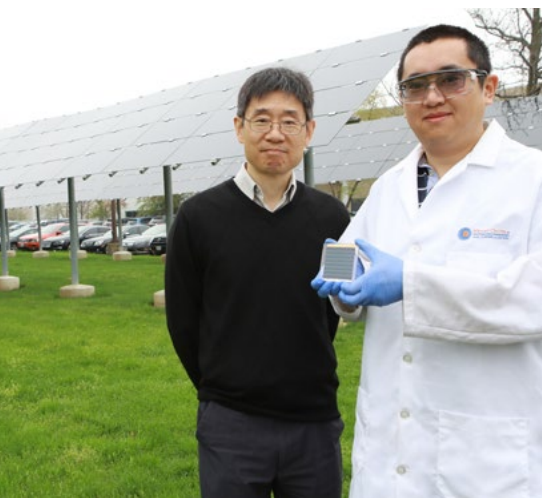




# MASTER OF SCIENCE PHYSICS



*The University of Toledo graduate programs in the Department of Physics and Astronomy aim to develop exceptional personal and professional scientific skills, and engage students in cutting edge research with a world-class faculty, all within a supportive and creative learning environment.*

UToledo graduate programs in Physics and Astronomy develop a strong and broad foundation in fundamental physics, while simultaneously teaching the mathematical 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. Our graduate program is designed for students interested in conducting research in: astronomy and astrophysics; atomic physics; biophysics and medical physics; condensed matter, computational materials science and photovoltaics; and photonics and non-linear optics.

## Physics Graduate 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.
- **International reputation in photovoltaics.** Toledo and the State of Ohio have a long history of success in the photovoltaics industry. That history, along with The University of Toledo's expertise in PV science and technology, led to the creation of the [Wright Center for Photovoltaics Innovation and Commercialization](#).
- **High-tech labs and research facilities.** UToledo physics graduate students have access to: state-of-the-art equipment in the Wright Center for Photovoltaics Innovation and Commercialization; 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 Cluster; radiation and diagnostic equipment to perform research in medical physics; and the Toledo Heavy Ion Accelerator (THIA).
- **Research opportunities.** Faculty and students in UToledo's Department of Physics and Astronomy work closely to conduct world-class research. Our primary areas of strength are in: atomic, molecular and optical physics; condensed matter/materials science and photovoltaics; astronomy and astrophysics; biological physics; and medical physics (with strong ties to the UToledo College of Medicine and Life Sciences).

# PROGRAM OVERVIEW

## Master of Science in Physics

For the M.S. in physics degree a student must complete at least 30 hours of graduate credit including the following:

- PHYS 6140 (Fundamentals of Modern Physics).
- An additional 15 hours of graduate course credit in physics, with six of the 15 hours numbered above 6000. Credit in PHYS 5900 (Research Techniques), 6010 (Colloquium) and/or 6020 (Journal Seminar) will not count toward the degree.
- A satisfactory thesis based on directed research for no more than eight hours of degree credit.
- Additional hours to complete the 30 total required hours will be chosen from any courses approved for graduate credit not previously elected, with the approval of the student's committee.

In some cases, students working toward the Ph.D. may earn the M.S. without formal presentation of the M.S. thesis if they have: (1) passed the Ph.D. Qualifying Examination; (2) satisfied the course requirements for the M.S.; and (3) completed a research project under the supervision of a research advisor, resulting in acceptance for publication of a peer-reviewed research paper with the student as its first author. A substantial paper mainly written by the student is an acceptable substitution for a thesis and the peer review process substitutes for a thesis defense. Students meeting the above requirements may petition the department to grant the M.S. without formal presentation of a thesis.

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

Faculty contact information is available at: [utoledo.edu/nsm/physast/research](http://utoledo.edu/nsm/physast/research)

### Faculty Member

### Area(s) of Research

Amar, Jacques .....	Theoretical condensed matter physics, materials science and surface physics
Anderson-Huang, Lawrence .	Astrophysics, theory of stellar atmosphere
Bjorkman, Jon .....	Astrophysics, 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
Cheng, Song .....	Ion-atom and molecule collisions
Collins, Robert .....	Condensed matter physics, optical properties of solids and thin solid films
Cushing, Michael .....	Astrophysics, low-mass stars and brown dwarfs
Deng, Xunming.....	Materials science, thin films and photovoltaics
Ellingson, Randall .....	Ultrafast laser spectroscopy, photophysics of semiconductor nanocrystals and nanocrystalline films
Federman, Steven .....	Interstellar matter
Gao, Bo .....	Light-atom interactions, Bose-Einstein condensation and many-body interactions
Heben, Michael .....	Nanoscience, materials for energy conversion and storage
Irving, Richard .....	Atomic physics
Karpov, Victor .....	Theoretical condensed matter physics and photovoltaics
Khare, Sanjay .....	Theoretical condensed matter physics and materials science
Lee, Scott .....	Biophysics and high-pressure physics
Medling, Anne .....	Black hole growth and feedback
Medling, Scott .....	X-ray absorption spectroscopy
Megeath, S. Thomas .....	Planet and star formation
Ray, Aniruddha .....	Utilizing nanotechnology and optical imaging for biophysical and medical applications
Podraza, Nikolas .....	Condensed matter and photovoltaics
Smith, J.D. ....	Infrared and extragalactic astronomy
Visbal, Elijah .....	Cosmology simulations
Yan, Yanfa.....	Materials science, condensed matter and photovoltaics

## What to expect when you graduate ...

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

Alumni of UToledo's graduate programs in physics have landed positions at institutions such as: University of Chicago, Baker College, Rensselaer Polytechnic Institute, Ohio State University, Pacific Northwest National Laboratory, NASA, Intel Corporation, Boeing Company and the Raytheon Company.

Admission requirements, guidelines and application information can be found at: [utoledo.edu/graduate/apply](http://utoledo.edu/graduate/apply).

If you have questions about the application process, contact 419.530.4723 or [graduateonlineapplication@utoledo.edu](mailto:graduateonlineapplication@utoledo.edu).