General University Information

Chancellor: Kent Syverud
Dean of Graduate School: Peter Vanable
University website: http://www.syr.edu
School Type: Private
Setting: Urban
Total Faculty: 1,757
Total Graduate Faculty: 1,757
Total number of Students: 21,970
Total number of Graduate Students: 6,752

Department Information

Department Chairman: Prof. Eric A. Schiff, Chair
Department Contact: Physics Main Office Staff, Physics Main Office Staff
Total full-time faculty: 29
Total number of full-time equivalent positions: 28
Full-Time Graduate Students: 78
Female Full-Time Graduate Students: 15
First-Year Graduate Students: 18
Female First-Year Students: 3
Total Post Doctorates: 20

Department Address
201 Physics Building
Syracuse, NY 13244-1130
Phone: (315) 443-3901
Fax: (315) 443-9103
E-mail: phyadmin@syr.edu
Website: http://physics.syr.edu/

ADMISSIONS

Admission Contact Information
Address admission inquiries to: Department of Physics at Syracuse University, C/O: Graduate Coordinator, 201 Physics Building, Syracuse, NY 13244
Phone: (315) 443-3901
E-mail: graduate@phy.syr.edu
Admissions website: http://physics.syr.edu/graduate/apply.html

Application deadlines
Fall admission:
U.S. students: January 15  Int’l. students: January 15

Application fee
U.S. students: $75  Int’l. students: $75
Late applications are accepted until all available slots are filled.

Admissions information
For Fall of 2017:
Number of applicants: 134
Number admitted: 51
Number enrolled: 15

Admission requirements
Bachelor’s degree requirements: Bachelor’s degree in physics is recommended but not required.
Minimum undergraduate GPA: 3.0

GRE requirements
The GRE is required.
Quantitative score: 147
Verbal score: 140
Analytical score: 2.5

Subjective GRE requirements
The Subjective GRE is required.
Minimum accepted Advanced GRE score: 560

TOEFL requirements
The TOEFL exam is required for students from non-English-speaking countries.
PBT score: 600
iBT score: 90

Other admissions information
Additional requirements: Three Letters of recommendation and personal statement.
Undergraduate preparation assumed: At least one semester of each: Classical Mechanics, Quantum Mechanics and Electromagnetic Theory (see e.g. textbooks by Griffiths).

TUITION

Tuition year 2017–18:
Full-time students: $1,500 per credit
Part-time students: $1,500 per credit
Almost all department graduate students have their tuition covered by a graduate assistantship, except in rare cases.
Credit hours per semester to be considered full-time: 9
Deferred tuition plan: Yes
Health insurance: Yes, $1,672.00.
Other academic fees: $836 student fees.
Academic term: Semester
Number of first-year students who received full tuition waivers: 17

Teaching Assistants, Research Assistants, and Fellowships
Number of first-year Teaching Assistants: 12
Fellowship students: 2
Average stipend per academic year
Teaching Assistant: $24,250
Research Assistant: $24,250
Fellowship student: $25,290

FINANCIAL AID

Application deadlines
Fall admission:
U.S. students: January 15  Int’l. students: January 15

Loans
Loans are available for U.S. students.
Loans are available for international students.
GAPSFAS application required: Yes
FAFSA application required: Yes

For further information
Address financial aid inquiries to: Financial Aid Office, 200 Bowne Hall, Syracuse, NY 13244-1140.
Phone: (315) 443-1513
E-mail: finmail@syr.edu
Financial aid website: http://financialaid.syr.edu
HOUSING

Availability of on-campus housing
Single students: No
Married students: No

For further information
Address housing inquiries to: Off-Campus and Commuter Services, 754 Ostrom Avenue, Syracuse, NY 13244.
Phone: (315) 443-5489
E-mail: offcampus@syr.edu
Housing aid website: http://occs.syr.edu/

New York

Syracuse U., Phys.

SPECIAL EQUIPMENT, FACILITIES, OR PROGRAMS

The department is a strong participant in the Syracuse Biomaterials Institute of Syracuse University and has a world leading Soft Matter Program. The high energy physics group is the major US group involved in the LHCb project at CERN in Geneva. The gravitational wave group is extremely strong and includes the past spokesperson for the collaboration and leading experimentalists and data analysts in the LIGO Scientific Collaboration. The physics research laboratories include a number of clean and shielded rooms, several advanced cryostats served by a helium liquefier, advanced quantum optical equipment, laboratory equipment designed to simulate interstellar chemical reactions, high energy particle detector construction facilities, neutrino detector technology testbeds, excellent microscopes for biophysics work, and high speed cameras and related equipment for soft matter physics. The Department of Physics also hosts the University’s Surface Imaging Laboratory, with atomic force and electron microscopes. Students also travel to a number of national facilities, including the Laser Interferometer Gravitational Wave Observatory (LIGO), Jefferson National Laboratory, and to the Cornell NanoScale Science Facility.

