

WEST VIRGINIA UNIVERSITY

DEPARTMENT OF PHYSICS AND ASTRONOMY

Morgantown, West Virginia 26506

<http://physics.wvu.edu/>

General University Information

President: E. Gordon Gee
Dean of Graduate School: Greg Dunaway
University website: <http://www.wvu.edu>
School Type: Public
Setting: Urban
Total Faculty: 2,034
Total Graduate Faculty: 1,100
Total number of Students: 28,409
Total number of Graduate Students: 5,905

Department Information

Department Chair: Prof. D.J. Pisano, Chair
Department Contact: D.J. Pisano, Chair
Total full-time faculty: 28
Total number of full-time equivalent positions: 28
Full-Time Graduate Students: 82
Female Full-Time Graduate Students: 16
First-Year Graduate Students: 13
Female First-Year Students: 3
Total Post Doctorates: 17

Department Address

135 Willey Street
P.O. Box 6315
Morgantown, WV 26506
Phone: (304) 293-3422
Fax: (304) 293-5727
E-mail: physics@wvu.edu
Website: <http://physics.wvu.edu/>

ADMISSIONS

Admission Contact Information

Address admission inquiries to: Admissions Committee, Department of Physics and Astronomy, P.O. Box 6315, Morgantown, WV 26506
Phone: (304) 293-3422
E-mail: physics@wvu.edu
Admissions website: <http://physics.wvu.edu/grad/apply>

Application deadlines

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

Application fee

U.S. students: \$60
A personal statement and CV are required.

Admissions information

For Fall of 2020:
Number of applicants: 156
Number admitted: 33
Number enrolled: 13

Admission requirements

Bachelor's degree requirements: A bachelor's degree in Physics, Astronomy, or a related field is required.
Minimum undergraduate GPA: 3.0

GRE requirements

The GRE is required.
No minimum score set.

GRE Physics requirements

The GRE Physics is not required.

TOEFL requirements

The TOEFL exam is required for students from non-English-speaking countries.

Minimum accepted TOEFL scores:

PBT score: 550

iBT score: 79

The minimum accepted computer-based exam (CBT) score is 213. The minimum accepted IELTS score is 6.5.

Other admissions information

Additional requirements: No minimum score is specified.

Undergraduate preparation assumed: Intermediate mechanics, electricity and magnetism, atomic and quantum physics, thermodynamics, and mathematics through partial differential equations. Typical physics texts include Davis (mechanics), Wangsness (electricity and magnetism), McIntyre (quantum mechanics), and Sears and Salinger (thermodynamics).

TUITION AND ASSISTANTSHIPS

Teaching Assistants, Research Assistants, and Fellowships

Number of first-year

Teaching Assistants: 8

Research Assistants: 1

Fellowship students: 4

Average stipend per academic year

Teaching Assistant: \$25,000

Research Assistant: \$25,000

Fellowship student: \$28,000

Teaching assistantships guaranteed to all incoming first year students. Fellowships in specific fields are available; contact faculty or go to <http://graduateeducation.wvu.edu/funding-and-cost/fellowships-and-scholarships>.

Tuition year 2020–21:

Tuition for in-state residents

Full-time students: \$5,454 per semester

Part-time students: \$606 per credit

Tuition for out-of-state residents

Full-time students: \$13,761 per semester

Part-time students: \$1,529 per credit

Costs include University tuition, University fees, and College tuition. International students pay an additional \$300 university fee per year. University tuition is waived for students with assistantships and fellowships.

Credit hours per semester to be considered full-time: 9

Deferred tuition plan: Yes

Health insurance: \$1,824.00

Other academic fees: Fees are included in tuition numbers cited above.

Academic term: Semester

Number of first-year students who received full tuition waivers: 13

FINANCIAL AID

Application deadlines

Fall admission:

U.S. students: January 15

Int'l. students: February 15

Loans

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

For further information

Address financial aid inquiries to: Graduate Program Committee,
 Department of Physics and Astronomy, West Virginia University,
 Morgantown, WV 26506-6315.
 Phone: (304) 293-3422
 E-mail: DJPisano@mail.wvu.edu
 Financial aid website: <https://financialaid.wvu.edu/students/graduate>

