

High Energy Physics

The Program

The High Energy Physics (HEP) program strives to advance our understanding of how the universe works at its most fundamental level.

The Request

The President requests \$788,000,000 for High Energy Physics, an increase of 2.9% from last year's appropriation.

The Reason

Requested funds are intended for efforts such as:

- Implement the strategy of the [Particle Physics Project Prioritization Panel](#) – address the five compelling science drivers with research in three frontiers and related efforts in theory, computing and advanced technology R&D
- [Energy Frontier](#): Continue leadership role in LHC discoveries, data analysis, and initial upgrades to the ATLAS and CMS detectors
- [Intensity Frontier](#): Develop a world-class U.S.-hosted Long Baseline Neutrino Facility
- [Cosmic Frontier](#): Advance our understanding of dark matter and dark energy

The Research (and Developments)

- World Record for Compact Particle Accelerator
<http://newscenter.lbl.gov/2014/12/08/world-record-for-compact-particle-accelerator/>
- Researchers Hit Milestone in Accelerating Particles with Plasma
<https://www6.slac.stanford.edu/news/2014-11-05-researchers-hit-milestone-accelerating-particles-plasma.aspx>
- Fermilab's 500-Mile Neutrino Experiment Up and Running
http://www.fnal.gov/pub/presspass/press_releases/2014/NOvA-Running-20141006.html
- DOE's High-Speed Network to Boost Big Data Transfers by Extending 100G Connectivity Across Atlantic
<http://newscenter.lbl.gov/2014/10/20/does-high-speed-network-to-boost-big-data-transfers-by-extending-100g-connectivity-across-atlantic/>
- Selection of Next Generation of Dark Matter Detectors
<http://www.pppl.gov/news/2014/10/scientists-use-plasma-shaping-control-turbulence-stellarators-1>

Nuclear Physics

The Program

The mission of the Nuclear Physics (NP) program is to discover, explore, and understand all forms of nuclear matter.

The Request

The President requests \$624,600,000 for Nuclear Physics, an increase of 4.9% from last year's appropriation.

The Reason

Requested funds are intended for efforts such as:

- High priority research areas such as nuclear structure, nuclear astrophysics, the study of matter at extreme conditions, fundamental properties of the neutron, and neutrino-less double beta decay
- Continuing construction of the [Facility for Rare Isotope Beams](#) for research on nuclear structure and nuclear astrophysics
- Implementation and commissioning activities for the [12 GeV CEBAF Upgrade](#)
- Operations of Brookhaven Lab's Relativistic Heavy Ion Collider ([RHIC](#))
- Operations of the [ATLAS facility](#) and associated modest upgrades
- Research, development, and production of [stable and radioactive isotopes](#) for science, medicine, industry, and national security

The Research (and Developments)

- Shades of Perfection in Perfect Liquids
<http://science.energy.gov/np/highlights/2014/np-2014-04-e/>
- Jefferson Lab Accelerator Upgrade Completed: Initial Operations Set to Begin While Experimental Equipment Upgrades Continue
<https://www.jlab.org/news/releases/jefferson-lab-accelerator-upgrade-completed-initial-operations-set-begin-while-experim>
- (Video) [Special report: A look inside the FRIB](#), FOX 47 News, November 18, 2014
- Improving the Availability of the Therapeutic Radionuclide Astatine-211
<http://science.energy.gov/np/highlights/2014/np-2014-11-b/>
- Nuclear Theory Helps Forecast Neutron Star Temperatures
<http://science.energy.gov/np/highlights/2014/np-2014-05-d/>
- Radiokrypton Dating Identifies Ancient Antarctic Ice
<http://science.energy.gov/np/highlights/2014/np-2014-11-a/>

Fusion Energy Sciences

The Program

The Fusion Energy Sciences (FES) program advances the fundamental understanding of matter at very high temperatures and densities and builds the scientific foundations needed to develop a fusion energy source.

The Request

The President requests \$420,000,000 for Fusion Energy Sciences.

The Reason

Requested funds are intended for efforts such as:

- [DIII-D](#) and [NSTX-U](#) national programs
- U.S. research involvement on international machines EAST (China), KSTAR (Korea), and W7-X (Germany)
- HEDLP research on the MEC instrument at [LCLS](#)
- U.S. contributions to ITER, supporting [U.S. ITER Project Office](#)
- General plasma science activities, including the partnership with NSF

The Research (and Developments)

- Panel Ensures Safe Operation of the \$94 Million NSTX Upgrade
<http://www.pppl.gov/news/2015/01/panel-ensures-safe-operation-94-million-nstx-upgrade>
- Scientists Use Plasma Shaping to Control Turbulence in Stellarators
<http://www.pppl.gov/news/2014/10/scientists-use-plasma-shaping-control-turbulence-stellarators-1>
- PPPL Successfully Tests Systems for Mitigating Instabilities Called “ELMs”
<http://www.pppl.gov/news/press-releases/2014/09/pppl-successfully-tests-system-mitigating-instabilities-called-%E2%80%9Celm%E2%80%9D>