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 the national laboratories.

The Department of Physics, Applied Physics, and Astronomy prepares students to contribute to new concepts and technologies through innovative teaching methods that combine student-faculty interactions, computer-based education, and “hands-on” experience in modern 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

In all areas of research, problems are addressed using computational techniques. One-third of our faculty members conduct computationally driven research programs.

Astronomy and Astrophysics
- Astrobiology
- Chemistry of interstellar dust
- Galactic structure and evolution
- Magnetohydrodynamics

Biological Physics
- Complex systems and networks
- Protein folding and dynamics

Energy Research
- Energy harvesting, conversion and transfer
- Solid-state lighting

Particle Physics
- Lattice field theory
- Neutrino experiments

Optical Physics
- Plasmonic structures
- Terahertz spectroscopy

Condensed Matter Physics
- Complex systems
- Molecular electronics
- Quantum molecular dynamics
- Semiconductor materials and devices
- Thin film morphologies and transport

AFFILIATED RESEARCH CENTERS

These centers provide students access to state-of-the-art facilities, including supercomputers, a class 100 microfabrication clean room, thin film deposition laboratories, and scanning probe microscopy laboratories.

- Center for Biotechnology and Interdisciplinary Studies
- Center for Integrated Electronics
- Center for Computational Innovations
- New York Center for Astrobiology
- New York Interconnect Focus Center
- NSF Smart Lighting Engineering Research Center

For general inquiries, information, or questions, contact:

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(518) 276-839
gradphysics@rpi.edu

rpi.edu/dept/phys
Physics, Applied Physics, and Astronomy

**Faculty and Research Areas**

**PROFESSOR**

**Angel García**
Department Head; Senior Constellation Chaired Professor in Biocomputation and Bioinformatics
Theoretical and computational aspects of the structure, dynamics, and stability of biological molecules.

**Shirley Ann Jackson**
NAE, President

**György Korniss**
Complex systems; social dynamics; transport, flow, and cascading failures in complex networks; population dynamics and ecological invasion.

**Shawn-Yu Lin**
Constellation Professor in Future Chips
Photonic crystals, plasmonics, nano and silicon photonics, solid state lighting, solar energy applications.

**Toh-Ming Lu**
R.P. Baker Distinguished Professor of Physics
Materials physics, thin film morphology and texture, nanostructures for energy and electronics applications.

**Vincent Meunier**
Gail and Jeffrey L. Kodosky ’70 Constellation Professor of Physics, Information Technology, and Entrepreneurship
Theory, modeling, and computer simulation in nanoscience, including energy storage, electronic transport properties and materials.

**James Napolitano**
Experimental nuclear and particle physics; scientific computation.

**Saroj Nayak**
Study of atomic and electronic structures of matters.

**Heidi Jo Newberg**
Structure and dark matter distribution of the Milky Way galaxy, using MilkyWay@home, SDSS, and LAMOST.

**Peter Persans**
Department Associate Head
Optical and structural properties of amorphous, nanocrystalline, and quantum dot semiconductor materials.

**Wayne Roberge**
Astrobiology, multifluid magnetohydrodynamics, interstellar shock waves; physics of dusty plasmas.

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

**Michael Shur**
Patricia W. and C. Sheldon Roberts ’48 Professor of Solid State Electronics
THz electronics, physics of semiconductor materials and devices, color rendition; deep ultraviolet light emitting diodes.

**Paul Stoler**
Properties of hadrons; neutrino physics.

**Humberto Terrones**
Rayleight Endowed Chair in Theoretical Condensed Matter Physics
Physics and chemistry of nanostructures, in particular, carbon-based nanostructures.

**Douglas Whittet**
Director, New York Center for Astrobiology
Composition and evolution of interstellar matter; organic inventories of protoplanetary disks; infrared astronomy; astrobiology.

**Shengbai Zhang**
Gail and Jeffrey L. Kodosky ’70 Senior Constellation Professor of Physics, Information Technology, and Entrepreneurship
First-principles theory of structures, dynamics, defect properties of condensed matter, layered structures, and topological insulators.

**ASSOCIATE PROFESSOR**

**Joel Giedt**
Lattice field theory beyond the standard model; phenomenology of warped string compactifications.

**Kim Michelle Lewis**
Investigations of electron transport in molecules and nanostructures.

**Ingrid Wilke**
Ultrafast and THz spectroscopy, sources and detectors of THz radiation.

**Masashi Yamaguchi**
Structural and electronic dynamics in condensed matter; nonlinear THz and picosecond acoustic spectroscopy of nanomaterials.

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