

# MIAMI UNIVERSITY

## DEPARTMENT OF PHYSICS

Oxford, Ohio 45056

<http://www.MiamiOH.edu/physics>

### General University Information

*President:* Gregory Crawford  
*Dean of Graduate School:* James Oris, Dean  
*University website:* <http://www.MiamiOH.edu>  
*School Type:* Public  
*Setting:* Rural  
*Total Faculty:* 973  
*Total Graduate Faculty:* 598  
*Total number of Students:* 19,452  
*Total number of Graduate Students:* 2,305

### Department Information

*Department Chair:* Prof. Herbert Jaeger, Chair  
*Department Contact:* Dr. Mahmud Khan, Graduate Director  
*Total full-time faculty:* 14  
*Total number of full-time equivalent positions:* 14  
*Full-Time Graduate Students:* 19  
*Female Full-Time Graduate Students:* 1  
*First-Year Graduate Students:* 9

### Department Address

500 E. Spring Street  
217 Kreger Hall  
Oxford, OH 45056  
*Phone:* (513) 529-5625  
*Fax:* (513) 529-5629  
*E-mail:* [physics@MiamiOH.edu](mailto:physics@MiamiOH.edu)  
*Website:* <http://www.MiamiOH.edu/physics>

### ADMISSIONS

#### Admission Contact Information

*Address admission inquiries to:* Graduate School, 102 Roudebush Hall, Oxford, OH 45056  
*Phone:* (513) 529-3734  
*E-mail:* [gradschool@MiamiOH.edu](mailto:gradschool@MiamiOH.edu)  
*Admissions website:* <http://www.miamioh.edu/graduate-studies/admission/index.html>

#### Application deadlines

Fall admission:  
*U.S. students:* February 15      *Int'l. students:* February 15  
Spring admission:  
*U.S. students:* November 1      *Int'l. students:* October 15

#### Application fee

*U.S. students:* \$50      *Int'l. students:* \$50  
Late applications may be considered until all positions are filled.

#### Admissions information

For Fall of 2019:  
*Number of applicants:* 48  
*Number admitted:* 10  
*Number enrolled:* 9

#### Admission requirements

*Bachelor's degree requirements:* A bachelor's degree in Physics or related areas is required. Consult our Graduate Student Adviser about the appropriateness of related area.  
*Minimum undergraduate GPA:* 2.75

#### GRE requirements

The GRE is recommended but not required.  
Test is recommended - No minimum is set

#### GRE Physics requirements

The GRE Physics is recommended.  
Test is recommended - No minimum is set

#### TOEFL requirements

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

Minimum accepted TOEFL scores:

*PBT score:* 550

*iBT score:* 80

Other equivalent exams may be accepted.

#### Other admissions information

*Additional requirements:* A brief statement (one page or less) of research interest must be included with the application.

*Undergraduate preparation assumed:* Classical Mechanics, Symon; Electromagnetism, Griffiths; Quantum Mechanics, Griffiths; Statistical and Thermal Physics, Reif; courses in linear algebra and differential equations.

### TUITION AND ASSISTANTSHIPS

#### Teaching Assistants, Research Assistants, and Fellowships

Number of first-year  
*Teaching Assistants:* 8  
*Research Assistants:* 1  
Average stipend per academic year  
*Teaching Assistant:* \$17,406  
*Research Assistant:* \$17,406

#### Tuition year 2018–19:

Tuition for in-state residents

*Full-time students:* \$12,068 annual

*Part-time students:* \$503 per credit

Tuition for out-of-state residents

*Full-time students:* \$29,456 annual

*Part-time students:* \$1,228 per credit

*Credit hours per semester to be considered full-time:* 12

*Deferred tuition plan:* No

*Health insurance:* Available at the cost of \$1521 per year.

*Other academic fees:* Transit fee, Student Technology fee, Armstrong Student Center fee, and facilities fee total per academic year is \$1010. Some individual courses may charge special course fees.

*Academic term:* Semester

*Number of first-year students who received full tuition waivers:* 9

### FINANCIAL AID

#### Application deadlines

Fall admission:  
*U.S. students:* March 15      *Int'l. students:* March 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:* One Stop for Student Success.  
*Phone:* (513) 529-0001  
*E-mail:* [OneStop@MiamiOH.edu](mailto:OneStop@MiamiOH.edu)

Financial aid website: <http://www.miamioh.edu/admission/finaid/graduate/index.html>

## HOUSING

### For further information

Address housing inquiries to: Graduate School.

