PHYSICS, M.A.

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.

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

FUNDING
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/#policiesandrequirementstext), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

<table>
<thead>
<tr>
<th>Mode of Instruction Definitions</th>
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<tbody>
<tr>
<td>Accelerated: Accelerated programs are offered at a fast pace that condenses the time to completion. Students are able to complete a program with minimal disruptions to careers and other commitments.</td>
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<tr>
<td>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.</td>
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<tr>
<td>Face-to-Face: Courses typically meet during weekdays on the UW-Madison Campus.</td>
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<tr>
<td>Hybrid: These programs combine face-to-face and online learning formats. Contact the program for more specific information.</td>
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<tr>
<td>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.</td>
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CURRICULAR REQUIREMENTS

<table>
<thead>
<tr>
<th>Requirements Detail</th>
<th>Minimum Credit Requirement</th>
<th>Minimum Residence Credit Requirement</th>
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</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>30 credits</td>
<td>30 credits</td>
</tr>
<tr>
<td>Credit Requirement</td>
<td></td>
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<tr>
<td>Graduation Coursework</td>
<td>Half of degree coursework (15 credits out of 30 total credits) must be completed graduate-level coursework; courses with the Graduate Level Coursework attribute are identified and searchable in the university’s Course Guide (<a href="https://registrar.wisc.edu/course-guide/">https://registrar.wisc.edu/course-guide/</a>). No 300-level courses will be counted toward the 30 credit minimum.</td>
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<tr>
<td>Overall</td>
<td>3.00 GPA required.</td>
<td></td>
</tr>
<tr>
<td>Graduate GPA</td>
<td>3.00 GPA required.</td>
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<tr>
<td>Requirement</td>
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<tr>
<td>Other Grade</td>
<td>The Graduate School requires an average grade of B or better in all coursework (300 or above, not including research credits) taken as a graduate student unless conditions for probationary status require higher grades. Grades of Incomplete are considered to be unsatisfactory if they are not removed during the next enrolled semester.</td>
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</table>
Assessments: All master of arts degree candidates must pass the qualifying examination at the master’s level.

Language: Contact the program for information on any language requirements.

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>PHYSICS 711</td>
<td>Theoretical Physics-Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>PHYSICS 715</td>
<td>Statistical Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYSICS 721</td>
<td>Theoretical Physics-Electrodynamics</td>
<td>3</td>
</tr>
<tr>
<td>PHYSICS 731</td>
<td>Quantum Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>PHYSICS 732</td>
<td>Quantum Mechanics</td>
<td>3</td>
</tr>
</tbody>
</table>

The remaining 15 credits may be earned through a combination of coursework, directed study, and research, to be determined by the advisor in consultation with the student.

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 Work from Other Institutions
Prior coursework from other institutions may count toward any graduate degree in physics as allowed by the Graduate School policy on prior coursework.

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

UW–Madison University Special
With program approval and payment of difference in tuition (between Special and graduate tuition), students are allowed to count no more than 15 credits of coursework numbered 500 or above taken as a UW–Madison University Special student. Coursework earned five 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 CONSTRAINTS
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/)
- Dean of Students Office (https://doso.students.wisc.edu/) (for all students to seek grievance assistance and support)
- 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 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

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 restrictions related to funding.

**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**

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**

**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, Associate Professor  
Baha Balantekin, Eugene P. Wigner Professor  
Vernon Barger, Vilas Professor and Van Vleck Professor  
Keith Bechtol, Assistant 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 Assistant Professor  
Duncan Carlsmith, Professor  
Daniel Chung, Professor  
Susan Coppersmith, Robert E. Fassnacht Professor and Vilas Professor  
Sridhara Dasu, Department Chair & Professor  
Jan Egedal, Professor  
Mark Eriksson, John Bardeen Professor  
Lisa Everett, Professor  
Ke Fang, Assistant Professor  
Gary Forest, Prager Professor of Experimental Physics  
Pupa Gilbert, Vilas Distinguished Achievement Professor  
Francis Halzen, Gregory Breit Professor and Hilldale Professor  
Kael Hanson, Professor, WIPAC Director  
Aki Hashimoto, Professor  
Matthew Herndon, Professor  
Lev Ioffe, Honorary Associate  
Robert Joynt, Professor  
Albrecht Karle, Professor  
Shimon Kolkowitz, Assistant Professor  
James Lawler, Arthur and Aurelia Schawlow Professor  
Alex Levchenko, Professor  
Lu Lu, Assistant Professor  

Dan McCammon, Professor  
Robert McDermott, Professor  
Moritz Muenchmeyer, Assistant Professor  
Marshall Onellion, Professor  
Kimberly Palladino, Assistant Professor  
Yibin Pan, Associate Professor  
Jeff Parker, Assistant Professor  
Brian Rebel, Associate 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, Professor  
Sau Lan Wu, Enrico Fermi Professor and Vilas 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’Ongchia, Associate 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, Assistant Professor, Materials Science & Engineering  
Alexandre Lazarian, Professor, Astronomy  
Oliver Schmitz, Professor, Engineering Physics  
Carl Sovinec, Professor, Engineering Physics