

# PHYSICS, MA

## DEPARTMENT OVERVIEW

The Department of Physics has a strong tradition of graduate study and research in astrophysics; atomic, molecular, and optical physics; condensed matter physics; high energy and particle physics; plasma physics; quantum computing; and string theory. There are many facilities for carrying out world-class research (<https://www.physics.wisc.edu/research/areas/>). We have a large professional staff: 45 full-time faculty (<https://www.physics.wisc.edu/people/staff/>) members, affiliated faculty members holding joint appointments with other departments, senior scientists, and postdocs. There are over 175 graduate students in the department who come from many countries around the world. More complete information on the graduate program, the faculty, and research groups is available at the department website (<http://www.physics.wisc.edu>).

Research specialties include:

### THEORETICAL PHYSICS

Astrophysics; atomic, molecular, and optical physics; condensed matter physics; cosmology; elementary particle physics; nuclear physics; phenomenology; plasmas and fusion; quantum computing; statistical and thermal physics; string theory.

### EXPERIMENTAL PHYSICS

Astrophysics; atomic, molecular, and optical physics; biophysics; condensed matter physics; cosmology; elementary particle physics; neutrino physics; experimental studies of superconductors; medical physics; nuclear physics; plasma physics; quantum computing; spectroscopy.

## MA DEGREE DETAILS

The master of arts degree is a purely academic degree, requiring graduate course work and passage of the qualifying examination at the master's level. It is designed to strengthen the student's physics background and enhance the opportunities for employment as a physicist or in physics education.

## ADMISSIONS

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This master's program is offered for work leading to the PhD. Students may not apply directly for the master's, and should instead see the admissions information for the PhD. (<http://guide.wisc.edu/graduate/physics/physics-phd/>)

## FUNDING

### FUNDING GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (<https://grad.wisc.edu/funding/>) is available from the Graduate School.

Be sure to check with your program for individual policies and processes related to funding.

## REQUIREMENTS

### MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (<http://guide.wisc.edu/graduate/#policiesandrequirements>), in addition to the program requirements listed below.

### MAJOR REQUIREMENTS MODE OF INSTRUCTION

Face to Face	Evening/ Weekend	Online	Hybrid	Accelerated
Yes	No	No	No	No

#### Mode of Instruction Definitions

**Accelerated:** Accelerated programs are offered at a fast pace that condenses the time to completion. Students typically take enough credits aimed at completing the program in a year or two.

**Evening/Weekend:** Courses meet on the UW–Madison campus only in evenings and/or on weekends to accommodate typical business schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.

**Face-to-Face:** Courses typically meet during weekdays on the UW–Madison Campus.

**Hybrid:** These programs combine face-to-face and online learning formats. Contact the program for more specific information.

**Online:** These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.

### CURRICULAR REQUIREMENTS

Requirement Detail	
Minimum Credit Requirement	30 credits
Minimum Residence Credit Requirement	16 credits
Minimum Graduate Coursework Requirement	15 credits must be graduate-level coursework. Refer to the Graduate School: Minimum Graduate Coursework (50%) Requirement policy: <a href="https://policy.wisc.edu/library/UW-1244">https://policy.wisc.edu/library/UW-1244</a> ( <a href="https://policy.wisc.edu/library/UW-1244/">https://policy.wisc.edu/library/UW-1244/</a> ).
Overall Graduate GPA Requirement	3.00 GPA required. Refer to the Graduate School: Grade Point Average (GPA) Requirement policy: <a href="https://policy.wisc.edu/library/UW-1203">https://policy.wisc.edu/library/UW-1203</a> ( <a href="https://policy.wisc.edu/library/UW-1203/">https://policy.wisc.edu/library/UW-1203/</a> ).
Other Grade Requirements	n/a

**Assessments and Examinations** All master of arts degree candidates must pass the qualifying examination at the master's level.