HOUSING

Availability of on-campus housing

Single students: Yes
 Married students: Yes
 Childcare Assistance: No

For further information

Address housing inquiries to: University Apartments, PO Box
 6430, Morgantown, WV 26505.
 Phone: (304) 293-5840 or (304) 293-054e
 E-mail: wvumedcenterapt@mail.wvu.edu
 Housing aid website: <https://housing.wvu.edu/housing-options>

Table A—Faculty, Enrollments, and Degrees Granted

Research Specialty	2019–20 Faculty	Enrollment Fall 2020		Number of Degrees Granted 2019–20 (2008–2019)		
		Master's	Doctorate	Master's	Terminal Master's	Doctorate
Astrophysics	7	–	28	4(28)	–(2)	2(25)
Condensed Matter						
Physics	12	–	29	2(38)	–(4)	4(45)
Fluids, Rheology	–	–	–	–(2)	–	–(2)
Medical, Health Physics	–	–	–	–(2)	–	–
Neuroscience/Neuro						
Physics	1	–	2	–	–	–(1)
Physics and other						
Science Education	4	–	4	–(3)	–	1(1)
Plasma and Fusion	5	–	19	2(21)	–(3)	2(21)
Statistical & Thermal						
Physics	–	–	–	–(1)	–	–(1)
Total	29	–	82	8(95)	–(9)	9(96)
Full-time Grad. Stud.	–	–	82	–	–	–
First-year Grad. Stud.	–	–	13	–	–	–

GRADUATE DEGREE REQUIREMENTS

Master's: Approved courses with a minimum GPA of 3.0 are required. There is no residence or language requirement. For a degree with thesis, 24 credits are required. For a degree without a thesis, 30 credits are required.

Doctorate: A minimum of 36 hours of course work in an approved program with a minimum GPA of 3.0 is required. A written comprehensive exam, oral research exam, dissertation, and oral dissertation defense are required.

Thesis: Thesis may be written in absentia.

SPECIAL EQUIPMENT, FACILITIES, OR PROGRAMS

The department and associated instrument and electronics shops are housed in White Hall, a six-story building located on the downtown campus. The building renovation was completed in

2011 and houses a 60-seat planetarium, a roof-top observatory, a small radio telescope, and 23 state-of-the-art research laboratories.

The plasma facilities include a triple plasma source, a Q-machine for generating space-like plasmas and waves, two helicon plasma sources, a space simulation chamber, a plasma processing test facility, four laser facilities dedicated to plasma diagnosis, and a magnetic reconnection experiment.

The condensed matter physics facilities include molecular beam epitaxy (MBE) growth facilities, pulsed laser deposition magnetic resonance laboratory (EPR, ENDOR), SQUID magnetometer with magneto-resistance probe, QD PPMS system, rotating anode X-ray source, an atomic force microscope, Hall effect apparatus, ARPES, a 4 mK STM, an optical spectrophotometer, an FTIR spectrophotometer, a high-temperature graphite furnace, ultrasonic, thermogravimetry, and differential scanning calorimetry; characterization capabilities for thermoluminescence, optical absorption, photoreflectance, photoconductance, and photoluminescence of materials, two-dimensional Fourier transform spectroscopy, second harmonic generation system for interface studies, and a sputtering system for thin-film deposition.

Laser facilities include four cw argon ion lasers, three dye lasers, three tunable diode lasers, three cw and Q-switched Nd:YAG lasers, and three femtosecond lasers.

Departmental computing facilities include two dedicated cluster facilities for development of new computational resources and two large computer clusters. Cooperative research programs with National Energy Technology Laboratory and Pittsburgh Supercomputing Center are possible. University-wide shared research facilities that include sophisticated materials characterization and device fabrication tools, as well as high-performance computing, are available (<http://sharedresearchfacilities.wvu.edu>). A nanotechnology program focusing on bionanotechnology (NanoSAFE, <https://undergraduateresearch.wvu.edu/research-opportunities/wvu-opportunities/nanosafe-reu>) engages students in interdisciplinary research. A comprehensive astrophysics program, teaming with the Green Bank Observatory in Green Bank, WV, gives students the opportunity to work with a wide array of world-class researchers in the field (<http://astro.wvu.edu>).