Table A—Faculty, Enrollments, and Degrees Granted

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Master’s Doctorate</td>
<td>Master’s Terminal Master’s Doctorate</td>
<td></td>
</tr>
<tr>
<td>Astrophysics</td>
<td>1 – 2 1(5) –(1) –(3) 1(12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biophysics</td>
<td>4 – 2 –(3) –(1) 1(12) 1(10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>Condensed Matter</td>
<td>4 – 10 –(5) –(3) 1(10)</td>
<td></td>
</tr>
<tr>
<td>Physics</td>
<td>Experimental High</td>
<td>7 – 11 1(1) 3(13)</td>
<td></td>
</tr>
<tr>
<td>Energy Physics</td>
<td>First Year/Undecided</td>
<td>1 – 17 1(2) 1(12)</td>
<td></td>
</tr>
<tr>
<td>Medium Energy Physics</td>
<td>1 – 2 –(2) –(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relativity &amp; Gravitation</td>
<td>3 – 10 1(4) –(1) 2(9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>Condensed Matter</td>
<td>5 – 14 –(5) –(2) 3(17)</td>
<td></td>
</tr>
<tr>
<td>Matter Physics</td>
<td>Theoretical Particle Physics &amp; Cosmology</td>
<td>5 – 9 1(1) –(16)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>30 1 77 3(38) 1(20) 10(82)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total Full-time Grad. Stud. – 77
First-year Grad. Stud. – 16

GRADUATE DEGREE REQUIREMENTS

Master’s: Minimum of one year in residence is required. A student admitted to graduate work in the department must take the comprehensive examination. The Master’s degree can be achieved in one of three ways: (1) 24 hours of coursework including a thesis, (2) 30 hours of coursework including a minor problem and passing the qualifying examination, or (3) 36 hours of coursework and passing the qualifying examination. A “B” average in coursework must be maintained to be eligible for a degree. There is no foreign language requirement.

Doctorate: Satisfactory performance in a course program approved by the student’s research committee, which may include courses taken for the M.S. degree. Students must pass a written qualifying examination and a preliminary oral research examination. Students must write and defend a thesis on significant original research. There is no foreign language requirement. A total of 48 credits are required for the degree, maintaining at least a "B" average.

Thesis: Thesis may be written in absentia.

Table B—Separately Budgeted Research Expenditures by Source of Support

<table>
<thead>
<tr>
<th>Source of Support</th>
<th>Departmental Research</th>
<th>Physics-related Research</th>
<th>Outside Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal government</td>
<td>$7,004,649</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State/local government</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-profit organizations</td>
<td>$216,507</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business and industry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$7,221,156</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table C—Separately Budgeted Research Expenditures by Research Specialty

<table>
<thead>
<tr>
<th>Research Specialty</th>
<th>No. of Grants</th>
<th>Expenditures ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Astrophysics</td>
<td>1</td>
<td>$244,729</td>
</tr>
<tr>
<td>Biophysics</td>
<td>2</td>
<td>$484,975</td>
</tr>
<tr>
<td>Experimental Condensed Matter Physics</td>
<td>9</td>
<td>$1,556,711</td>
</tr>
<tr>
<td>Theoretical Condensed Matter Physics</td>
<td>11</td>
<td>$1,171,978</td>
</tr>
<tr>
<td>Experimental High Energy Physics</td>
<td>10</td>
<td>$1,544,003</td>
</tr>
<tr>
<td>Theoretical Particle Physics &amp; Cosmology</td>
<td>4</td>
<td>$516,471</td>
</tr>
<tr>
<td>Medium Energy Physics</td>
<td>1</td>
<td>$244,729</td>
</tr>
<tr>
<td>Relativity &amp; Gravitation</td>
<td>9</td>
<td>$1,357,858</td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>$7,166,593</td>
</tr>
</tbody>
</table>

FACULTY

Distinguished University Professor


Chair Professor
Professor

Rosenzweig, Carl, Ph.D., Harvard University, 1972. Particles and Fields. Theoretical elementary particles and fields physics.

Associate Professor

Laiho, John, Ph.D., Princeton University, 2004. Computational Physics, Particles and Fields, Theoretical Physics. Theoretical elementary particle physics; Lattice QCD.

Assistant Professor

Paulsen, Joseph, Ph.D., University of Chicago, 2013. Condensed Matter Physics. Surface-tension driven flows, memories in disordered materials, and elasticity and geometry of this sheets.

Research Professor


Research Assistant Professor


Teaching Assistant Professor

Freeman, Walter, Ph.D., University of Arizona, 2011. Particles and Fields, Physics and other Science Education. Lattice particle physics, educational research.