**Language Requirements** Contact the program for information on any language requirements.

## REQUIRED COURSES

All graduate degree candidates are required to take five core courses:

Code	Title	Credits
<b>Required Core</b>		
PHYSICS 711	Theoretical Physics–Dynamics	3
PHYSICS 715	Statistical Mechanics	3
PHYSICS 721	Theoretical Physics–Electrodynamics	3
PHYSICS 731	Quantum Mechanics	3
PHYSICS 732	Quantum Mechanics	3
<b>Additional Coursework</b>		<b>15</b>
The remaining credits may be earned through a combination of coursework, directed study, and research, to be determined by the advisor in consultation with the student. Courses numbered 300 to 399 cannot fulfill any degree coursework requirements.		
<b>Total Credits</b>		<b>30</b>

## POLICIES

### GRADUATE SCHOOL POLICIES

The Graduate School's Academic Policies and Procedures (<https://grad.wisc.edu/acadpolicy/>) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

### MAJOR-SPECIFIC POLICIES

#### PRIOR COURSEWORK

##### Graduate Credits Earned at Other Institutions

Refer to the Graduate School: Transfer Credits for Prior Coursework (<https://policy.wisc.edu/library/UW-1216/>) policy.

##### Undergraduate Credits Earned at Other Institutions or UW–Madison

Up to 7 credits in courses numbered 500 or above may be used to satisfy minimum degree requirements.

##### Credits Earned as a Professional Student at UW–Madison (Law, Medicine, Pharmacy, and Veterinary careers)

Refer to the Graduate School: Transfer Credits for Prior Coursework (<https://policy.wisc.edu/library/UW-1216/>) policy.

##### Credits Earned as a University Special Student at UW–Madison

With program approval, students are allowed to transfer no more than 15 credits of coursework numbered 500 or above taken as a UW–Madison

University Special student. Coursework earned ten or more years prior to admission to a master's degree is not allowed to satisfy requirements.

### PROBATION

Grade of B or better in all coursework and a minimum cumulative graduate GPA of 3.0 are required.

### ADVISOR / COMMITTEE

The director of graduate studies (DGS) serves as the academic advisor to all master of arts degree candidates. The DGS will meet regularly with the master's candidate to monitor progress toward the degree.

### CREDITS PER TERM ALLOWED

15 credits

### TIME LIMITS

n/a

### GRIEVANCES AND APPEALS

These resources may be helpful in addressing your concerns:

- Bias or Hate Reporting (<https://doso.students.wisc.edu/bias-or-hate-reporting/>)
- Graduate Assistantship Policies and Procedures (<https://hr.wisc.edu/policies/gapp/#grievance-procedure>)
- Hostile and Intimidating Behavior Policies and Procedures (<https://hr.wisc.edu/hib/>)
  - Office of the Provost for Faculty and Staff Affairs (<https://facstaff.provost.wisc.edu/>)
- Employee Assistance (<http://www.eao.wisc.edu/>) (for personal counseling and workplace consultation around communication and conflict involving graduate assistants and other employees, post-doctoral students, faculty and staff)
- Employee Disability Resource Office (<https://employeedisabilities.wisc.edu/>) (for qualified employees or applicants with disabilities to have equal employment opportunities)
- Graduate School (<https://grad.wisc.edu/>) (for informal advice at any level of review and for official appeals of program/departmental or school/college grievance decisions)
- Office of Compliance (<https://compliance.wisc.edu/>) (for class harassment and discrimination, including sexual harassment and sexual violence)
- Office Student Assistance and Support (OSAS) (<https://osas.wisc.edu/>) (for all students to seek grievance assistance and support)
- Office of Student Conduct and Community Standards (<https://conduct.students.wisc.edu/>) (for conflicts involving students)
- Ombuds Office for Faculty and Staff (<http://www.ombuds.wisc.edu/>) (for employed graduate students and post-docs, as well as faculty and staff)
- Title IX (<https://compliance.wisc.edu/titleix/>) (for concerns about discrimination)

Students should contact the department chair or program director with questions about grievances. They may also contact the L&S Academic Divisional Associate Deans, the L&S Associate Dean for Teaching and Learning Administration, or the L&S Director of Human Resources.

## OTHER

n/a

## PROFESSIONAL DEVELOPMENT

### PROFESSIONAL DEVELOPMENT GRADUATE SCHOOL RESOURCES

Take advantage of the Graduate School's professional development resources (<https://grad.wisc.edu/pd/>) to build skills, thrive academically, and launch your career.

### PROGRAM RESOURCES

Students are encouraged to attend Graduate School sponsored Professional Development events and participate in Graduate School Professional Development resources, such as the Individual Development Plan (IDP).

