

# UNIVERSITY OF DELAWARE

## DEPARTMENT OF PHYSICS AND ASTRONOMY

Newark, Delaware 19716  
<http://web.physics.udel.edu>

### General University Information

*President:* Dennis Assanis  
*Dean of Graduate School:* Ann Ardis  
*University website:* <http://www.udel.edu>  
*Control:* Public  
*Setting:* Suburban  
*Total Faculty:* 1,207  
*Total number of Students:* 22,852  
*Total number of Graduate Students:* 3,752

### Department Information

*Department Chairman:* Prof. Edmund Nowak, Chair  
*Department Contact:* Maura Perkins, Academic Support Coordinator  
*Total full-time faculty:* 35  
*Total number of full-time equivalent positions:* 33  
*Full-Time Graduate Students:* 77  
*First-Year Graduate Students:* 15  
*Female First-Year Students:* 3  
*Total Post Doctorates:* 12

### Department Address

104 The Green/ 217 Sharp Lab  
Newark, DE 19716  
*Phone:* (302) 831-1995  
*Fax:* (302) 831-1637  
*E-mail:* [physics@physics.udel.edu](mailto:physics@physics.udel.edu)  
*Website:* <http://web.physics.udel.edu>

### ADMISSIONS

---

#### Admission Contact Information

*Address admission inquiries to:* Chair of Graduate Admissions Committee  
*Phone:* (302) 831-1995  
*E-mail:* [physics@physics.udel.edu](mailto:physics@physics.udel.edu)  
*Admissions website:* <http://web.physics.udel.edu/graduate/apply>

#### Application deadlines

Fall admission:  
*U.S. students:* April 15      *Int'l. students:* April 15

#### Application fee

*U.S. students:* \$75      *Int'l. students:* \$75

#### Admissions information

For Fall of 2016:  
*Number of applicants:* 99  
*Number admitted:* 38  
*Number enrolled:* 15

#### Admission requirements

*Bachelor's degree requirements:* Admission to either the M.S. or Ph.D. program requires a Bachelor's degree in Physics or a closely related field.  
*Minimum undergraduate GPA:* 3.2

#### GRE requirements

The GRE is required.  
*Quantitative score:* 160  
*Mean GRE score range (25th–75th percentile):* 313-326  
GRE scores are on new scale

### Advanced GRE requirements

The Advanced GRE is required.  
*Minimum accepted Advanced GRE score:* 650  
*Mean Advanced GRE score range (25th–75th percentile):* 670-850

### TOEFL requirements

The TOEFL exam is required for students from non-English-speaking countries.  
*PBT score:* 600  
*iBT score:* 100  
IELTS score of 7.0 is acceptable in place of TOEFL.

### Other admissions information

*Additional requirements:* Advanced GRE score expected for financial aid consideration.  
*Undergraduate preparation assumed:* Electricity and Magnetism, Classical Mechanics, Quantum Mechanics, Thermodynamics.

### TUITION

---

Tuition year 2016–17:  
Tuition for in-state residents  
*Full-time students:* \$15,480 per semester  
*Part-time students:* \$1,720 per credit  
Tuition for out-of-state residents  
*Full-time students:* \$15,480 per semester  
*Part-time students:* \$1,720 per credit  
Teaching and Research Assistant tuition is waived.  
*Credit hours per semester to be considered full-time:* 6  
*Deferred tuition plan:* Yes  
*Health insurance:* Available at the cost of \$200 per year.  
*Other academic fees:* \$454 (Health Service) per year.  
*Academic term:* Semester  
*Number of first-year students who received full tuition waivers:* 14

### Teaching Assistants, Research Assistants, and Fellowships

Number of first-year  
*Teaching Assistants:* 14  
Average stipend per academic year  
*Teaching Assistant:* \$26,800  
*Research Assistant:* \$26,800

### FINANCIAL AID

---

#### Application deadlines

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

#### Loans

Loans are not 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:* Chair Graduate Admissions Committee.  
*E-mail:* [physics@physics.udel.edu](mailto:physics@physics.udel.edu)