Table B—Separately Budgeted Research Expenditures by Source of Support

Source of Support	Departmental Research	Physics-related Research Outside Department
Federal government	\$5,745,637	
State/local government		
Non-profit organizations	\$112,483	
Business and industry		
Other		
Total	\$5,858,120	

Table C—Separately Budgeted Research Expenditures by Research Specialty

Research Specialty	No. of Grants	Expenditures (\$)
Astrophysics	29	\$2,040,070
Condensed Matter Physics	15	\$1,517,954
Physics and other Science Education	7	\$377,867
Plasma and Fusion	26	\$1,912,606
Other	2	\$9,621
Total	79	\$5,858,118

FACULTY**Distinguished University Professor**

- Li, Lian**, Ph.D., Arizona State University, 1995. Robert L. Carroll Chair of Physics. *Condensed Matter Physics, Solid State Physics, Theoretical Physics*. Condensed matter.
- McLaughlin, Maura A.**, Ph.D., Cornell University, 2001. Eberly Family Distinguished Professor of Physics and Astronomy. *Astronomy, Astrophysics*. Radio astronomy; astrophysics.
- Scime, Earl E.**, Ph.D., University of Wisconsin-Madison, 1992. Oleg Jefimenko Professor of Physics and Astronomy; Interim Dean, Benjamin M. Statler College of Engineering and Mineral Resources. *Applied Physics, Atmosphere, Space Physics, Cosmic Rays, Plasma and Fusion*. Experimental plasma physics.

Chair Professor

- Pisano, Daniel J.**, Ph.D., University of Wisconsin-Madison, 2001. Chair of Physics and Astronomy. *Astronomy, Astrophysics*. Radio astronomy; astrophysics.

Professor

- Abdul-Razzaq, Wathiq**, Ph.D., University of Illinois at Chicago, 1986. *Condensed Matter Physics, Physics and other Science Education*. Experimental solid state; magnetism of nanoparticles; particulate matter in the environment.
- Cassak, Paul**, Ph.D., University of Maryland, 2006. *Plasma and Fusion*. Theoretical plasma physics.
- Golubovic, Leonardo**, Ph.D., University of Belgrade, 1987. *Condensed Matter Physics, Statistical & Thermal Physics*. Condensed matter theory and statistical physics.
- Johnson, Matthew B.**, Ph.D., California Institute of Technology, 1989. *Condensed Matter Physics, Nano Science and Technology*. Condensed matter.
- Koepke, Mark E.**, Ph.D., University of Maryland, 1984. *Atmosphere, Space Physics, Cosmic Rays, Plasma and Fusion*. Experimental plasma physics; nonlinear dynamics.
- Lorimer, Duncan R.**, Ph.D., University of Manchester, 1994. Associate Dean of Research. *Astronomy, Astrophysics*. Radio astronomy; astrophysics.
- Murphy, Sheena**, Ph.D., Cornell University, 1991. Associate VP for Research Development. *Low Temperature Physics*. Low temperature physics.
- Romero, Aldo H.**, Ph.D., University of California, San Diego, 1998. *Computational Physics, Condensed Matter Physics, Nano Science and Technology, Theoretical Physics*.
- Stanescu, Tudor**, Ph.D., University of Illinois at Urbana-Champaign, 2002. *Condensed Matter Physics*. Theoretical condensed matter physics.
- Stewart, Gay**, Ph.D., University of Illinois, 1994. Eberly Professor of STEM Education; Flexible Education Research Network (FERN) initiative leader. *Physics and other Science Education*. STEM education, graduate student training.
- Stewart, John**, Ph.D., University of Illinois, Urbana-Champaign, 1994. *Physics and other Science Education*. Physics education research.

Associate Professor

- Anderson, Loren**, Ph.D., Boston University, 2009. *Astronomy, Astrophysics*. Observational astrophysics.
- Bristow, Alan**, Ph.D., University of Sheffield, 2003. Associate Chair of Physics and Astronomy. *Condensed Matter Physics, Optics*. Experimental condensed matter physics; optics.
- Cen, Cheng**, Ph.D., University of Pittsburgh, 2010. *Applied Physics, Condensed Matter Physics, Materials Science, Metallurgy, Nano Science and Technology*. Novel complex oxide-based material systems.

