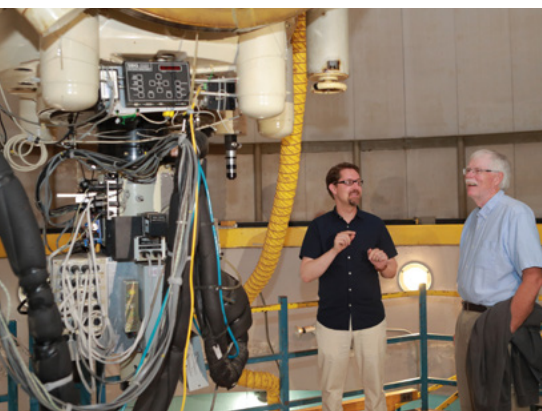




Ph.D. DEGREE PHYSICS

Astronomy/Astrophysics Concentration



The doctoral degree in physics prepares students to enter research careers in academic, government and industrial settings. Non-research careers in a variety of areas, including public policy, science communication, intellectual property law and science education, are also possible.

UToledo graduate programs in Physics and Astronomy develop a strong and broad foundation in physics, while simultaneously teaching the computational, data analysis and problem-solving skills necessary to advance knowledge of our physical world. Coursework is tailored to your specific area of research concentration, with flexibility, so you acquire the skills necessary to complete an innovative, important and original thesis research project.

UToledo boasts nationally and internationally recognized faculty members in physics and astronomy. Students in our Ph.D. in Physics with Astronomy/Astrophysics concentration must satisfactorily complete the core physics courses and pass the physics qualifying and comprehensive exams. Ph.D. students in physics spend most of their time conducting research to complete their thesis and are expected to publish several papers in peer-reviewed journals and present at conferences.

Physics Ph.D./Astronomy or Astrophysics Degree Highlights:

- **Financial support.** Graduate physics students are supported through teaching and research assistantships. We also offer incentive and stipend enhancements for exceptionally qualified applicants, one example is the Spitzer Fellowship.
- **High-tech labs and research facilities.** Toledo physics graduate students have access to: an on-campus, one-meter reflecting telescope with dedicated spectrographs; full access to the Lowell Discovery Telescope in Arizona through UToledo's partnership with Lowell Observatory; several parallel computing clusters, as well as access to the Ohio Supercomputer Center; the Toledo Heavy Ion Accelerator (THIA); radiation and diagnostic equipment to perform research in medical physics; and state-of-the-art equipment in the Wright Center for Photovoltaics Innovation and Commercialization.
- **Research opportunities.** Faculty and students in UToledo's Ph.D. in Physics with Astronomy/Astrophysics concentration work closely together to conduct world-class research. Our primary areas of research include: disks and planet formation; extragalactic astronomy; interstellar gas; interstellar dust; stellar atmosphere theory; stellar spectroscopy/polarimetry; and galactic star formation.

PROGRAM OVERVIEW

Ph.D. Degree in Physics with Astronomy/Astrophysics Concentration

The doctoral degree in physics is awarded to a student who has demonstrated mastery in the field of physics and a distinct and superior ability to make substantial contributions to the field. The quality of work and the resourcefulness of the student must be such that the faculty can expect a continuing effort toward the advancement of knowledge and significant achievement in research and related activities. Publication of research in peer-reviewed journals is expected.

This degree provides a foundation in physics while preparing students for a career in astronomy and astrophysics. A strong training may be expected in research methodologies and practices, rigorous hypothesis-driven scientific investigation and the dissemination of research results and ideas through scholarly article publication as well as presentation at conferences, other universities and research settings. In general, work for the Ph.D. takes five years of study beyond the bachelor's degree.

A substantial portion of this time is spent in independent research leading to a dissertation. Normally, 90 credit hours of study beyond the bachelor's degree are required for the Ph.D. Students may opt to get a M.S. degree during their Ph.D. program.

To fulfill the requirement of 18 hours of credit in physics courses numbered above 6100, the concentration requires:

- **PHYS 6/7810-6/7820** (Stellar Astrophysics I and II) and **PHYS 6/7830-6/7840** (Galactic Astronomy I and II) - **12 hrs.**
- Two related elective courses: **PHYS 6/7710** (Atomic Physics), **PHYS 6/7720** (Atomic and Molecular Spectroscopy), **PHYS 8860** (General Relativity), **PHYS 8870** (Cosmology) or other appropriate courses - **6 hrs.**
- One of the following: **PHYS 6980** or **8980** (Special Topics - on an astrophysics-related topic) - **3 hrs.**
- A satisfactory dissertation in astronomy or astrophysics with a supervisor who is a member of the [Ritter Astrophysical Research Center](#)

We encourage you to contact individual faculty members directly to discuss research interests and opportunities.

Faculty contact information is available at: utoledo.edu/nsm/astro/people

Faculty Member	Area(s) of Research
Anderson-Huang, Lawrence	Theory of stellar atmosphere
Bjorkman, Jon	Theory of stellar winds and disks, radiation transfer and simulations
Bjorkman, Karen	Circumstellar disks, polarimetry and stellar winds
Chandar, Rupali	Stellar populations, star and galaxy formation and evolution
Cushing, Michael	Low-mass stars and brown dwarfs
Federman, Steven	Interstellar matter
Medling, Anne	Black hole growth and feedback
Megeath, S. Thomas	Planet and star formation
Smith, J.D.	Infrared and extragalactic astronomy
Visbal, Elijah	Galaxy evolution and cosmology theory/simulations
Witt, Adolf	Interstellar matter and spectrography of nanoparticles

What to expect when you graduate ...

Graduates of UToledo's Ph.D. program in physics typically advance to postdoc programs or take jobs in industry.

Alumni of UToledo's graduate program in physics with astronomy/astrophysics concentration have landed positions at institutions such as: Apache Point Observatory, Eureka Scientific, Lowell Observatory, Malin Space Science Systems, NASA, Ohio State University, Rensselaer Polytechnic Institute, Space Telescope Science Institute, University of Washington, U.S. Patent & Trademark Office and many others.

Admission requirements, guidelines, and application information can be found at: utoledo.edu/graduate/apply.

If you have questions about the application process, contact 419.530.4723 or graduateonlineapplication@utoledo.edu.