**HOUSING**

**Availability of on-campus housing**

Single students: Yes  
Married students: Yes

**For further information**

Address housing inquiries to: Office of Housing and Residence Life, www.udrentals.com.  
Phone: 302-831-4663  
E-mail: reslife-housing@udel.edu  
Housing aid website: <http://www1.udel.edu/reslife/resources/students/grad.html>

**Table A—Faculty, Enrollments, and Degrees Granted**

Research Specialty	2016–2017 Faculty	Enrollment Fall 2016		Number of Degrees Granted 2015–2016 (2011–16)		
		Mas-ter's	Doc-torate	Mas-ter's	Terminal Master's	Doc-torate
<b>Astrophysics</b>	8	–	6	–(1)	–(1)	1(7)
<b>Atmosphere, Space Physics, Cosmic Rays</b>	4	–	6	–(1)	–	1(5)
<b>Atomic, Molecular, &amp; Optical Physics</b>	7	–	20	2(4)	–(3)	2(2)
<b>Biophysics</b>	1	–	3	–(1)	–	–
<b>Condensed Matter Physics</b>	9	–	27	–	1(3)	7(14)
<b>Particles and Fields</b>	6	–	8	–	–(2)	2(12)
<b>Non-specialized</b>	–	–	14	–	–(3)	–
<b>Total</b>	35	–	84	2(7)	1(12)	13(40)
<b>Full-time Grad. Stud.</b>	–	–	84	–	–	–
<b>First-year Grad. Stud.</b>	–	–	15	–	–	–

**GRADUATE DEGREE REQUIREMENTS**

**Master's:** Twenty-four credit hours of classroom courses plus six credits of M.S. thesis. Thirty credit hours for M.S. without thesis.

**Doctorate:** Thirty credit hours of classroom courses, passing the Ph.D. written and oral candidacy exam, Ph.D. thesis. Students entering the program with a Master's degree may follow the Ph.D. fast track which has a reduced course requirement of 12 credit hours.

**Thesis:** Thesis may be written in absentia.

**SPECIAL EQUIPMENT, FACILITIES, OR PROGRAMS**

The Department of Physics and Astronomy is housed in Sharp Laboratory, which has its own library, machine and electronics shops, as well as research and teaching laboratories, classrooms, and office space. The condensed matter and material science programs have in house scanning and transmission microscopes, a variety of magnetometers, X-ray diffractometers, differential scanning calorimeters, thin-film deposition systems and cryogenic facilities, and make use of accelerator based facilities for X-ray and neutron scattering. The atomic and molecular physics laboratories include femtosecond and high-power pulsed lasers for non-linear optical studies and high resolution multiphoton spectroscopy. The astro-particle physics programs include high-altitude balloon flights and high-energy cosmic ray and neutrino experiments in Antarctica (ICECUBE and Anita). Space physics programs maintain a world-wide network of neutron monitors and are involved with MMS, the Magnetosphere Multiscale mission, and multispacecraft missions such as Cluster-2, to study the magnetosphere and the solar wind. Opportunities are avail-

able for participation in several NASA missions: ACE, The Spitzer infrared telescope, the Chandra X-ray satellite and the Hubble Space Telescope. UD is the lead institution for the Whole Earth Telescope (WET). Further programs on campus are the Institute for Energy Conversion and the Center for Composite Materials.

**Table B—Separately Budgeted Research Expenditures by Source of Support**

Source of Support	Departmental Research	Physics-related Research Outside Department
<b>Federal government</b>	\$4,221,008.49	
<b>State/local government</b>		
<b>Non-profit organizations</b>	\$14,444.46	
<b>Business and industry</b>	\$869,153.47	
<b>Other</b>	\$797,170	
<b>Total</b>	\$5,901,776.42	

