

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: Suburban
Total Faculty: 1,460
Total Graduate Faculty: 1,233
Total number of Students: 26,478
Total number of Graduate Students: 3,402

Department Information

Department Chairman: Gregory A. Parker
Department Contact: Debbie Barnhill, Program Coordinator
Total full-time faculty: 32
Total number of full-time equivalent positions: 32
Full-Time Graduate Students: 60
First-Year Graduate Students: 12
Female First-Year Students: 3
Total Post Doctorates: 7

Department Address

440 West Brooks, Room 100
Norman, OK 73019
Phone: (405) 325-3961
Fax: (405) 325-7557
E-mail: inquiry@physics.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: inquiry@physics.ou.edu
Admissions website: physics.ou.edu

Application deadlines

Fall admission:

We do not have a strict application deadline. However we ask that students arrange for us to receive all their application material by 15 February.

Applications are evaluated on a rolling basis beginning late January through April. Late applicants run the risk that we may have filled all the program slots for that year.

Spring admission:

The application deadline for Spring is 01 September. Students are admitted for spring only under special circumstances.

Application fee

There is no application fee required, if all the application material is sent directly to the Department (see address above).

Please apply directly to the Department of Physics and Astronomy to avoid graduate application fees.

Admissions information

For Fall of 2010:

Number of applicants: 83

Number admitted: 12

Number enrolled: 12

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 strongly recommended. Although not strictly required, we ask for it because it is an objective and standardized way for us to compare you to 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 to other applicants.

Advanced GRE requirements

The Physics Subject GRE is highly recommended. Although not strictly required, we ask for it because it is an objective and standardized way for us to compare you to 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 to other applicants.

TOEFL requirements (English Proficiency)

The demonstration of English proficiency is required for students from non-English-speaking countries. Our department has set a minimum TOEFL of 600/250/100 for paper/computer/IB or IELTS of 7.0. The graduate school minimum is 550/213/79 or 6.5. There is some flexibility for candidates that are exceptional in other areas.

Other admissions information

Undergraduate preparation assumed: Marion, Classical Dynamics of Particles and Systems; French, Vibrations and Waves; Lorrain, Electromagnetic Fields and Waves; Saxon, Elementary Quantum Mechanics.

TUITION

Tuition year 2010–11:

Tuition for in-state residents

Full-time students: \$2,910 semester

Tuition for out-of-state residents

Full-time students: \$3,320 semester

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

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

Deferred tuition plan: No

Health insurance: Yes, and provided as part of TA and RA support.

Other academic fees: \$1660/semester

Academic term: Semester

Number of first-year students who receive full tuition waivers: 12

TEACHING ASSISTANTS, RESEARCH ASSISTANTS, AND FELLOWSHIPS

Number of first-year
Teaching Assistants: 11
Research Assistants: 1
Fellowship students: 0
Average stipend per academic year
Teaching Assistant: \$21,600 (12 month)
Research Assistant: \$21,600 (12 month)
Fellowship student:

FINANCIAL AID

We offer teaching assistantships or research assistantships to students we accept into our graduate program.

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	2009–10 Faculty	Enrollment Fall 2009		Number of Degrees Granted 2009–10 (2004–10)		
		Mas- ter's	Doc- torate	Mas- ter's	Terminal Master's	Doc- torate
Astrophysics	8	2	10	0(3)	0(7)	3(7)
Atomic, Molecular, & Optical Physics	6	–	16	–	–	–
Condensed Matter Physics	7	1	11	0(3)	1(2)	3(6)
High Energy Physics	8	2	15	0(3)	0(1)	1(5)
Non-specialized	2	–	–	–	–	–
Total	–	5	52	1(13)	5(14)	9(26)
Full-time Grad. Stud.	–	5	55	–	–	–
First-year Grad. Stud.	–	–	12	–	–	–

GRADUATE DEGREE REQUIREMENTS

Master's: A student must complete 30 hours of course work including preparation of a thesis, or 32 hours of course work (non-thesis program), taken in accordance with the general rules of the Graduate College. The allowable minimum number of credits in physics and astronomy is 18 hours, six hours of which must be at the 5000 level or above.
Doctorate: The student must complete a minimum of 36 hours of course work 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 course

work is required as appropriate for the student's field of research specialization, including research hours. The qualifying exam is offered semi-annually 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 exam, 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. Areas of specialization for the Ph.D. in Physics include: Astrophysics; Atomic, Molecular, & Optical Physics; Condensed Matter Physics; High Energy Physics; and others.

