Physics, Applied Physics, and Astronomy

Physics is the source of new concepts about the nature of the universe and is a driving force for new technologies. The fundamental physics research of one generation often leads to the applied physics and technology of the next. Rensselaer's graduate program in physics conducts both fundamental and applied research, in collaboration with researchers from other departments, other universities, industry, or national laboratories.

DEGREES OFFERED

Applied Physics B.S.
Astronomy M.S.
Multidisciplinary Science M.S., Ph.D.
Physics B.S., M.S., Ph.D.

MAJOR RESEARCH AREAS

Astronomy and Astrophysics
Computational astronomy, galactic structure and evolution, large astronomical surveys, dark matter.

Energy Research
Energy harvesting, conversion and transfer, solid-state lighting, complex systems and networks.

Nanoscience and Nanomaterials
Nanoelectronics, Nanophotonics, nanostructures, nano-bio interfaces.

Particle Physics
Direct detection of dark matter, lattice field theory, neutrinoless double beta decay.

Optical Physics
Plasmonic structures, light-matter interaction, terahertz spectroscopy, quantum optics and photon entanglement.

Condensed Matter and Statistical Physics
Molecular electronics, quantum molecular dynamics, semiconductor materials and devices, thin film morphologies and transport, low-dimensional systems, complex systems and networks.

AFFILIATED RESEARCH CENTERS

These centers provide students access to state-of-the-art facilities, including supercomputers, a class 2100 microfabrication clean room, thin film deposition laboratories, and scanning probe microscopy laboratories.

- Center for Biotechnology and Interdisciplinary Studies
- Center for Materials, Devices, and Integrated Systems
- Center for Computational Innovations
- New York Interconnect Focus Center
- NSF Smart Lighting Engineering Research Center
- Network Science and Technology Center

Quick Facts

Location
The 275-acre Rensselaer campus is located on a hill in a beautiful park-like setting, with a striking combination of traditional ivy-colored buildings and modern facilities. The campus overlooks historic downtown Troy, New York, which is located on the upper Hudson River.

Research Highlights
- 6 affiliated research centers
- 1 research constellation

Faculty
- 22 faculty members
- 7 chaired professors
- 8 APS Fellows
- 5 AAAS Fellows
- 3 MRS Fellows
- 2 AVS Fellows
- 2 IEEE Fellows

For general inquiries, information, or questions, contact:
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Physics, Applied Physics, and Astronomy

**PROFESSOR**

**Shirley Ann Jackson**  
NAE, President

**Gyorgy Korniss**  
Statistical physics, complex systems, and networks; Synchronization and extreme fluctuations in interconnected systems; Social dynamics; Transport, flow, and cascading failures in complex networks; Collaborations at the Network Science and Technology Center (NeST).

**Shengbai Zhang**  
First-principles structural and electronic properties of a broad range of solid-state materials from crystalline, amorphous semiconductors, metals, to various nanostructures.

**ASSOCIATE PROFESSOR**

**Joel Giedt**  
Associate Department Head
Study of strongly interacting systems beyond the Standard Model of particle physics using lattice gauge theory methods, including supersymmetric gauge theories and models of compositeness at high scales.

**Ingrid Wilke**  

**ASSISTANT PROFESSOR**

**Ethan Brown**  
Dark matter direct detection (XENON), neutrinoless double beta decay (nEXO), novel rare event detectors, experimental particle physics.

**Peter Persans**  
Development and mentoring, and professional development programs for students.

**John Schroeder**  
Glass and nanoparticle physics; cataract studies in human lenses.

**Christian Wetzel**  
Electronic band and defect structure of wide band gap semiconductor materials and devices for energy efficiency by means of epitaxy and optical spectroscopy. This work supports the Smart Lighting Engineering Research Center.

**Moussa N’Gom**  
Quantum optics and wavefront structured light fields to develop new tools for light-matter interaction for imaging and to address the core problem of photon entanglement degradation.

**Esther Wertz**  
Light-matter interactions of single molecules with plasmonic nanostructures, super-resolution microscopy.

**AFFILIATED FACULTY**

**Vidhya Chakrapani**  
Assistant Professor of Chemical and Biological Engineering
Semiconductor electrochemistry, advanced materials, quantum dot solar cells.

**Ravishankar Sundaraman**  
Assistant Professor of Materials Science and Engineering
Computational material science, electronic properties, nanomaterials.

**Boleslaw Szymanski**  
Professor of Computer Science
Network science, social networks, complex systems.

To apply, learn more at admissions.rpi.edu/graduate