

UNIVERSITY OF MARYLAND, BALTIMORE COUNTY

PHYSICS GRADUATE PROGRAM

Baltimore, Maryland 21250

<http://physics.umbc.edu/>

General University Information

President: Freeman A. Hrabowski
Dean of Graduate School: Janet C. Rutledge
University website: <http://www.umbc.edu/>
School Type: Public
Setting: Suburban
Total Faculty: 838
Total Graduate Faculty: 546
Total number of Students: 13,662
Total number of Graduate Students: 2,428

Department Information

Department Chairman: Prof. L. Michael Hayden, Chair
Department Contact: Jennifer Salmi, Programs Specialist
Total full-time faculty: 22
Total number of full-time equivalent positions: 22
Full-Time Graduate Students: 32
Female Full-Time Graduate Students: 6
First-Year Graduate Students: 9
Female First-Year Students: 2
Total Post Doctorates: 5

ADMISSIONS

Admission Contact Information

Address admission inquiries to: Dr. Laszlo Takacs, Graduate Admissions Coordinator, Department of Physics
Phone: (410) 455-2513
E-mail: takacs@umbc.edu
Admissions website: <http://physics.umbc.edu/>

Application deadlines

Fall admission:
U.S. students: January 1 *Int'l. students:* January 1

Application fee

U.S. students: \$50 *Int'l. students:* \$50

Admissions information

For Fall of 2018:
Number of applicants: 59
Number admitted: 17
Number enrolled: 9

Admission requirements

Bachelor's degree requirements: Bachelor's degree in Physics, Chemistry, Math, or Engineering is required.
Minimum undergraduate GPA: 3.0

GRE requirements

The GRE is required.

Subjective GRE requirements

The Subjective GRE is recommended.

TOEFL requirements

The TOEFL exam is required for students from non-English-speaking countries.
PBT score: 550
iBT score: 80

Other admissions information

Additional requirements: Letters of recommendation, undergraduate transcripts, and personal statement.

Undergraduate preparation assumed: Thermal and Statistical Physics (Mandl); Classical Mechanics (Taylor); Modern Physics (Thornton & Rex); Introduction to Electrodynamics (Griffiths); Introduction to Quantum Mechanics (Griffiths).

TUITION

Tuition year 2018–19:
Tuition for in-state residents
Full-time students: \$640 per credit
Tuition for out-of-state residents
Full-time students: \$1,099 per credit
Credit hours per semester to be considered full-time: 9
Deferred tuition plan: No
Health insurance: Available
Other academic fees: \$136/credit.
Academic term: Semester
Number of first-year students who received full tuition waivers: 9

Teaching Assistants, Research Assistants, and Fellowships

Number of first-year
Teaching Assistants: 9
Average stipend per academic year
Teaching Assistant: \$26,000
Research Assistant: \$28,000
Fellowship student: \$31,000

FINANCIAL AID

Application deadlines

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

Loans

Loans are available for U.S. students.
Loans are available for international students.
GAPSFAS application required: No
FAFSA application required: No

For further information

Address financial aid inquiries to: Dr. Laszlo Takacs, Graduate Admissions Coordinator, Department of Physics.
Phone: (410)-455-2513
E-mail: takacs@umbc.edu
Financial aid website: <http://www.umbc.edu/financialaid/>

HOUSING

Availability of on-campus housing

Single students: Yes
Married students: No

For further information

Address housing inquiries to: Office of Residential Life.
Housing aid website: <http://www.umbc.edu/reslife/>

Table A—Faculty, Enrollments, and Degrees Granted

Research Specialty	2018–19 Faculty	Enrollment Fall 2018		Number of Degrees Granted 2017–18 (2013–2018)		
		Master's	Doctorate	Master's	Terminal Master's	Doctorate
Astrophysics	5	–	7	1(3)	2(3)	1(7)
Atmospheric Physics	5	–	1	–	–	–
Condensed Matter Physics	7	–	14	2(5)	–(4)	1(8)
Quantum Optics and Quantum Information	5	–	10	1(5)	1(3)	–(7)
Total	22	–	32	4(13)	3(10)	2(22)
Full-time Grad. Stud.	–	–	31	–	–	–
First-year Grad. Stud.	–	–	9	–	–	–

GRADUATE DEGREE REQUIREMENTS

Master's: Completion of 30 credit hours of coursework, including required core courses in quantum mechanics and mathematical physics. Overall competence must be demonstrated by an oral thesis defense (thesis option) or a written comprehensive examination (non-thesis option). For thesis option, six hours of the required 30 credit hours are for thesis research.

Doctorate: Completion of a core curriculum consisting of quantum mechanics I & II, statistical mechanics, mathematical physics, classical mechanics, and electromagnetic theory I & II. In addition, students are required to take physics seminar, and a minimum of 3 graduate elective courses. Students are required to pass a written examination in order to qualify for candidacy for the Ph.D. degree. Upon completion of the doctoral research, students are required to write and defend a dissertation before a committee constituted in accordance with the graduate school regulations.