Other Degrees: Advanced degree in Engineering Physics (M.S.) is also offered.
Thesis: Thesis and dissertations 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, & 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 & 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. Our astrophysics group routinely has access to Kitt Peak Observatory, the Very Large Array, the MDM Observatory, and Cerro Tololo Inter-American observatories as well as data from the Hubble Space Telescope, the Spitzer Space Telescope, and the Chandra x-ray telescope. Experimental research is supported by an instrument and machine shop within the Department staffed with three full-time machinists.

Theoretical work is supported by ubiquitous 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 (\$)
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**

- Baer**, Howard, Ph.D., Wisconsin, 1984. High-energy theory; supersymmetry phenomenology.
- Baron**, Edward A., Ph.D., SUNY, Stony Brook, 1985. Astrophysics of condensed objects, particularly supernova.
- Doezema**, Ryan E., Ph.D., Maryland, 1971. Experimental solid state physics; 2D electron-systems in semiconductors; superconductivity.
- Furneaux**, John E., Ph.D., California, Berkeley, 1979. Experimental semiconductor physics and low-temperature physics.
- Gutierrez**, Phillip, Ph.D., California, Riverside, 1983. Experimental high-energy physics; Fermilab DØ experiment.
- Henry**, Richard C., Ph.D., Michigan, 1983. Chemical evolution of galaxies; abundance of planetary nebulae; evolution of intermediate mass stars.
- Johnson**, Matthew, Ph.D., Cal. Tech., 1989. Experimental semiconductor and surface physics; scanning tunnelling microscopy.
- Kantowski**, Ronald, Ph.D., Texas, Austin, 1966. Unified classical and quantum field theories.
- Milton**, Kimball, Ph.D., Harvard, 1971. High-energy theory, particularly the development of nonperturbative methods to be applied to quantum chromodynamics and other field theories.
- Mullen**, Kieran, Ph.D., Michigan, 1989. Theoretical solid state physics.
- Parker**, Gregory, Ph.D., Brigham Young, 1976. Theoretical atomic physics, particularly reactive scattering.
- Romanishin**, William, Ph.D., Arizona, 1980. Extragalactic astronomy; clusters of galaxies; active galactic nuclei.
- Santos**, Michael, Ph.D., Princeton, 1992. Experimental semiconductor and surface physics; MBE growth of narrow gap systems.
- Shafer-Ray**, Neil, Ph.D., Columbia, 1990. Experimental atoms; molecular physics; laser physics.
- Skubic**, Patrick, Ph.D., Michigan, 1977. Experimental high-energy physics; Fermilab-DØ Experiment.
- Strauss**, Michael, Ph.D., UCLA, 1988. Experimental high-energy physics; Fermilab DØ experiment.
- Watson**, Deborah K., Ph.D., Harvard, 1977. Theoretical atomic and molecular physics; dimensional perturbation theory, Bose-Einstein condensates.

Associate Professor

- Abbott**, Braden, Ph.D., Purdue, 1994. Experimental high-energy physics; DØ experiment.
- Abraham**, Eric, Ph.D., Rice, 1996. Experimental atomic and molecular physics.

Bumm, Lloyd A., Northwestern Univ., 1991. Experimental condensed matter physics, nanophysics; surface physics & chemistry; self assembly; scanning tunneling microscopy; surface spectroscopy; molecular plasmonics; development of novel instrumentation.

Kao, Chung, Ph.D., Texas, Austin, 1990. High-energy physics; electroweak symmetry breaking; supersymmetry.

