

# GEORGE WASHINGTON UNIVERSITY

## DEPARTMENT OF PHYSICS

Washington, D.C. 20052

<http://physics.columbian.gwu.edu/>

### General University Information

*President:* Thomas LeBlanc  
*Dean of Graduate School:* Chad Heap  
*University website:* <http://www.gwu.edu/>  
*School Type:* Private  
*Setting:* Urban  
*Total Faculty:* 4,673  
*Total Graduate Faculty:* N/A  
*Total number of Students:* 21,000  
*Total number of Graduate Students:* 10,000

### Department Information

*Department Chair:* Prof. William J Briscoe, Chair  
*Department Contact:* William J Briscoe, Chair  
*Total full-time faculty:* 22  
*Total number of full-time equivalent positions:* 19  
*Full-Time Graduate Students:* 44  
*Female Full-Time Graduate Students:* 11  
*First-Year Graduate Students:* 13  
*Female First-Year Students:* 4  
*Total Post Doctorates:* 9

### Department Address

Corcoran Hall  
725 21st Street, NW  
Washington, D.C. 20052  
*Phone:* (202) 994-6275  
*Fax:* (202) 994-3001  
*E-mail:* [phys@gwu.edu](mailto:phys@gwu.edu)  
*Website:* <http://physics.columbian.gwu.edu/>

### ADMISSIONS

#### Admission Contact Information

*Address admission inquiries to:* Prof. Chen Zeng, Director of Graduate Programs, Department of Physics, 725 21st Street, NW, Washington D.C. 20052  
*Phone:* (202) 994-6481  
*E-mail:* [gradappl@gwu.edu](mailto:gradappl@gwu.edu)  
*Admissions website:* <https://graduate.admissions.gwu.edu/admissions>

#### Application deadlines

Fall admission:  
*U.S. students:* January 15      *Int'l. students:* January 15  
Spring admission:  
*U.S. students:* September 1      *Int'l. students:* September 1

#### Application fee

*U.S. students:* \$75      *Int'l. students:* \$75  
April 01/2019 for MS applicants

#### Admissions information

For Fall of 2017:  
*Number of applicants:* 70  
*Number admitted:* 35  
*Number enrolled:* 17

#### Admission requirements

*Bachelor's degree requirements:* Bachelor's degree in Physics or equivalent is required.  
*Minimum undergraduate GPA:* 3.0

### GRE requirements

The GRE is required.  
We require GRE general with a good Q score and reasonable A and V scores. There are no set values required.

### GRE Physics requirements

The GRE Physics is recommended.  
GRE subject is optional but reporting a good score can enhance your chances.

### TOEFL requirements

The TOEFL exam is required for students from non-English-speaking countries.  
Minimum accepted TOEFL scores:  
*PBT score:* 600  
*iBT score:* 100

### Other admissions information

*Undergraduate preparation assumed:* Subjects at the level of Taylor, Classical Mechanics; Griffiths, Intro to Electrodynamics; Kittel and Kroemer, Thermal Physics; Griffiths, Intro to Quantum Mechanics.

### TUITION AND ASSISTANTSHIPS

#### Teaching Assistants, Research Assistants, and Fellowships

Number of first-year  
*Teaching Assistants:* 6  
*Research Assistants:* 1  
*Fellowship students:* 2  
Average stipend per academic year  
*Teaching Assistant:* \$24,000  
*Research Assistant:* \$24,000  
*Fellowship student:* \$25,000

#### Tuition year 2019–2020:

*Full-time students:* \$1,767 per credit  
*Part-time students:* \$1,767 per credit  
*Credit hours per semester to be considered full-time:* 9  
*Deferred tuition plan:* Yes  
*Health insurance:* Available at the cost of \$1,100 per year.  
*Other academic fees:* One time matriculation fee of \$300.  
*Academic term:* Semester  
*Number of first-year students who received full tuition waivers:* 9  
*Number of first-year students who received partial tuition waivers:* 1

### FINANCIAL AID

#### Application deadlines

Fall admission:  
*U.S. students:* February 15      *Int'l. students:* February 15  
Spring admission:  
*U.S. students:* September 1      *Int'l. students:* September 1

#### Loans

Loans are available for U.S. students.  
Loans are not available for international students.  
*GAPSFAS application required:* No  
*FAFSA application required:* Yes

#### For further information

*Address financial aid inquiries to:* Cloyd Heck Marvin Center, Ground Floor, 800 21st Street, NW, Washington D.C. 20052,  
*Fax:* 202-994-9009.