- Etienne, Zach B.**, Ph.D., University of Illinois, 2009. *Astronomy, Astrophysics*. Gravitational wave theory.
- Flagg, Edward**, Ph.D., University of Texas-Austin, 2008. *Nano Science and Technology, Optics, Quantum Foundations*. Quantum optics.
- Holcomb, Mikel**, Ph.D., University of California - Berkeley, 2009. *Condensed Matter Physics, Materials Science, Metallurgy, Nano Science and Technology, Optics, Solid State Physics, Surface Physics*. Multiferroic materials and interfaces.
- McWilliams, Sean**, Ph.D., University of Maryland, 2008. General relativity. *Astronomy, Astrophysics*. Gravitational wave theory.
- Tu, Weichao**, Ph.D., University of Colorado at Boulder, 2011. *Engineering Physics/Science*. Theoretical and numerical space plasma physics.

Assistant Professor

- Burke-Spolaor, Sarah**, Ph.D., Swinburne University of Technology, 2011. *Astronomy, Astrophysics*. Astrophysics.
- Lee, Joonhee**, Ph.D., Seoul National University, 2010. *Nano Science and Technology, Neuroscience/Neuro Physics*. Qualitative neuroscience.

Emeritus

- Halliburton, Larry E.**, Ph.D., University of Missouri, Columbia, 1971. *Applied Physics, Condensed Matter Physics, Materials Science, Metallurgy, Optics*. Optical and magnetic properties of point defects.
- Pavlovic, Arthur S.**, Ph.D., Pennsylvania State University, 1966. *Condensed Matter Physics*. Solid state physics experiments.
- Treat, Richard P.**, Ph.D., University of California, Riverside, 1967. Quantum field theory.
- Weldon, H. Arthur**, Ph.D., Massachusetts Institute of Technology, 1974. *Particles and Fields*. Particle theory.

Professor Emeritus

- Seehra, Mohindar S.**, Ph.D., University of Rochester, 1969. Eberly Family Distinguished Professor. *Applied Physics, Condensed Matter Physics*. Solid state experiment; X-ray scattering; applied physics; magnetism.

Research Assistant Professor

- Wang, Qiang**, Ph.D., University of Colorado Boulder, 2011. *Condensed Matter Physics*. Condensed matter.

Teaching Associate Professor

- Miller, Paul**, Ph.D., West Virginia University, 2009. *Physics and other Science Education, Plasma and Fusion*. Physics education.
- Williamson, Kathryn**, Ph.D., Montana State University, 2013. *Physics and other Science Education*. Physics education.

Teaching Assistant Professor

- Kobelski, Adam**, Ph.D., Montana State University, 2014. *Astronomy, Astrophysics, Plasma and Fusion*. Radio signatures of solar coronal activity, including radio burst activity related to photospheric magnetic flux emergence; using radio observations of non-solar sources passing behind the solar corona to better understand coronal turbulence, the extended coronal magnetic field, and the solar wind; observational signatures of the instigation of magnetic reconnection, with emphasis on constraining the heating of Active Regions by modeling X-ray and EUV observations of micro flares as bundles of independent strands.

Adjunct Professor

- Ganguli, Gurudas**, Ph.D., Boston College, 1980. *Plasma and Fusion*. Plasma physics theory.

Lockman, Felix J., Ph.D., University of Massachusetts, 1979. *Astronomy, Astrophysics*. Galactic and extragalactic radio astronomy.

O'Neil, K., Ph.D., University of Oregon, 1997. Extragalactic radio astronomy.

Raylman, Raymond R., Ph.D., University of Michigan, 1991. *Medical, Health Physics, Nuclear Physics*. Medical physics; radiology; imaging.

Adjunct Associate Professor

Frayner, D., Ph.D., University of Virginia, 1996. *Astronomy, Astrophysics*. Extragalactic astronomy.

Keesee, Amy, Ph.D., West Virginia University, 2006. *Plasma and Fusion*.

Schulze, Felix Julian, Ph.D., Ruhr-University Bochum, Germany, 2009. *Low Temperature Physics, Plasma and Fusion*. Low temperature plasma physics, capacitive and inductive RF plasmas, electron heating, control of distribution functions, plasma diagnostics, Particle in Cell simulations, plasma modeling, sheaths, plasma-surface interactions, microplasmas, Plasma Enhanced Chemical Vapor Deposition, Plasma Etching, Sputtering.

Adjunct Assistant Professor

Bandura, Kevin, Ph.D., Carnegie Mellon University, 2011. *Astronomy, Cosmology & String Theory*. Radio astronomy.