Phone: (513) 529-3734

E-mail: [gradschool@miamioh.edu](mailto:gradschool@miamioh.edu)

Housing aid website: <http://miamioh.edu/graduate-studies/student-life/housing.html>

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

Research Specialty	2018–19 Faculty	Enrollment Fall 2018		Number of Degrees Granted 2018–19 (2015–19)		
		Mas-ter's	Doc-torate	Mas-ter's	Terminal Master's	Doc-torate
Applied Physics	3	–	–	–	–(1)	–
Astrophysics	1	1	–	–	–(3)	–
Atomic, Molecular, & Optical Physics	2	2	–	–	5(15)	–
Biophysics	2	2	–	–	1(9)	–
Condensed Matter Physics	3	2	–	–	1(11)	–
Nano Science and Technology	1	–	–	–	–(2)	–
Physics and other Science Education	2	–	–	–	1(2)	–
Quantum Optics & Quantum Information	3	3	–	–	2(10)	–
Other	3	–	–	–	–	–
<b>Total</b>	14	20	–	–	10(53)	–
Full-time Grad. Stud.	–	20	–	–	–	–
First-year Grad. Stud.	–	10	–	–	–	–

## GRADUATE DEGREE REQUIREMENTS

**Master's:** For the thesis option, a minimum of 30 semester hours of graduate course work, research, and thesis credit is required. You must write a thesis proposal and defend it before your thesis committee. Subsequent completion and defense of the thesis are required. For the non-thesis option, a minimum of 36 semester hours of graduate credit is required. A comprehensive examination must also be passed. The thesis option is strongly recommended. For either the thesis or non-thesis option, you are expected to show proficiency in the areas of quantum physics, classical mechanics, electromagnetism, statistical physics, and mathematical methods used in physics. Evidence of proficiency means successful completion of courses at the graduate level. Graduate course work is selected in consultation with the thesis director (thesis option) and graduate program director.

## SPECIAL EQUIPMENT, FACILITIES, OR PROGRAMS

Faculty qualified to direct graduate student research maintain or have access to the following: cold atom trap and optical lattice with tunable diode lasers; nanosecond time-resolved fluorescence spectrometer and sectioning microscope; cell culture facility of laminar flow-hood, CO2 incubators; gamma-ray spectrometer; positron lifetime spectrometer; Quantum Design physical properties measurement system; grid cluster for computation; and Class 1000 clean room to fabricate nanodevices; Quantum Design helium liquifier; Center for Advanced Microscopy and Imaging

(CAMI); Instrumentation Lab. Miami University is a node institution of the Southwest Quantum Information and Technology (SQuInT) network.

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

Source of Support	Departmental Research	Physics-related Research Outside Department
Federal government	\$525,497	
State/local government		
Non-profit organizations		
Business and industry		
Other		
<b>Total</b>	\$525,497	

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

Research Specialty	No. of Grants	Expenditures (\$)
Atomic, Molecular, & Optical Physics	2	\$109,977
Physics and other Science Education	1	\$355,531
Quantum Foundations	1	\$59,989
<b>Total</b>	4	\$525,497

## FACULTY

### Chair Professor

**Jaeger**, Herbert, Ph.D., Oregon State University, 1987. *Acoustics, Applied Physics, Condensed Matter Physics*. Experimental solid state, physical acoustics.

### Professor

**Bali**, Samir, Ph.D., University of Rochester, 1994. *Applied Physics, Atomic, Molecular, & Optical Physics*. Experimental quantum optics.

**Bayram**, S. Burcin, Ph.D., Old Dominion University, 1998. *Atomic, Molecular, & Optical Physics*. Experimental atomic and molecular spectroscopy, quantum optics.

**Blue**, Jennifer, Ph.D., University of Minnesota, 1997. *Physics and other Science Education*. Implementation of student-centered teaching; equity issues.

### Associate Professor

**Alexander**, Stephen, Ph.D., Pennsylvania State University, 1990. Chief Departmental Adviser. *Astrophysics, Computational Physics*. Planetary and galactic dynamics.

**Eid**, Khalid, Ph.D., Michigan State University, 2002. *Applied Physics, Condensed Matter Physics, Nano Science and Technology*. Magnetism; superconductors; and semiconductors.