Thesis: Thesis may be written in absentia.

SPECIAL EQUIPMENT, FACILITIES, OR PROGRAMS

There are close working relationships between UMBC and several other research institutions in the Baltimore-Washington area. Formal cooperative agreements are in place between UMBC and the NASA Goddard Space Flight Center (GSFC) in the form of the Joint Center for Earth Systems Technology (JCET) [<http://jcet.umbc.edu/>] and the Center for Research and Exploration in Space Science and Technology (CRESST) [<http://cresst.umd.edu/>]. UMBC also hosts the Center for Advanced Studies in Photonics Research (CASPR) [<http://www.umbc.edu/caspr/>]. The Physics Department also houses the new state-of-the-art UMBC Nano Imaging Center (NIC) .

Table B—Separately Budgeted Research Expenditures by Source of Support

Source of Support	Departmental Research	Physics-related Research Outside Department
Federal government	\$1,737,844	
State/local government		
Non-profit organizations		
Business and industry		
Other		
Total	\$1,737,844	

Table C—Separately Budgeted Research Expenditures by Research Specialty

Research Specialty	No. of Grants	Expenditures (\$)
Astrophysics	22	\$621,139
Condensed Matter Physics	4	\$383,392
Quantum Optics and Quantum Information	7	\$733,313
Total	33	\$1,737,844

FACULTY

Professor

- Demoz**, Belay, Ph.D., University of Nevada and DRI, 1992. Director, JCET. *Climate/Atmospheric Science*. Atmospheric physics and chemistry; meteorological observations.
- Franson**, James D., Ph.D., California Institute of Technology, 1977. Quantum optics and quantum computing.
- Gougousi**, Theodosia, Ph.D., University of Pittsburgh, 1996. Nanoscience; interfaces.
- Hayden**, L. Michael, Ph.D., University of California, Davis, 1987. Nonlinear optical properties of polymers; electro-optic techniques; photonic devices.
- Johnson**, Anthony M., Ph.D., City College of New York, 1981. Director, JCET. Nonlinear optics; ultrafast optics; optoelectronics; laser research; ultrashort pulse propagation.
- Martins**, Vanderlei, Ph.D., University of São Paulo, 1999. Radiative effects of biomass burning and bio-aerosols.
- Pittman**, Todd B., Ph.D., University of Maryland, Baltimore County, 1996. Quantum optics and quantum computing.
- Shih**, Yanhua, Ph.D., University of Maryland, 1987. Quantum optics; laser physics; nonlinear optics.
- Turner**, T. Jane, Ph.D., University of Leicester, 1988. Extragalactic astrophysics; x-ray astronomy.

Associate Professor

- Georganopoulos**, Markos, Ph.D., Boston University, 1999. Broad-band synchrotron emission from relativistic flows in active galaxies, galactic microquasars, and gamma-ray bursts.
- George**, Ian M., Ph.D., University of Leicester, 1988. Astrophysics; x-ray astronomy.
- Henriksen**, Mark J., Ph.D., University of Maryland, 1986. Astrophysics; X-ray astronomy.
- Sparling**, Lynn C., Ph.D., University of Texas, Austin, 1987. Atmospheric physics; modeling.
- Takacs**, Laszlo, Ph.D., Eotvos University, 1978. Amorphous and metastable crystalline alloys; energy-dispersive X-ray diffraction; magnetic susceptibility.
- Worchesky**, Terrance L., Ph.D., Georgetown University, 1984. Optical properties of semiconductors; photonics.
- Zhang**, Zhibo, Ph.D., Texas A&M University, 2008. Remote sensing; aerosol-cloud-precipitation interactions; atmospheric physics.

Assistant Professor

- Ataca**, Can, Ph.D., Bilkent University, 2012. Computational physics, nanophysics, condensed matter physics.
- Deffner**, Sebastian, Ph.D., University of Augsburg, 2011. Quantum thermodynamics, quantum information theory, condensed matter theory.
- Kestner**, Jason, Ph.D., University of Michigan, 2009. Condensed matter theory; quantum information theory.
- Meyer**, Eileen T., Ph.D., Rice University, 2012. *Astrophysics*. Galaxy formation; HST imaging.
- Pelton**, Matthew, Ph.D., Stanford, 2002. Optical studies of nanomaterials; nanophotonics.
- Zhai**, Pengwang, Ph.D., Texas A&M University, 2006. *Atmosphere, Space Physics, Cosmic Rays*. Atmospheric physics.

