GEORGIA INSTITUTE OF TECHNOLOGY

SCHOOL OF PHYSICS

Atlanta, Georgia 30332-0430
http://www.physics.gatech.edu

General University Information

President: G. P. ″Bud″ Peterson
Dean of Graduate School: Rafael Bras
University website: http://www.gatech.edu
Control: Public
Setting: Urban
Total Faculty: 919
Total Graduate Faculty: 919
Total number of Students: 20,720
Total number of Graduate Students: 6,970

Department Information

Department Chairman: Paul Goldbart
Department Contact: James Sowell, Graduate Recruiter
Total full-time faculty: 35
Total number of full-time equivalent positions: 0
Full-Time Graduate Students: 119
First-Year Graduate Students: 24
Female First-Year Students: 4
Total Post Doctorates: 26

Department Address

837 State Street
Atlanta, GA 30332-0430
Phone: (404) 894-5200
Fax: (404) 894-9958
E-mail: jim.sowell@physics.gatech.edu
Website: http://www.physics.gatech.edu

ADMISSIONS

Admission Contact Information

Address admission inquiries to: Graduate Recruiter, School of Physics
Phone: 404-385-1294
E-mail: jim.sowell@physics.gatech.edu
Admissions website: http://www.physics.gatech.edu

Application deadlines

Fall admission:
U.S. students: January 31, 2012 *Int'l. students*: January 31, 2012

Application fee

U.S. students: *Int'l. students*: $50

Admissions information

For Fall of 2011:
Number of applicants: 174
Number admitted: 77
Number enrolled: 22

Admission requirements

Bachelor's degree requirements: Bachelor's degree in physics is preferred, with a minimum undergraduate GPA of 3.0 preferred for the M.S. program and 3.5 for the Ph.D. program.
Minimum undergraduate GPA: 3.5

GRE requirements

The GRE is required.
Quantitative score: 700
Verbal score: 500
Analytical score: 3

Advanced GRE requirements

The Advanced GRE is required.
Minimum accepted Advanced GRE score: 640

TOEFL requirements

The TOEFL exam is required for students from non-English-speaking countries.
iBT score: 106

Other admissions information

Undergraduate preparation assumed: Symon, Classical Mechanics; Corson and Lorrain, Classical Electromagnetic Fields and Waves, Liboff, Quantum Mechanics; Callen, Thermodynamics.

TUITION

Tuition year 2011–12:
Tuition for in-state residents
Full-time students: $10,282 annually
Tuition for out-of-state residents
Full-time students: $27,850
Credit hours per semester to be considered full-time: 0
Deferred tuition plan: No
Health insurance: Available.
Other academic fees: Students employed as Graduate Research or Teaching Assistants pay $25 per semester tuition plus $823 fee per semester.
Academic term: Semester
Number of first-year students who receive full tuition waivers: 22

Teaching Assistants, Research Assistants, and Fellowships

Number of first-year
Teaching Assistants: 22
Research Assistants: 0
Fellowship students: 2
Average stipend per academic year
Teaching Assistant: $23,000
Research Assistant: $23,000
Fellowship student:

FINANCIAL AID

Loans

Loans are available for U.S. students.
Loans are available for international students.
GAPSFAS application required: No
FAFSA application required: Yes

HOUSING

Availability of on-campus housing

Single students: Yes
Married students: Yes

For further information

Address housing inquiries to: Housing Office.
Housing aid website: http://www.housing.gatech.edu

Table A—Faculty, Enrollments, and Degrees Granted

Research Specialty	2011–12 Faculty	Enrollment Fall 2011		Number of Degress Granted 2010–11 (2006–11)		
		Master's	Doctorate	Master's	Terminal Master's	Doctorate
Applied Physics	3	–	–	–	–	0(1)
Astrophysics	5	–	2	–	–	–
Atomic, Molecular, & Optical Physics	8	–	5	–	–	4(12)
Biophysics	6	–	13	–	–	1(2)
Computational Physics	2	–	2	–	–	0(4)
Computer Science	2	–	–	–	–	–
Condensed Matter Physics	17	–	13	–	–	3(11)
Electrical Engineering	1	–	1	–	–	1(2)
Electromagnetism	1	–	–	–	–	–
Energy Sources & Environment	1	–	–	–	–	–
Fluids, Rheology	4	–	–	–	–	–
Low Temperature Physics	2	–	2	–	–	1(8)
Materials Science, Metallurgy	1	–	8	–	–	2(4)
Mechanics	1	–	–	–	–	–
Nano Science and Technology	17	–	9	–	–	4(16)
Nonlinear Dynamics and Complex Systems	6	–	9	–	–	2(10)
Nuclear Physics	–	–	–	–	–	0(3)
Optics	5	–	3	–	–	2(8)
Particles and Fields	2	–	–	–	–	–
Physics and other Science Education	1	–	–	–	–	1(1)
Quantum Foundations	2	–	4	–	–	1(5)
Relativity & Gravitation	2	–	–	–	–	–
Statistical & Thermal Physics	11	–	–	–	–	–
Non-specialized	–	5	45	1(7)	2(5)	–
Other	3	–	3	–	–	0(2)
Total	103	5	15	1(7)	2(5)	22(89)
Full-time Grad. Stud.	–	5	119	–	–	–
First-year Grad. Stud.	–	1	22	–	–	–