## LEARNING OUTCOMES

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1. Mastery of the core physical concepts (classical mechanics, electricity and magnetism, quantum mechanics, and statistical mechanics).
2. Articulates, critiques, or elaborates the theories, research methods, and approaches to inquiry or schools of practice in physics.
3. Evaluates or synthesizes information pertaining to questions or challenges in physics.
4. Gains rudimentary awareness of physics research execution.
5. Communicates clearly in ways appropriate to the field of physics.

## PEOPLE

### PEOPLE FACULTY

More detail about each faculty member (<https://www.physics.wisc.edu/people/faculty/>) and the research areas (<https://www.physics.wisc.edu/research/areas/>) can be found on the Physics website.

Yang Bai, Professor  
 Baha Balantekin, Eugene P. Wigner Professor  
 Vernon Barger, Van Vleck Professor and Vilas Research Professor  
 Keith Bechtol, Associate Professor  
 Kevin Black, Professor  
 Stanislav Boldyrev, Professor  
 Uwe Bergmann, Martin L. Pearl Professor in Ultrafast X-Ray Science  
 Tulika Bose, Professor  
 Victor Brar, Van Vleck Associate Professor  
 Duncan Carlsmith, Professor  
 Daniel Chung, Professor  
 Susan Coppersmith, Emeritus Robert E. Fasnacht Professor and Vilas Research Professor  
 Kyle Cranmer, Professor & Data Science Institute Director  
 Sridhara Dasu, Professor  
 Jan Egedal, Professor  
 Mark Eriksson, John Bardeen Professor and Department Chair  
 Ilya Esterlis, Assistant Professor  
 Lisa Everett, Professor

Ke Fang, Assistant Professor  
 Cary Forest, Prager Professor of Experimental Physics  
 Pupa Gilbert, Vilas Distinguished Achievement Professor  
 Francis Halzen, Gregory Breit Professor, Hilldale Professor, & Vilas Research Professor  
 Kael Hanson, Professor  
 Aki Hashimoto, Professor  
 Matthew Herndon, Professor  
 Robert Joynt, Emeritus Professor  
 Albrecht Karle, Professor  
 Roman Kuzmin, Dunson Cheng Assistant Professor  
 Alex Levchenko, Professor  
 Lu Lyu (aka Lu Lu), Assistant Professor  
 Dan McCammon, Professor  
 Robert McDermott, Professor  
 Moritz Muenchmeyer, Assistant Professor  
 Yibin Pan, Associate Professor  
 Brian Rebel, Professor  
 Mark Rzchowski, Associate Chair and Professor  
 Mark Saffman, Professor  
 John Sarff, Professor  
 Gary Shiu, Professor  
 Paul Terry, Professor  
 Peter Timbie, Professor  
 Justin Vandenbroucke, Associate Professor  
 Maxim Vavilov, Professor  
 Thad Walker, Vilas Distinguished Achievement Professor  
 Sau Lan Wu, Enrico Fermi Professor, Hilldale Professor, and Vilas Research Professor  
 Deniz Yavuz, Professor  
 Ellen Zweibel, William L. Kraushaar Professor of Astronomy & Physics

### AFFILIATED FACULTY

David Anderson, Professor, Electrical & Computer Engineering  
 Paul Campagnola, Professor, Biomedical Engineering  
 Jennifer Choy, Assistant Professor, Engineering Physics  
 Elena D'Onghia, Professor, Astronomy  
 Chang-Beom Eom, Professor, Materials Science & Engineering  
 Chris Hegna, Professor, Engineering Physics  
 Sebastian Heinz, Professor, Astronomy  
 Mikhail Kats, Associate Professor, Electrical & Computer Engineering  
 Jason Kawasaki, Associate Professor, Materials Science & Engineering  
 Irena Knezevic, Professor, Electrical & Computer Engineering  
 Alexandre Lazarian, Professor, Astronomy  
 Daniel Rhodes, Assistant Professor, Materials Science & Engineering  
 Oliver Schmitz, Professor, Engineering Physics  
 Micheline Soley, Assistant Professor, Chemistry  
 Carl Sovinec, Professor, Engineering Physics  
 Richard Townsend, Professor, Astronomy  
 Ying Wang, Assistant Professor, Materials Science & Engineering  
 Jun Xiao, Assistant Professor, Materials Science & Engineering