Leighly, Karen, Ph.D., Montana State, 1991. Active Galactic Nuclei (AGN).

Mason, Bruce A., Ph.D., Maryland, 1985. Theoretical solid state and device physics; computational physics.

Murphy, Sheena, Ph.D., Cornell, 1991. Experimental semiconductor and superconductor physics; low-temperature physics.

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

Shaffer, James P., Rochester, 1999. Atomic, molecular, chemical physics; optics.

Wang, Yun, Ph.D., Carnegie Mellon, 1991. Cosmic microwave background anisotropy and supernovae.

Assistant Professor

- Capogrosso-Sansone**, Barbara, Ph.D., Massachusetts Amherst, 2008. Many-body systems; phase transitions; ultra-cold atoms and polar molecules in optical lattices; superfluidity; quantum monte carlo simulations.
- Dai**, Xinyu, Ph.D., Pennsylvania State, 2001. Observational Cosmology: Gravitational lensing, galaxy clusters, galaxy evolution high energy astrophysics, x-ray astronomy, AGNs, gamma-ray bursts.
- Kilic**, Mukremin, Ph.D., Texas, Austin, 2006. White dwarf; merger systems; planets; debris disk around white dwarfs; age and the dark matter content of the galaxy.
- Sellers**, Ian, Ph.D., Sheffield UK, 2004. High-efficiency solar cells, impedance spectroscopy of semi-conductors; optical spectroscopy of impurities quantum dots and defects in GaInNAs.
- Uchoa**, Bruno, Ph.D., Campinas, Sp, Brazil and Boston, 2004. Quantum critical system; physics of graphene; layered compounds with unconventional quasiparticles; strong correlated systems.

Emeritus Professor

- Branch**, David, Ph.D., Maryland, 1969. Spectroscopic astrophysics; supernovae.
- Cowan**, John J., Ph.D., Maryland, 1976. Stellar evolution and nucleosynthesis; supernovae; cosmology.
- Morrison**, Michael, Ph.D., 1976. Theoretical atomic and molecular physics, particularly electron and positron collisions and near-threshold excitations.

Adjunct Professor

- Beasley**, William, Ph.D., Dallas, Texas, 1974. Meteorology.
- Crompton**, Robert, Ph.D., Adelaide, 1954. Electron and ion diffusion.
- Feldt**, Andrew N., Ph.D., Oklahoma, 1980. Atomic and molecular theory.
- MacGorman**, Donald, Ph.D., Rice, 1978. Atmospheric electricity.
- Rust**, David, Ph.D., New Mexico Inst. Tech., 1973. Atmospheric and plasma physics.
- Snow**, Joel, Ph.D., Yale, 1983.

DEPARTMENTAL RESEARCH SPECIALTIES AND STAFF

Theoretical

Astronomy. Cosmology; extragalactic astronomy nucleosynthesis; stellar atmospheres; stellar evolution; supernovae; gravitational lensing; active galactic nuclei.

Atomic, Molecular, & Optical Physics. Atomic and molecular collisions; ultra-cold physics; coherent control of bimolecular collisions; dimensional perturbation theory; electron molecule collision; large scale Monte Carlo simulations; molecular bosonic gases; optical lattices; computation physics; conical intersections.

Condensed Matter Physics. Graphene; carbon nanotubes; topological insulators; low dimensional quantum systems; strongly correlated materials.

High Energy Physics. Quantum field theory; particle physics phenomenology; general relativity; particle physics; Casimir effect; cosmology; dark matter.

Experimental

Astronomy. Binary and variable stars; extra-galactic astronomy; extragalactic H regions; supernovae; white dwarfs; gravitational lensing; active galactic nuclei.

Atomic, Molecular, & Optical Physics. Atomic and molecular scattering; laser spectroscopy; multiphoton ionization; reactive scattering; precision measurement; cooling & trapping; quantum optics; Bose-Einstein condensation; nonlinear optics.

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; photovolatics; quantum cascade lasers; magneto-optics; topological insulators.

High Energy Physics. New states of matter found at ATLAS and DØ.



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