, Ph.D., New Mexico Institute of Mining and Technology, 1973. Atmospheric and plasma physics.

Snow, Joel, Ph.D., Yale University, 1983.

DEPARTMENTAL RESEARCH SPECIALTIES AND STAFF

Theoretical

Astronomy. Cosmology; extragalactic astronomy; nucleosynthesis; stellar atmospheres; stellar evolution; supernovae; gravitational lensing; active galactic nuclei. Baron, Henry, Kaib, Leighly.

Atomic, Molecular, & Optical Physics. Atomic and molecular collisions; ultracold Fermi systems; coherent control of bimolecular collisions; dimensional perturbation theory; electron molecule collision; molecular bosonic gases; optical lattices; computational physics; conical intersections. Parker, Watson.

Condensed Matter Physics. Graphene; carbon nanotubes; topological insulators; low-dimensional quantum systems; strongly correlated materials. Mason, Mullen, Uchoa.

High Energy Physics. Quantum field theory; particle physics phenomenology; general relativity; particle physics; Casimir effect; cosmology; dark matter. Baer, Kantowski, Kao, Milton.

Experimental

Astronomy. Binary and variable stars; extragalactic astronomy; extragalactic H regions; supernovae; white dwarfs; gravitational lensing; active galactic nuclei. Dai, Kilic, Leighly, Wisniewski.

Atomic, Molecular, & Optical Physics. Atomic and molecular scattering; laser spectroscopy; multi-photon ionization; reactive scattering; precision measurement; cooling and trapping; quantum optics; Bose-Einstein condensation; non-linear optics. Abraham, Marino, Schwettmann, Shaffer.

Condensed Matter Physics. Molecular beam epitaxy; narrow-gap semiconductors; scanning probe microscopy (AFM & STM); electron microscopy (SEM & TEM); nanofabrication; surface physics; molecular plasmonics; spin transport; photovoltaics; quantum cascade lasers; magneto-optics; topological insulators. Bumm, Furneaux, Johnson, Murphy, Santos, Sellers.

High Energy Physics. Experimental investigation of the fundamental particles and interactions, and searches for new particles and interactions, using the CERN LHC ATLAS and Fermilab Tevatron detectors. Abbott, Gutierrez, Skubic, Strauss.

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www.gradschoolshopper.com**