GRADUATE DEGREE REQUIREMENTS

Master's: 30 semester hrs. are required. Thesis is optional. 2.7 GPA is required. One-year residency required. No language requirement, no final examination.

Doctorate: The number of credit hours is not stipulated except 9 hrs. in minor with 2.9 GPA required. One year residency required. Comprehensive examination, thesis, thesis examination are required.

Thesis: Thesis may be written in absentia.

SPECIAL EQUIPMENT, FACILITIES, OR PROGRAMS

Research programs are described at http://www.physics.gatech.edu

Table B—Separately Budgeted Research Expenditures by Source of Support

Source of Support	Departmental Research	Physics-related Research Outside Department
Federal government	$5,446,801	$1,169,444
State/local government		
Non-profit organizations		
Business and industry		
Other	$632,328	
Total	$6,079,129	$1,169,444

Table C—Separately Budgeted Research Expenditures by Research Specialty

Research Specialty	No. of Grants	Expenditures ($)
Applied Physics	–	
Astrophysics	11	$668,704
Atomic, Molecular, & Optical Physics	14	$851,078
Biophysics	11	$699,049
Chemical Physics	–	
Computer Science	–	
Condensed Matter Physics	23	$2,857,192
Electromagnetism	–	
Electrical Engineering	–	
Energy Sources & Environment	–	
Fluids, Rheology	–	
Low Temperature Physics	–	
Materials Science, Metallurgy	–	
Mechanics	–	
Nano Science and Technology	–	
Nuclear Physics	–	
Optics	5	$303,956
Particles and Fields	–	
Relativity & Gravitation	–	
Statistical & Thermal Physics	–	
Nonlinear Dynamics and Complex Systems	11	$499,100
Other	5	$200,000
Total	80	$6,079,079

FACULTY

Professor

Bellissard, Jean, Ph.D., Univ. of Provence, Marseille, 1974. *Condensed Matter Physics, Nano Science and Technology*. Mathematical physics.

Chapman, Michael S., Ph.D., MIT, 1995. *Atomic, Molecular, & Optical Physics, Optics*. Experimental quantum optics; atomic physics.

Chou, Mei-Yin, Ph.D., California, Berkeley, 1986. *Condensed Matter Physics, Nano Science and Technology*. Theoretical condensed matter physics; electronic structure of materials; computational materials physics.

Conrad, Edward H., Ph.D., Wisconsin-Madison, 1983. *Condensed Matter Physics, Nano Science and Technology*. Experimental surface physics.

Cvitanović, Predrag, Ph.D., Cornell, 1973. *Particles and Fields, Statistical & Thermal Physics*. Nonlinear dynamics.

de Heer, Walter A., Ph.D., University of California, 1984. *Condensed Matter Physics, Nano Science and Technology*. Experimental condensed matter physics; magnetic and electronic properties of clusters; carbon nanostructures.

Erbil, Ahmet, Ph.D., MIT, 1983. *Applied Physics, Condensed Matter Physics, Energy Sources & Environment, Nano Science and Technology*. Experimental condensed matter physics.

First, Phillip, Ph.D., Illinois, Urbana, 1988. *Condensed Matter Physics, Nano Science and Technology*. Experimental condensed matter physics.

Goldbart, Paul M, Ph.D., Imperial College, 1985. *Condensed Matter Physics, Nano Science and Technology, Statistical & Thermal Physics*. Theoretical statistical and condensed matter physics.