Biloiu, Costel, Ph.D., Bucharest University, 1999. Principal Scientist, Varian Semiconductor Equipment, Applied Materials. *Plasma and Fusion*.

Fang, Fang, Ph.D., University of Michigan, 2012. *Solar Physics*. Numerical Modeling on Solar and Stellar Physics.

Fonseca, Emmanuel, Ph.D., University of British Columbia, 2016. *Astrophysics*. Radio pulsars; Fast Radio bursts; Radio instrumentation.

Fowler, Christopher M., Ph.D., University of Colorado, Boulder, CO. *Atmosphere, Space Physics, Cosmic Rays, Plasma and Fusion*. Plasma Physics; Space Plasmas.

Goodrich, Katherine, Ph.D., University of Colorado, Boulder, CO, 2017. *Atmosphere, Space Physics, Cosmic Rays, Solar Physics*. Plasma Physics; Space Plasmas.

Lynch, Ryan S., Ph.D., University of Virginia, 2011. *Astronomy*. Radio astronomy.

Affiliate Assistant Professor

Zhang, Fan, Ph.D., California Institute of Technology, 2013. *Astrophysics*. General relativity.

DEPARTMENTAL RESEARCH SPECIALTIES AND STAFF

Theoretical

Applied Physics. Photocatalytic materials, new materials by design. Romero.

Astrophysics. Interstellar medium; galactic structure; stellar evolution; compact objects; general relativity; pulsars. Etienne, McWilliams.

Condensed Matter Physics. Surface and interface phenomena; lattice stability and relaxation; molecular dynamics; properties of disordered materials; biomaterials; complex fluids and membranes; fracture; transport in random media; thin-film growth; optical properties of materials. Golubovic, Romero, Seehra, Stanescu.

Plasma and Fusion. Plasma instabilities; simulations applicable to space and laboratory plasmas; low-temperature plasmas; fusion diagnostics; space plasma instrumentation; space plasma modeling and data analysis. Cassak, Fang, Fowler, Ganguli, Goodrich, Kobelski, Koepke, Scime.

Statistical & Thermal Physics. Fractals; percolation theory; chaos; phase transitions and critical phenomena; nonequilibrium growth and pattern formation. Golubovic, Tu.

Experimental

Applied Physics. Preparation and characterization of nanoparticles; iron-based catalysts; properties of air-borne particulate matter; coal-based high-purity carbons and carbon fibers; electrochemical detection of Hg and other trace metals using boron-doped diamond films; visible and UV light emitters and sensors; nonlinear optical and photorefractive materials. Bristow, Flag.

Astrophysics. Radio astronomy; X-ray astronomy; pulsars; tests of strong-field gravity; digital signal processing; computational astrophysics. Anderson, Bandura, Burke-Spolaor, Frayer, Kobelski, Lockman, Lorimer, McLaughlin, O'Neil, Pisano.

Biophysics. Optogenetic devices, implantable neural sensors, neural signal processing. Lee.

Condensed Matter Physics. Electronic structure and magnetic properties of artificially grown surfaces and superlattices and nanoscale particles; spin transport; properties of magnetic ions and clusters; elementary excitations in antiferromagnets; magnetic susceptibility; magnetostriction; electrical, structural, and electro-optic properties of semiconductors; optical and magnetic resonance characterization of point defects. Bristow, Cen, Flag, Golubovic, Holcomb, Johnson, Li, Murphy, Seehra, Wang.

Materials Science, Metallurgy. X-ray scattering from disordered systems; Auger and X-ray photoelectron spectroscopy deposition physics; molecular beam epitaxy; properties of monolayer and multilayer thin films; optical properties of quantum-confined systems and semiconductors. Holcomb, Seehra.

Nano Science and Technology. Nanostructured materials; nano toxicology; biological sensors; nanomagnetism; quantum dots. Bristow, Cen, Flag, Holcomb, Johnson, Seehra, Stanescu, Wang.

Physics and other Science Education. K-12 teacher training; development of GTA training programs; curriculum development. Abdul-Razzaq, Miller, Gay Stewart, John Stewart, Williamson.

Plasma and Fusion. Plasma waves and instabilities; nonlinear interactions; turbulence and chaos; space plasma instrument design; space plasma data analysis and instrument (sensor) development; magnetic reconnection; plasma processing. Biloiu, Kobelski, Koepke, Scime.

View additional information about this department at 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.