**Urayama**, Paul, Ph.D., Princeton University, 2001. *Biophysics*. Metabolic sensing; piezophysiology; high-pressure biotechnology.

### Assistant Professor

**Khan**, Mahmud, Ph.D., Southern Illinois University, 2007. Graduate Director. *Condensed Matter Physics, Energy Sources & Environment*. Magnetism; materials for energy applications.

**Mirza**, Imran, Ph.D., University of Oregon, 2014. *Nano Science and Technology, Quantum Foundations*. Quantum Information Theory. Hybrid atom-cavity optomechanics; propagation of light in non-uniform media; waveguide and cavity quantum electrodynamics; optomechanics; super- and subradiance.

**Samson**, E. Carlo, Ph.D., University of Arizona, 2012. *Atomic, Molecular, & Optical Physics, Quantum Foundations*. Bose Einstein condensates; superfluidity and quantum vortices;

matter wave interferometry; quantum nonequilibrium dynamics.

**Vishwanath**, Karthik, Ph.D., University of Michigan, 2005. *Biophysics*. Theoretical and experimental approaches in quantitative spectroscopy of turbid materials; tissue optics; coherence-based optical sensing; opto-electronic device development.

#### Teaching Associate Professor

**Beer**, Christopher P., Ph.D., Ball State University, 2010. Society of Physics Students Advisor, Astronomy Club Adviser. *Physics and other Science Education*. Scale-up.

#### Teaching Assistant Professor

**Fabby**, Carol A., Ph.D., University of Cincinnati, 2019. *Physics and other Science Education*.

#### Visiting Assistant Professor

**Leu**, Bogdan, Ph.D., Northeastern University, 2006. *Nuclear Physics*. Inelastic X-ray scattering; nuclear resonance scattering.

### DEPARTMENTAL RESEARCH SPECIALTIES AND STAFF

#### Theoretical

Astrophysics. Simulations of the motion of stars in Dwarf Spheroidal Galaxies using an alternative to the dark matter paradigm, i.e. Modified Newtonian Dynamics (MOND). Alexander.

Quantum Optics & Quantum Information. Theoretical and computational modeling of light and matter for generating non-classical or entangled states of light and atoms. Mirza.

#### Experimental

Atomic, Molecular, & Optical Physics. Bose-Einstein condensation of dilute alkali gases, dynamics of quantum vortices in BECs and superfluidity, atom trapping with painted po-

tentials; Laser spectroscopy, time-resolved pump-probe spectroscopy, laser-induced fluorescence in molecules, quantum beat spectroscopy in atomic and molecular systems; dynamics of laser-cooled atoms in magneto-optical traps and optical lattices, electromagnetically induced transparency and absorption in atoms, optical sensing in highly turbid media. Bali, Bayram, Samson.

Biophysics. Monitoring and imaging of pressure effects on biomolecules and cellular physiology; novel label-free optical biosensing of surface ligand-analyte binding, monitoring and imaging of pressure effects on biomolecules and cellular physiology; in vivo optical biosensing, diffuse optics, low-cost instrumentation for use in remote or resource limited settings. Urayama, Vishwanath.

Condensed Matter Physics. Fabrication and characterization of nanoscale materials and devices using a variety of methods such as photo and electron beam lithography, photovoltaic and microfluidic applications, magnetoresistance in nanodevices at cryogenic temperatures, angular correlation spectroscopy of ceramic materials, positron annihilation lifetime spectroscopy, electronic and thermal properties of novel solid-state materials, magnetic and structural transitions, giant magnetoresistance, giant magnetocaloric effect, exchange bias effect, shape memory effects, and permanent magnetic materials. Eid, Jaeger, Khan.

Physical Acoustics. Measurement and numerical modeling of acoustic impedance of simple and complex air columns. Jaeger.

Physics and other Science Education. Strategies for teaching scientific reasoning and problem-solving skills in introductory physics classes; elementary school and K-12 science education. Beer, Blue, Fabby.

Quantum Optics & Quantum Information. Dynamics of laser-cooled atoms in optical lattices via single-photon correlation measurement; Quantum coherence studies using Bose-Einstein condensates. Bali, Samson.

**View additional information about this department at [www.gradschoolshopper.com](http://www.gradschoolshopper.com). Check out the “Why Choose Us?” section, find out more about the department’s culture and get links to social media networks.**