Emeritus

- Hoff**, Raymond M., Ph.D., Simon Fraser University, 1975. Atmospheric physics; LIDAR.
- Kramer**, Ivan, Ph.D., University of California, Berkeley, 1967. Mathematical modeling.
- McCann**, Kevin J., Ph.D., Georgia Institute of Technology, 1974. LIDAR and atmospheric aerosols.
- Melfi**, Harvey, Ph.D., College of William and Mary, 1970. Atmospheric LIDAR; remote sensing.
- Reno**, Robert C., Ph.D., Brandeis University, 1970. Hyperfine interactions in solids; electron microscopy; neutron diffraction measurement.
- Rous**, Philip J., Ph.D., Imperial College of Science and Technology, 1986. Theoretical physics: surfaces, interfaces, and nanostructures.
- Rubin**, Morton H., Ph.D., Princeton University, 1964. Theoretical physics; quantum optics.
- Summers**, Geoffrey P., Ph.D., University of Oxford, 1970. Radiation effects in semiconductors; defects in solids.
- Wu**, En-Shinn, Ph.D., Cornell, 1972. Optical studies of macromolecules.

Research Professor

- Strow**, L. Larrabee, Ph.D., University of Maryland, 1981. High-resolution infrared molecular spectroscopy; atmospheric radiative transfer.

Research Associate Professor

- Peter**, Kuchunov, Ph.D., University of Texas Health Science Center at San Antonio, 2001. MRI; quantitative imaging; imaging genetics.

Adjunct Professor

- Fitelson**, Michael, Ph.D., Pennsylvania State University, 1966. Advanced technologies.
- Krotkov**, Nickolay, Ph.D., Shirshov Institute, Russian Academy of Sciences, 1990. Atmospheric physics.
- Kuchner**, Marc, Ph.D., California Institute of Technology, 2000. Astrophysics.

Affiliate Professor

- Remer**, Lorraine, Ph.D., University of California, Davis, 1991. Climate change; remote sensing.

Affiliate Associate Professor

- Davis**, David, Ph.D., University of Maryland, College Park, 1994. Galaxy clusters; X-ray astronomy.
- Hoban**, Susan, Ph.D., University of Maryland, 1989. Planetary science; comets; dust in the solar system; STEM education.
- Olson**, William, Ph.D., University of Wisconsin-Madison, 1987. Remote sensing of precipitation.
- Pottschmidt**, Katja, Ph.D., Universitaet Tuebingen, 2002. High-energy astrophysics; accreting X-ray binary stars.
- Varnai**, Tamas, Ph.D., McGill University, 1996. Cloud physics and radiation transfer.

- Yuan**, Tianle, Ph.D., University of Maryland, College Park, 2008. Atmospheric and oceanic sciences.

Affiliate Assistant Professor

- De Souza-Machado**, Sergio, Ph.D., University of Maryland, College Park, 1996. Infrared remote sensing and radiation transfer.
- Engel**, Don, Ph.D., University of Pennsylvania, 2005. Computational physics; molecular biophysics; statistical artificial intelligence.
- Johnson**, Benjamin, Ph.D., University of Wisconsin-Madison, 2007. Cloud modeling, radiative transfer, cloud microphysics.

Lecturer

- Anderson**, Eric, Ph.D., Arizona State University, 1993. Physics education.
- Cui**, Lili, Ph.D., Kansas State University, 2006. Physics education.
- Goolsby-Cole**, Cody, Ph.D., University of Massachusetts, 2017. Physics education, theoretical physics.

DEPARTMENTAL RESEARCH SPECIALTIES AND STAFF**Theoretical**

- Astrophysics.** High-energy astrophysics; active galactic nuclei; relativistic jets; quasars, X-ray astronomy. Davis, Georganopoulos, George, Henriksen, Hoban, Kuchner, Meyer, Pottschmidt, Turner.
- Atmospheric Physics.** De Souza-Machado, Demoz, Engel, Hoban, Benjamin Johnson, Martins, Olson, Remer, Sparling, Strow, Varnai, Yuan, Zhai, Zhang.
- Condensed Matter Physics.** Semiconductor quantum dots; cold atoms; theoretical physics. Ataca, Deffner, Kestner.
- Quantum Optics and Quantum Information.** Quantum foundations; entanglement; non-classical states; quantum imaging; photonic qubits; spin qubits; quantum information theory; quantum thermodynamics. . . Deffner, Franson, Kestner, Shih.

Experimental

- Astrophysics.** X-ray astronomy; active galaxies; extragalactic astrophysics. Davis, Georganopoulos, George, Henriksen, Meyer, Pottschmidt, Turner.
- Atmospheric Physics.** De Souza-Machado, Demoz, Hoff, Martins, Remer, Strow, Zhai, Zhang.
- Condensed Matter Physics.** Thin films; surfaces and interfaces; atomic layer deposition; polymer physics; mechanical alloying; semi-conductors; optical studies of nanomaterials. Gougousi, Hayden, Anthony Johnson, Pelton, Takacs, Worchesky.
- Quantum Optics and Quantum Information.** Photonic quantum information; quantum imaging; entanglement; single photon physics; quantum foundations. Franson, Pelton, Pittman, Shih.