Brandeis University

Physics

Knowledge Justice Excellence

Why Physics at Brandeis?

Brandeis offers students the unique opportunity to prepare for graduate school or employment in a variety of technical fields. Our undergraduate program is strongly based on a first-rate research program by our faculty, which gives students the opportunity to participate in cutting-edge research in areas including astrophysics and cosmology, biological physics, condensed matter physics, high-energy particle physics, and theoretical physics, and topics such as string theory, liquid crystals, DNA, polymers, elementary particles, distant quasars, and the early universe.

Curriculum Overview

Students majoring in physics can work toward a bachelor of arts or bachelor of science degree. One can also minor in physics. The *Brandeis University Bulletin* describes the requirements for these options in detail. The core curriculum in physics for a bachelor's degree includes a sequence of six semester courses plus laboratories, starting with Classical Mechanics, and ending with Quantum Mechanics. Normally, students take one or more years of mathematics beyond the required courses in calculus. For the bachelor of science degree, more courses in physics, math, and other sciences are required, encouraging students to broaden their preparation for interdisciplinary studies, or to strengthen their preparation in physics. Most students preparing for graduate studies pursue the BS degree, while the BA allows ample time for joint majors in a broad range of fields including mathematics, computer science, chemistry, biology, biological physics, or neuroscience, but also with economics, music, philosophy, and creative writing, among others.

Electives for the physics major cover a range of topics, fundamental and of special interest for different career objectives.

The physics major requires three laboratory courses. Our advanced labs cover electronics, microprocessors, and modern experimental methods. These courses are popular, since they relate to technology and applications of physics to practical problems. Some basic electives offered by the department are Statistical Physics, Classical Physics, and Mathematical Physics. More specialized electives include Astrophysics, Condensed Matter Physics, Particle Physics, and Biological Physics. Besides establishing a sound basis for continuing work in physics, these courses are valuable for preparing students to do research with our faculty, perhaps the most important part of an undergraduate career in science, and one of the strongest points of the program at Brandeis.

Physics
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Undergraduate Research Opportunities

All physics students are strongly encouraged to get involved in research projects. Our condensed matter research laboratories are equipped with some of the latest technology for basic research in the physics of fascinating systems, including liquid crystals and biological materials. Our new microfluidics laboratory offers the chance to fabricate novel experimental devices. Our high-energy experimental physics group has opportunities for work on new particle detectors for the new accelerator at CERN in Switzerland, and for studies of experimental design and data analysis. Our radio astronomy group uses a combination of telescopes worldwide to make high-resolution images of active galactic nuclei, involving massive black holes and relativistic jets of matter. The theory group studies the fundamentals of quantum theory and string theory, the properties of DNA, proteins, and other biological materials, the structure and dynamics of glasses, the flow of granular material, and the regulation of genetic systems in living cells.

Career and Education Opportunities

Most of our graduates go on to graduate school, while some go into high-tech employment, medical school, or other professional studies. Our students have a record of entering the best graduate programs.

Faculty

Following is a list of department faculty members and their areas of specialization:

- **James Bensinger**
  Experimental high-energy physics
- **Craig Blocker**
  Experimental high-energy physics
- **Bulbul Chakraborty**
  Theoretical condensed matter physics
- **Zvonimir Dogic**
  Soft condensed matter physics, biological physics
- **Richard Fell**
  Theoretical quantum electrodynamics
- **Seth Fraden**
  Physics of liquid crystals, colloids, macromolecules, microfluidics
- **Michael Hagan**
  Computation and theory in biological physics
- **Matthew Headrick**
  Theoretical high-energy and gravitational physics; string theory and related areas of quantum field theory, general relativity
- **Lawrence Kirsch**
  Experimental high-energy physics
- **Jané Kondev**
  Theoretical condensed matter physics
- **Albion Lawrence**
  String theory and its applications to particle physics and cosmology
- **Robert Meyer**
  Physics of liquid crystals, colloids, and polymer gels
- **David Roberts**
  Theoretical astrophysics, radio astronomy
- **Azadeh Samadani**
  Experimental biological physics, soft condensed matter physics
- **Howard Schnitzer**
  Quantum theory of fields, string theory
- **Geoffry Svacha**
- **John Wardle**
  Radio astronomy, cosmology
- **Hermann Wellenstein**
  Experimental high-energy physics

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