Phone: (202) 994-9000  
 E-mail: ccentral@gwu.edu  
 Financial aid website: <http://colonialcentral.gwu.edu/>

**HOUSING**

**Availability of on-campus housing**

Single students: Yes  
 Married students: No

**For further information**

Address housing inquiries to: GW Housing, Division of Student Affairs, John Quincy Adams House, 2129 Eye Street, NW, Washington D.C. 20052, Fax: 202-994-1422.

Phone: (202) 994-2552  
 E-mail: gwhouse@gwu.edu  
 Housing aid website: <http://living.gwu.edu/>

**Table A—Faculty, Enrollments, and Degrees Granted**

Research Specialty	2015–16 Faculty	Enrollment Fall 2016		Number of Degrees Granted 2015–17 (2008–15)		
		Mas-ter's	Doc-torate	Mas-ter's	Terminal Master's	Doc-torate
<b>Astrophysics</b>	7	–	6	–	–	1(2)
<b>Biophysics</b>	5	–	7	–	–(1)	1(6)
<b>Medical, Health Physics</b>	–	–	1	–	–	1(2)
<b>Nuclear Physics</b>	12	–	9	–(1)	–(2)	2(9)
<b>Physics and other</b>						
<b>Science Education</b>	4	–	1	–	–	1(2)
<b>Non-specialized</b>	–	–	9	–(1)	–(2)	–
<b>Total</b>	25	–	34	–(2)	–(4)	6(9)
<b>Full-time Grad. Stud.</b>	–	–	34	–	–	–
<b>First-year Grad. Stud.</b>	–	–	6	–	–	–

**GRADUATE DEGREE REQUIREMENTS**

**Master's:** M.A. degree with thesis or no thesis options: 30 semester hours of course work in physics plus thesis, or 36 semester hours of course work in physics and mathematics, including a tool requirement in computer programming. A 3.0 GPA is required.

**Doctorate:** A minimum of 72 semester hours of approved courses for students with only a baccalaureate. For students with a master's degree, a minimum of 48 semester hours is required. Tool requirement: completion of numerical methods course. A 3.0 GPA is required.

**Thesis:** Thesis may be written in absentia.

**SPECIAL EQUIPMENT, FACILITIES, OR PROGRAMS**

High-end central computing facility (Colonial One); several departmental computing facilities, including five high-end clusters, two CMP/biophysics research laboratories; machine shop; Virginia campus facilities contains laboratories for design, construction, and testing of particle and radiation detectors for use at major accelerator laboratories worldwide.

A new Science and Engineering Hall (SEH) opened in January 2015. Physics Building (Corcoran Hall) is being completely renovated, reopens in January 2018.

**Table B—Separately Budgeted Research Expenditures by Source of Support**

Source of Support	Departmental Research	Physics-related Research Outside Department
<b>Federal government</b>	\$2,350,000	
<b>State/local government</b>		
<b>Non-profit organizations</b>		
<b>Business and industry</b>	\$400,000	
<b>Other</b>	\$200,000	
<b>Total</b>	\$2,950,000	

**Table C—Separately Budgeted Research Expenditures by Research Specialty**

Research Specialty	No. of Grants	Expenditures (\$)
<b>Astrophysics</b>	18	\$500,000
<b>Biophysics</b>	2	\$300,000
<b>Nuclear Physics</b>	7	\$2,000,000
<b>Physics and other Science Education</b>	4	\$150,000
<b>Total</b>	31	\$2,950,000

**FACULTY**

**Chair Professor**

**Briscoe**, William, Ph.D., Catholic University of America, 1978. *Nuclear Physics*. Experimental nuclear physics and particle physics.

**Professor**

**Feldman**, Gerald, Ph.D., University of Washington, 1987. *Nuclear Physics, Physics and other Science Education*. Experimental nuclear physics; physics education research.

**Johnson**, Neil, Ph.D., Harvard, 1989. *Biophysics, Computational Physics, Nonlinear Dynamics and Complex Systems, Statistical & Thermal Physics*.

**Kouveliotou**, Chryssa, Ph.D., Technical University of Munich, 1981. Director of the GWU Astronomy, Physics, and Statistics Institute of Sciences (APSIS). *Astrophysics*. High Energy Astrophysics: Gamma Ray Bursts, Magnetars, Compact Objects, Time Domain Astronomy, Multi-wavelength follow ups. (ORCID: 0000-0003-1443-593X)

**Lee**, Frank X., Ph.D., Ohio University, 1993. *Computational Physics, Nuclear Physics*. Theoretical nuclear and particle physics.