**Table C—Separately Budgeted Research Expenditures by Research Specialty**

Research Specialty	No. of Grants	Expenditures (\$)
<b>Astronomy</b>	6	\$127,931.01
<b>Astrophysics</b>	12	\$712,449.77
<b>Atmosphere, Space Physics, Cosmic Rays</b>	18	\$1,432,158.11
<b>Atomic, Molecular, &amp; Optical Physics</b>	17	\$1,061,320.03
<b>Condensed Matter Physics</b>	21	\$1,538,841.58
<b>High Energy Physics</b>	3	\$311,064.61
<b>Particles and Fields</b>	6	\$718,011.31
<b>Total</b>	83	\$5,901,776.42

**FACULTY**

**Professor**

- Barr, Stephen, Ph.D., Princeton University, 1978.** Director of Bartol Research Institute. *Particles and Fields*. Elementary particle theory.
- Chui, Siu-Tat, Ph.D., Princeton University, 1972.** *Condensed Matter Physics*. Theoretical condensed matter physics; low-dimensional and amorphous materials; nanomagnetism.
- Evenson, Paul A., Ph.D., University of Chicago, 1972.** *Atmosphere, Space Physics, Cosmic Rays*. Space physics; solar and cosmic-ray studies.
- Gaisser, Thomas K., Ph.D., Brown University, 1967.** *Particles and Fields*. Particle astrophysics; neutrino astronomy.
- Gizis, John, Ph.D., California Institute of Technology, 1998.** *Astrophysics*. Astronomy; subdwarfs; brown dwarfs.
- Hadjipanayis, George C., Ph.D., University of Manitoba, 1979.** *Condensed Matter Physics*. Experimental condensed matter and materials physics; magnetism; nanocrystalline materials.
- MacDonald, James, Ph.D., University of Cambridge, 1979.** *Astrophysics*. Astronomy and astrophysics; white dwarfs; cataclysmic variables.
- Matthaeus, William H., Ph.D., College of William and Mary, 1979.** *Astrophysics, Atmosphere, Space Physics, Cosmic Rays*. Space physics; plasma physics; turbulence theory; computational physics.
- Mullan, Dermott J., Ph.D., University of Maryland, 1969.** *Astrophysics*. Astrophysics; solar and stellar physics.
- Nikolic, Branislav, Ph.D., Stony Brook University, 2000.** Graduate Program Director. *Condensed Matter Physics*. Theoretical and computational condensed matter physics; nonequilibrium many-body theory; quantum transport; spintronics; nanoelectronics; thermoelectrics.

- Nowak**, Edmund R., Ph.D., University of Minnesota, 1994. *Condensed Matter Physics*. Experimental condensed matter and materials physics; magnetism; spintronics; superconductivity; granular materials.
- Owocki**, Stanley P., Ph.D., University of Colorado, 1982. *Astrophysics*. Computational astrophysics; stellar winds; stellar magnetospheres.
- Safronova**, Marianna, Ph.D., University of Notre Dame, 2001. *Atomic, Molecular, & Optical Physics*. Quantum computing with neutral atoms; Rydberg atoms.
- Seckel**, David, Ph.D., University of Washington, 1983. *Particles and Fields*. Particle astrophysics; cosmology.
- Shafi**, Qaisar, Ph.D., Imperial College, London, 1971. *Particles and Fields*. Elementary particle theory; cosmology.
- Shah**, Ismat, Ph.D., University of Illinois, 1986. *Condensed Matter Physics*. Experimental condensed matter and materials physics; thin films; surface; interface; nanostructures.
- Shay**, Michael, Ph.D., University of Maryland, College Park, 1998. *Atmosphere, Space Physics, Cosmic Rays*. Plasma physics; space physics; astrophysics.
- Shipman**, Harry L., Ph.D., California Institute of Technology, 1971. *Astronomy*. Astronomy and astrophysics; white dwarfs.
- Stanev**, Todor, Ph.D., Sofia, Bulgaria, 1977. *Particles and Fields*. Cosmic-ray physics; particle astrophysics.
- Szalewicz**, Krzysztof, Ph.D., University of Warsaw, 1977. *Atomic, Molecular, & Optical Physics*. Theoretical and computational molecular physics.
- Unruh**, Karl M., Ph.D., Johns Hopkins University, 1983. *Condensed Matter Physics*. Experimental condensed matter and materials physics; thin films; nanomagnetism.
- Walker**, Barry, Ph.D., Stony Brook University, 1996. *Atomic, Molecular, & Optical Physics*. Light-matter interactions; optical physics.
- Watson**, George, Ph.D., University of Delaware, 1984. *Condensed Matter Physics*. Experimental condensed matter and materials physics; laser spectroscopy of condensed matter; photonic band structure.
- Xiao**, John Q., Ph.D., Johns Hopkins University, 1993. *Condensed Matter Physics*. Experimental condensed matter and materials physics; spintronics; nanomagnetism.