Gole, James L., Ph.D., Rice, 1971. *Applied Physics, Condensed Matter Physics, Materials Science, Metallurgy, Nano Science and Technology*. Experimental chemical and condensed matter physics; optics; material science.

Kennedy, T. A. Brian, Ph.D., Queen's Belfast, 1986. *Atomic, Molecular, & Optical Physics, Optics*. Theoretical quantum optics.

Kuzmich, Alex, Ph.D., Univ. of Rochester, 2000. *Atomic, Molecular, & Optical Physics, Optics*. Experimental atomic, molecular, and optical physics.

Laguna, Pablo, Ph.D., University of Texas at Austin, 1987. *Astrophysics, Computer Science, Relativity & Gravitation*. Numerical relativity.

Landman, Uzi, Haifa, 1969. *Condensed Matter Physics, Nano Science and Technology*. Theoretical condensed matter physics; computational physics.

Trebino, Rick, Ph.D., Stanford University, 1983. *Applied Physics, Atomic, Molecular, & Optical Physics, Optics*. Ultrafast optics.

Uzer, Turgay, Ph.D., Harvard, 1979. *Atomic, Molecular, & Optical Physics, Statistical & Thermal Physics*. Theoretical, molecular, and chemical physics; nonlinear dynamics.

Wiesenfeld, Kurt, Ph.D., California, Berkeley, 1985. *Biophysics, Statistical & Thermal Physics*. Theoretical nonlinear dynamics; biophysics.

Zangwill, Andrew, Ph.D., Pennsylvania, 1981. *Condensed Matter Physics, Electromagnetism, Nano Science and Technology*. Theoretical condensed matter physics.

Associate Professor

Davidovic, Dragomir, Ph.D., Johns Hopkins University, 1996. *Low Temperature Physics*. Mesoscopics and low-temperature physics.

Grigoriev, Roman, Ph.D., California Institute of Technology, 1998. *Statistical & Thermal Physics*. Theoretical non-linear dynamics.

Pustilnik, Michael, Ph.D., Bar-Ilan University, 1997. *Condensed Matter Physics, Nano Science and Technology, Statistical & Thermal Physics*. Theoretical condensed matter.

Raman, Chandra, Ph.D., University of Michigan, 1997. *Atomic, Molecular, & Optical Physics, Optics*. Experimental atomic physics.

Riedo, Elisa, Ph.D., University of Milan, 2000. *Biophysics, Condensed Matter Physics, Statistical & Thermal Physics*. Experimental condensed matter; biophysics.

Sá de Melo, Carlos, Ph.D., Stanford University, 1991. *Condensed Matter Physics, Nano Science and Technology*. Theoretical condensed matter physics.

Schatz, Michael F., Ph.D., University of Texas, 1991. *Fluids, Rheology, Statistical & Thermal Physics, Other*. Experimental nonlinear dynamics; fluid dynamics.

Shoemaker, Deirdre, Ph.D., University of Texas at Austin, 1999. *Astrophysics, Computer Science, Relativity & Gravitation*. Numerical relativity.

Assistant Professor

Ballantyne, David R., Ph.D., University of Cambridge, 2002. *Astrophysics*. Theoretical astrophysics.

Curtis, Jennifer E., Ph.D., University of Chicago, 2002. *Biophysics, Fluids, Rheology*. Experimental biophysics.

Fernandez de las Nieves, Alberto, Ph.D., University of Granada, 2000. *Condensed Matter Physics, Fluids, Rheology, Nano Science and Technology, Statistical & Thermal Physics*. Experimental condensed matter physics.

Goldman, Daniel I., Ph.D., University of Texas at Austin, 2002. *Biophysics, Fluids, Rheology, Mechanics, Statistical & Thermal Physics*. Experimental biophysics; nonlinear dynamics.

Jiang, Zhigang, Ph.D., Northwestern University, 2005. *Condensed Matter Physics, Low Temperature Physics, Nano Science and Technology*. Experimental condensed matter physics.

Kim, Harold, Ph.D., Stanford University, 2004. *Biophysics*. Experimental biophysics.

Kindermann, Markus, Ph.D., Universiteit Leiden, 2003. *Condensed Matter Physics, Nano Science and Technology*. Theoretical condensed matter physics.

Nguyen, Toan T., Ph.D., University of Minnesota, 2002. *Biophysics, Statistical & Thermal Physics*. Theoretical biophysics.

Taboada, Ignacio, Ph.D., University of Pennsylvania, 2002. *Astrophysics, Particles and Fields*. Astrophysics.

