Washington University in St. Louis

# Physics

Website: http://physics.wustl.edu/graduate

The Department of Physics offers Master of Arts (AM) and Doctor of Philosophy (PhD) programs in physics. Research in this department covers a wide area of experimental and theoretical physics and benefits from close contacts with nuclear and inorganic chemists in the Department of Chemistry; planetary scientists in the Department of Earth, Environmental, and Planetary Sciences; applied scientists in the McKelvey School of Engineering and the Institute of Materials Science & Engineering; and biological scientists both on the Danforth Campus and at the School of Medicine. The department is a major participant in the McDonnell Center for the Space Sciences, the Institute of Materials Science & Engineering, and the Center for Quantum Sensors.

Experimental research areas include the following:

- Astrophysics (observations of cosmic rays, gamma rays, X-rays, dark matter detection, and high-precision tests of gravity)
- Space sciences (laboratory analysis of meteorites, stardust, and interplanetary dust particles)
- Condensed matter and materials physics (graphene and other two-dimensional atomic crystals, nanostructured materials, metallic glasses and liquids, magnetism and superconductivity, high-pressure physics, and topological materials)
- Quantum information science (quantum sensing and simulation and computation)
- Biophysics (computational neurophysics and systems cell biology)

Theoretical research areas include the following:

- Biophysics (nonequilibrium dynamics in biological cells and theory of the microbiome)
- Condensed matter physics and quantum materials (strongly correlated electron systems, topological phases, excited states of many-electron systems, density functional theory, glasses, quantum equilibrium and non-equilibrium phenomena, quantum memory, statistical mechanics, and networks and machine learning)
- Elementary particle physics (astroparticle physics, dark matter, theoretical cosmology, strong interactions, non-Hermitian Hamiltonians, and quark physics beyond the Standard Model)
- Nuclear theory (atomic nuclei, infinite neutron and nuclear matter, nuclear structure and reactions, ab initio calculations, nuclear models, quark matter, neutron star mergers, and physics beyond the Standard Model)

Students spend their first two years (four semesters) taking graduate courses. At the end of this time, they will typically have completed requirements for the master's degree. Students planning to complete a PhD will also need to find a dissertation advisor and start their research. PhD candidates will receive a stipend and complete two semesters of mentored teaching experiences. After achieving the required course grades and passing an oral examination at the end of their second year, PhD students are normally paid from research funds while working on their research and writing a dissertation. The PhD program typically takes between five and six years to complete.