#### Associate Professor

- Clem**, John, Ph.D., Vanderbilt, 1990. *Atmosphere, Space Physics, Cosmic Rays*. Particle astrophysics; space physics; cosmic-ray physics.
- DeCamp**, Matthew F., Ph.D., University of Michigan, 2002. Undergraduate program director. *Atomic, Molecular, & Optical Physics*. Experimental atomic and molecular physics.
- Dodson-Robinson**, Sarah, Ph.D., University of California at Santa Cruz, 2008. *Astronomy, Astrophysics, Planetary Sci-*

*ence, Theoretical Physics*. Planetary science; theoretical astrophysics; observational astronomy.

- Holder**, Jamie, Ph.D., University of Durham, UK, 1997. *Particles and Fields*. Gamma ray astronomy.
- Ji**, Yi, Ph.D., Johns Hopkins University, 2003. *Condensed Matter Physics*. Experimental condensed matter and materials physics; spintronics.
- Morgan**, John D., Ph.D., University of California, Berkeley, 1978. *Atomic, Molecular, & Optical Physics*. Theoretical atomic and molecular physics.
- Provencal**, Judith L., Ph.D., University Texas Austin, 1994. Director of the Delaware Asteroseismic Research Center (DARC). *Astronomy*. Observational astronomy and asteroseismic research.

#### Assistant Professor

- Gundlach**, Lars, Ph.D., Free University of Berlin, 2005. *Atomic, Molecular, & Optical Physics*. Experimental atomic and molecular physics.
- Lyman**, Edward, Ph.D., Virginia Polytechnic Institute and State University (Virginia Tech), 2004. *Biophysics*. Computational biophysics; soft condensed matter.
- Maruca**, Bennett, Ph.D., Harvard, 2012. *Atmosphere, Space Physics, Cosmic Rays*. Solar wind.
- Petit**, Veronique, Ph.D., Université Laval, 2011. *Astrophysics*. Magnetic fields in massive stars; optical, ultraviolet, and X-ray spectroscopy.

#### DEPARTMENTAL RESEARCH SPECIALTIES AND STAFF

##### Theoretical

- Astrophysics. Dodson-Robinson, MacDonald, Matthaues, Mullan, Owocki, Shay.  
 Atmosphere, Space Physics, Cosmic Rays. Gaisser, Matthaues, Seckel, Shay, Stanev.  
 Atomic, Molecular, & Optical Physics. Lyman, Morgan, Safronova, Szalewicz, Walker.  
 Biophysics. Lyman.  
 Condensed Matter Physics. Chui, Nikolic.  
 Particles and Fields. Barr, Gaisser, Seckel, Shafi, Stanev.

##### Experimental

- Astrophysics. Gizis, Holder, Petit, Provencal, Shipman.  
 Atmosphere, Space Physics, Cosmic Rays. Evenson, Gaisser, Holder, Maruca.  
 Atomic, Molecular, & Optical Physics. DeCamp, Gundlach, Walker.  
 Condensed Matter Physics. Hadjipanayis, Ji, Nowak, Shah, Unruh, Watson, Xiao.  
 Optics. DeCamp, Walker, Watson.

**View additional information about this department at  
[www.gradschoolshopper.com](http://www.gradschoolshopper.com)**