Tan, Shina, Ph.D., Univ. of Chicago, 2006. *Atomic, Molecular, & Optical Physics, Condensed Matter Physics, Nano Science and Technology*. Theoretical atomic and condensed matter physics.

Adjunct Professor

Bréchignac, Catherine, Ph.D., University of Paris-Sud, Orsay, 1977. *Atomic, Molecular, & Optical Physics, Condensed Matter Physics, Nano Science and Technology*. Molecular and cluster physics.

Brown, Kenneth, Ph.D., University of California, Berkeley, 2003. *Atomic, Molecular, & Optical Physics*. Atomic and molecular physics.

Harvey, Stephen C., Ph.D., Dartmouth College, 1971. *Biophysics*. Biophysics.

Orlando, Thomas, Ph.D., State, Univ. of New York-Stony Brook, 1988. *Chemical Physics, Materials Science, Metallurgy*. Experimental physical, analytical and materials chemistry.

Wartell, Roger, Ph.D., University of Rochester, 1971. *Biophysics*. Experimental biophysics.

Weitz, Joshua, Ph.D., Massachusetts Institute of Technology, 2003. *Biophysics*. Theoretical biophysics.

Zhu, Cheng, Ph.D., Columbia University, 1988. *Biophysics*. Biophysics.

Other

Barnett, Robert N., Ph.D., Kansas, 1980. *Condensed Matter Physics, Nano Science and Technology*. Theoretical condensed matter physics.

Berger, Claire, Ph.D., University Joseph Fourier, Grenoble, 1987. *Condensed Matter Physics, Nano Science and Technology*. Experimental condensed matter physics.

Bogachek, Eduard N., Ph.D., Kharkov, 1977. *Condensed Matter Physics, Nano Science and Technology*. Theoretical condensed matter physics; mesoscopics.

Gao, Jianping Ph.D., Brown, 1989. *Condensed Matter Physics, Nano Science and Technology*. Theoretical condensed matter physics.

Jarrio, Marty, Ph.D., Georgia Tech, 1996. *Nuclear Physics, Other*. Nuclear physics.

Luedtke, William D., Ph.D., Georgia Tech., 1984. *Condensed Matter Physics, Nano Science and Technology*. Theoretical condensed matter physics.

Murray, Eric, Ph.D., Cornell, 1992. *Materials Science, Metallurgy, Other*. Materials science.

Ruan, Wen-Ying, Ph.D., Zhongshan University, 1992. *Condensed Matter Physics, Nano Science and Technology*. Theoretical condensed matter.

Scherbakov, Andrew, Ph.D., Georgia Tech, 1997. *Condensed Matter Physics, Other*. Mesoscopic physics.

Sowell, James, Ph.D., Michigan, 1986. *Astronomy, Other*. Astronomy.

Yannouleas, C., Ph.D., University of Maryland, 1982. *Condensed Matter Physics, Nano Science and Technology, Nuclear Physics*. Theoretical condensed matter physics; theoretical nuclear physics.

Yoon, Bokwon, Ph.D., University of Paris-Sud, Orsay, 1997. *Condensed Matter Physics, Nano Science and Technology*. Theoretical condensed matter physics.

DEPARTMENTAL RESEARCH SPECIALTIES AND STAFF

Theoretical

Astrophysics. General relativity; gravitational wave patterns; gravitational interactions of compact binaries; theoretical and phenomenological astrophysics; galaxy and black hole evolution; high-energy particle astrophysics; accretion disks; numerical relativity; cosmology; gravitating systems; black holes; galaxy and black hole evolution; high-energy particle astrophysics; accretion disks; gravitational physics. Ballantyne, Laguna, Shoemaker, Taboada.

Atomic, Molecular, & Optical Physics. Three-body recombination; anti-hydrogen formation; cold collisions; collisional Stark mixing; Rydberg plasmas; classical-quantal correspondences; atomic Fermi gas transport; optical lattices; spin squeezing of atomic ensembles; Bose-Einstein condensate mixtures; quantum fluctuations; spatial solitary waves; nonlinear optical parametric processes; Rydberg atoms; light/matter interactions. Bréchignac, Brown, Chapman, Kennedy, Kuzmich, Raman, Tan, Trebino, Uzer.