**Peng**, Weiqun, Ph.D., University of Illinois, 2001. *Biophysics, Computational Physics*. Theoretical biophysics.

**Reeves**, Mark E., Ph.D., University of Illinois, 1989. *Biophysics, Condensed Matter Physics, Physics and other Science Education*. Experimental condensed matter physics; biophysics; medical physics.

**Zeng**, Chen, Ph.D., Cornell University, 1994. *Biophysics, Computational Physics, Statistical & Thermal Physics*. Theoretical condensed matter physics; biophysics.

**Associate Professor**

**Afanasev**, Andrei V., Ph.D., Kharkov National University, 1990. *Condensed Matter Physics, Nuclear Physics*. Theoretical nuclear physics.

**Alexandru**, Andrei, Ph.D., Louisiana State University, 2001. *Nuclear Physics*. Theoretical nuclear physics.

**Cobb Kung**, Bethany, Ph.D., Yale University, 2008. Also teaches in the University Honors Program. *Astrophysics*. Astrophysics (gamma-ray bursts, time-domain, astronomy).

**Dhuga**, Kalvir S., Ph.D., University of Birmingham, 1980. *Astrophysics, Nuclear Physics*. Astrophysics, experimental nuclear physics.

**Doering**, Michael, Ph.D., University of Valencia, 2007. Theoretical nuclear physics; phenomenology.

**Downie**, Evangeline J., Ph.D., University of Gaslow, 2007. *Nuclear Physics*. Experimental nuclear physics.

**Griesshammer**, Harald, Ph.D., University of Erlangen-Nürnberg, 1996. *Nuclear Physics*. Theoretical nuclear and particle physics.

**Haberzettl**, Helmut, Ph.D., University of Bonn, 1979. *Nuclear Physics*. Theoretical nuclear and particle physics.

**Kargaltsev**, Oleg, Ph.D., Pennsylvania State University, 2004. *Astrophysics*. Observational high-energy astrophysics: neutron stars, pulsars, pulsar winds, high-mass XRBs, black holes, GeV/TeV sources, machine-learning in astronomy, astrostatistics.

**Qui**, Xiangyun, Ph.D., Michigan State University, 2004. Experimental condensed-matter physics; biophysics.

#### Assistant Professor

**Guiriec**, Sylvain, Ph.D., Laboratoire de Physique Theorique et Astroparticules, 2008. *Astrophysics*. High-energy astrophysics: Fermi Gamma-ray Space Telescope – Gamma-Ray Bursts.

**van der Horst**, Alexander J., Ph.D., University of Amsterdam, 2007. *Astrophysics*. Observational and theoretical astrophysics of high-energy transients in X-ray, gamma-ray and radio wavelengths. Big data pipelines.

#### Emeritus

**Lehman**, Donald R., Ph.D., George Washington University, 1970. Theoretical nuclear physics.

#### Research Professor

**Strakovsky**, Igor, Ph.D., Petersburg Nuclear Physics Institute, 1984. Experimental nuclear physics; phenomenology.

#### Research Associate Professor

**Workman**, Ron, Ph.D., University of British Columbia, 1987. Theoretical nuclear physics; phenomenology.

### DEPARTMENTAL RESEARCH SPECIALTIES AND STAFF

#### Theoretical

**Astrophysics**. The Astrophysics Group has tripled in size over the past 3 years. Its faculty, postdocs, and students perform cutting-edge high-energy astrophysics research. We apply our expertise in astrophysics, nuclear and particle physics, to the exotic processes occurring near extremely dense and compact objects, such as white dwarfs, neutron stars and black holes. Some of these processes, such as extremely strong magnetic and gravity fields, stellar collapse, stellar mergers, and matter falling into black holes, are impossible to duplicate on Earth. They are responsible for powerful distant sources of light, neutrinos, and gravity waves. We study neutron stars, magnetars, black holes, X-ray and gamma-ray binaries, and gamma-ray bursts to understand the physics of these systems. Six astrophysics faculty are strongly committed to providing solid graduate education adopted to the needs of modern-day astronomy and astrophysics. We work hard to ensure that students get involved in research as early as possible and have enough time to publish their original research and make themselves noticeable. For further information, click on [Astro physics Group Webpage](#). Cobb Kung, Dhuga, Guiriec, Kargaltsev, Kouveliotou, van der Horst.