DEPARTMENTAL RESEARCH SPECIALTIES AND STAFF

Theoretical

Biophysics. Collective behavior of biological molecules, especially actins and motor proteins; interaction of living cells to form structure; pattern formation of active material; rheology of biological tissue. Bowick, Manning, Marchetti, Schwarz.
Computational Physics. Gravitational-wave data analysis and source modeling; grid computing; connections between algorithms and physical principles; study of condensed-matter order and optimal distributions on curved interfaces; analysis of phase transitions and phase structure in disordered systems; simulations of lattice quantum field theories; numerical simulations on parallel computers; technicolor and supersymmetric theories; models beyond Standard Model Physics. Bowick, Brown, Catterall, Laiho, Middleton.
Cosmology & String Theory. Theoretical models of dark and cosmic acceleration; inflation and alternatives; origin and evolution of cosmological structures. Catterall, Hubisz, Watson. Particles and Fields. Quantum gravity; supersymmetry; renormalization theory; chiral symmetries; monopoles and dyons in
curved space-time; noncommutative geometry; random surfaces, electroweak theory; quantum chromodynamics; general quantum field theory; constrained field theories; geometric quantization; phenomenological particle dynamics; simulations of lattice QCD; supersymmetric field theories on spacetime lattices; quark gluon plasma. Particle cosmology. Theories with extra dimensions. Simulations of lattice quantum field theories; technicolor and supersymmetric theories; holographic models of strings; models beyond Standard Model physics. Catterall, Hubisz, Laiho, Rosenzweig, Watson.

Experimental
Astrophysics. Laboratory studies of physical and chemical processes occurring in the interstellar medium and in planetary atmospheres, including formation of molecular hydrogen and hydrogenation and oxidation reaction on interstellar and/or planetary dust grain analogs. Vidali.
Biophysics. Single-molecule biophysics; membrane biophysics; bionanotechnology and biosensors; protein design; development of new optical technologies; photosensory transduction in microorganisms; bioinformatics; self-organized beating of cilia; phylogenetics and molecular clocks. Movileanu, Paterson.
Condensed Matter Physics. Much of the activity in this area is described under low-temperature physics and under solar physics. Additionally, soft condensed matter physics: tabletop experiments studying nonlinear and emergent behaviors in soft systems; examples include the wrinkling, crumpling, and folding of thin elastic sheets, and the arrangements of solid particles in a sludge. These scenarios feature soft, easily deformed materials that are common in nature and industry. The overarching goal is to uncover the fundamental principles that govern their behavior when they are pushed far away from the low-energy or spatially-uniform states that they prefer. LaHaye, Paulsen, Plourde, Schiff.
High Energy Physics. Experimental studies of the fundamental electroweak and strong interactions as manifested by the decays of beauty and charm quarks and the search for exotic particles; b & c quark decays are studied at the LHCb experiment at the CERN LHC hadron collider Geneva, Switzerland, concentrating on rare and CP violating decays; searches for exotic particle production, including unusual decays of the Higgs boson, are also done using LHCb; study of nucleon structure, including spin and quark components carried out at JLab; R&D into advanced silicon micro-pattern detectors, such as pixel sensors, and their related readout electronics. Members of the group have discovered several new particles, including the B, Ds, and Y(1D); made the first measurements of several very important decay modes of these objects; and is also starting an effort in neutrino physics. Artuso, Blusk, Holmes, Mountain, Skwarnicki, Soderberg, Souder, Stone, Wang, Whittington.
Low Temperature Physics. Quantum coherent superconducting circuits; measurement and coupling of circuits for quantum computing; vortex dynamics in nanofabricated thin-film devices; superconducting microwave resonant circuits; nanoelectromechanical systems (NEMS); quantum dynamics of mechanical systems; sensitive environmental gas and biosensors; measurements at millikelvin temperatures. LaHaye, Plourde.
Nano Science and Technology. Much of the activity in this area is described under low-temperature physics (for example nanoscopic mechanical systems) and under biophysics (nanopore technology). LaHaye, Movileanu, Plourde.
Relativity & Gravitation. Gravitational-wave detection and astrophysics: searches for gravitational waves using the Laser Interferometer Gravitational Wave Observatory (LIGO); commissioning and technology development for advanced gravitational wave detectors; gravitational wave source modeling and phenomenology; developing tests of general relativity using gravitational waves. Ballmer, Brown, Saulson.
Solar Physics. Electronic and optical properties of unconventional semiconductors (e.g., amorphous silicon, porous titania, and silicon); solar cell device physics; thin-film growth (plasma, hot-wire); hybrid organic-inorganic semiconductor devices; v surface physics (i.e., structure, kinetics, dynamics, and reactions). Schiff.