Biophysics. Energy transduction; chemosmosis; noise; protein biosynthesis; energy metabolism; ion channel fluctuations; molecular motors; Hodgkin-Huxley equations; chemomechanical energy conversion; energy driven rectification of Brownian motion; quantum mutations in DNA. Curtis, Goldman, Harvey, Kim, Nguyen, Riedo, Wartell, Weitz, Wiesenfeld, Zhu.

Computational Physics. Spatially extended non-equilibrium systems; chaotic mixing in fluids; thin liquid films; dynamics of solid surfaces; epitaxial growth processes; solid-liquid interfaces; melting; glasses; surface diffusion; atomic-scale friction and lubrication; confined complex fluids; electron localization; dynamics of small clusters; kinetic Monte Carlo and molecular dynamics simulations; density functional theory; quantum Monte-Carlo techniques; first-principles electronic structure; Landau-Lifshitz-Gilbert simulations; numerical relativity.

Condensed Matter Physics. Nanoscience; phase transitions; mesoscopic physics; quantum interference effects; superconductors in high magnetic fields; Bose-Einstein superconductivity; macroscopic quantum phenomena; ferroelectrics; Sutherland-Calogero models; ferromagnets; spintronics; semiconductor quantum dots. Barnett, Bellissard, Berger, Bogachek, Bréchignac, Chou, Conrad, de Heer, Erbil, Fernandez de las Nieves, First, Gao, Goldbart, Gole, Jiang, Kindermann, Landman, Luedtke, Pustilnik, Riedo, Ruan, Sá de Melo, Scherbakov, Tan, Yannouleas, Yoon, Zangwill.

Nonlinear Dynamics and Complex Systems. Molecular fluctuations; chaotic dynamics; quantum chaos; Husimi-Wigner wave packets; Lyapunov exponent; Rydberg states; trajectory analysis; massively coupled oscillators; chemical reaction dynamics; Hamiltonian flows.

Optics. Classical and Quantum. Quantum optics; atomic Fermi gas transport in optical lattices; nonlinear optics and lasers; radiative interactions; squeezed states, quantum computing, cavity QED. Chapman, Kennedy, Kuzmich, Raman, Trebino.

Other. Quantization of Non-Linear Field Theories.

Other. Bloch electrons in magnetic fields; quasicrystals; doped semiconductors; Lie algebras; Non-linear field theory.

Physics and other Science Education. Matter and Interactions curriculum.

Experimental

Astrophysics. Neutrino and gamma-ray astrophysics. Ballantyne, Laguna, Shoemaker, Taboada.

Atomic, Molecular, & Optical Physics. Fundamental properties of ultra-cold condensed gases; atom trapping; multi-atom entanglement; cavity QED; laser Raman and Brillouin scattering; chemical biosensors; photovoltaic devices. Bréchignac, Brown, Chapman, Kennedy, Kuzmich, Raman, Tan, Trebino, Uzer.

Biophysics. Morphogenesis, noise; ″g-jitter″; thin organic films; nanotribology. Curtis, Goldman, Harvey, Kim, Nguyen, Riedo, Wartell, Weitz, Wiesenfeld, Zhu.

Condensed Matter Physics. Nanoscience; Soft matter, Electron diffraction; low-temperature physics; scanning tunneling microscopy; ballistic electron emission spectroscopy; high-resolution x-ray scattering; magnetic susceptibility; magnetic heterostructures; graphene; Josephson tunneling; molecular clusters; thin-film magnetism; semiconductor nanostructures; atomic force microscopes; friction, adhesion; elasticity; wear; nanowires; laser fluorescence; chemiluminescence; mass spectroscopy; amorphous carbon thin films; novel soft materials. Barnett, Bellissard, Berger, Bogachek, Bréchignac, Chou, Conrad, de Heer, Erbil, Fernandez de las Nieves, First, Gao, Goldbart, Gole, Jiang, Kindermann, Landman, Luedtke, Pustilnik, Riedo, Ruan, Sá de Melo, Scherbakov, Tan, Yannouleas, Yoon, Zangwill.

Nonlinear Dynamics and Complex Systems. Spatiotemporal chaos; control/exploitation of chaos; pattern formation in fluids; low-gravity fluid physics; weather-in-a-box; spontaneous and manipulated patters; fluid instabilities; coupled mechanical oscillators.

Optics. Bose and Fermi condensed gases; atom and ion trapping; atom optics; multi-atom entanglement; cavity QED, ultrafast optics; frequency-resolved optical gating (FROG); ultrashort laser pulsesChapman, Kennedy, Kuzmich, Raman, Trebino.