**Biophysics**. The Theoretical Biophysics Group currently consists of our four faculty members, and associated postdoctoral associates, graduate students, and undergraduate students. Current research interests of the faculty members are as follows: Ganhui Lan - Theoretical analysis of biochemical networks for cells to maintain their precise temporal and spatial regulation; computational modeling of intracellular assembling processes. Weiqun Peng - Computation study of functional genomics, epigenomics, and gene regulation; bioinformatics; mathematical modeling of evolutionary dynamics. Guanyu Wang - Physical Oncology, disease modeling, and bionetwork analysis. Chen Zeng - Computational modeling and design of protein structures and numerical studies of bionetworks' robustness and evolvability. To learn more, click on the [Bio-physics Group's Web site](#). Johnson, Peng, Zeng.

**Nuclear Physics**. The theoretical nuclear physics research group aims to understand the structure and interactions of photons, hadrons, and nuclei at low and intermediate energy scales. It employs a variety of theoretical tools, such as lattice QCD and QCD sum rules, coupled-channels analysis, relativistic reaction theories, and effective field theories. For more information, click on the [Theoretical Nuclear Physics Web site](#). Afanasev, Alexandru, Doering, Griesshammer, Haberzettl, Lee, Lehman, Strakovsky, Workman.

#### Experimental

**Astrophysics**. The GWU Physics Faculty has a long tradition in Astrophysics going back to George Gamow, the developer of the hot Big Bang Theory of the Universe. The group has recently expanded with the hire of 3 new faculty members specializing in multiwavelength observational high-energy Astrophysics. Our current interests center on understanding the underlying physical processes of explosive transients (such as Gamma-Ray Bursts) and the emission processes near extremely compact and dense objects, such as magnetized neutron stars and black holes. We study these processes through the analysis of X-ray and gamma-ray data that have been collected by a number of space-borne telescopes. Astrophysics faculty and students use world's best space observatories (Hubble Space Telescope, Chandra X-ray Observatory, Fermi Gamma-ray Observatory) as well as state-of-the-art optical and radio observations on the ground (with with JVLA, LOFAR, GTC). The GW group closely collaborates with colleagues at NASA/Goddard Space Flight Center and Naval Research Laboratory. For further information, click on [Astro physics Group Webpage](#). Cobb Kung, Dhuga, Guiriec, Kargaltsev, Kouveliotou, van der Horst.

**Biophysics**. The experimental biophysics group currently consists of faculty members, Mark Reeves and Xiangyun Qiu, and their graduate and undergraduate students. The group features expertise in scanning probe-based near-field microscopy; detection of biomolecules by localized surface plasmon sensing; analysis of biomolecular structure, interaction, and functional relationships; X-ray and neutron scattering; and osmotic stress methods for modifying cellular components. These techniques are being applied to the study of electronic materials, biomaterials, and to problems in cellular biological physics. Our expertise allows our students to study structural linkages in proteins and crystalline systems, and to study biological and electronic functionality through sub-wavelength length-scale probes of the electromagnetic response of materials. Collaborations with federal laboratories (NRL, ORNL, NIH, and NIST) and with faculty in chemistry, biology, and in the medical school allow us to address a wide array of research questions. New approaches to investigating protein functionality are being developed, based on the electronic and

optical response of self-assembled nanoparticle systems. To learn more, click on the [Biophysics Group's Web site](#). Qui, Reeves.

Nuclear Physics. The focus of the experimental nuclear physics group remains the understanding of the strong interaction in the nuclear medium. Our intention is to measure the elementary amplitudes for meson photoproduction and baryon excitation on the nucleon and see how they are modified in the nuclear medium, particularly in the light nuclei, where the nuclear density changes dramatically with very little change in nuclear size. To learn more, click on the [GW Experimental Nuclear Physics Research Group's Web site](#). Briscoe, Dhuga, Downie, Feldman, Strakovsky, Workman.

Physics and other Science Education. Peer instruction: Developing and testing large collection of ConcepTests, organizing coherent sequences (ConcepModules), linking conceptual questions with numerical problems. Thinking skills curriculum: Taxonomy of physics problems (based on Marzano); develop cognitive skills necessary for problem-solving; problem-solving protocol (GW-ACCESS). Collaborative SCALEUP classroom: Students work in cooperatively groups; full integration of lecture; recitation and laboratory; entirely focused on students (instructor as coach). Briscoe, Feldman, Reeves, Workman.

***View additional information about this department at [www.gradschoolshopper.com](http://www.gradschoolshopper.com). Check out the "Why Choose Us?" section, find out more about the department's culture and get links to social media networks.***