

The United States at the Large Hadron Collider



Why the Large Hadron Collider at CERN?

The LHC, located near Geneva, Switzerland, is the world's most powerful particle collider. It accelerates and smashes atomic nuclei together, recreating the energetic conditions that existed after the Big Bang and generating new particles. Huge detectors record the collisions, and scientists study the products.



What are the smallest things that exist?

The subatomic world is a complex mosaic of fundamental particles, fields and forces. But there are still many pieces we don't understand.

How can we find these particles?

Albert Einstein discovered that energy and mass are two sides of the same coin. Pack enough energy into a tiny region of space, and new particles will pop into existence.

What does this research accomplish?

- **Uncovers** the ultimate laws of nature
- **Charts** the origins of the univers
- **Explores** the properties of matter and energy

What's next?

Scientists are characterizing the newly discovered Higgs boson, investigating subatomic interactions and searching for new particles and forces. The next steps and goals are outlined in a long-term strategic plan for the US particle physics program called the P5 Report.



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The Biggest Bang for Your Buck

What does the US gain by investing in research that replicates the conditions after the Big Bang?



The next big breakthrough

Many of today's essential technologies—including electricity, radio waves, radioactivity, X-rays, quantum mechanics, special relativity, and nuclear fission and fusion—were discovered through fundamental physics research. Today's fundamental research is paving the way for future technological breakthroughs.

An investment in the world's most powerful particle collider

Students, postdocs, scientists, engineers and technicians from nearly 100 US universities and laboratories work with a large international community to create, operate and analyze data from LHC experiments.

Globally competitive industries

American industries collaborate with US national laboratories and universities to cultivate ideas and build detectors, superconducting magnets and ultrafast computing systems. These partnerships advance science, seed innovation and help American industries maintain leadership.

Spin-off technologies

The tools developed for particle physics of life in everyday technologies: the World Wide Web, advanced cancer therapies, MRI, sensors, cryogenic cooling, microelectronics, superconducting magnets, grid computing and more. Ongoing upgrades to the LHC and its experiments will continue to advance these technologies.

A dynamic and tech-savvy American workforce

Students who participate in research at the LHC gain knowledge and experience working with teams from around the world and become researchers, professors, entrepreneurs and innovators who keep the US economy growing.

A deeper understanding of our universe

Research at the LHC gives us a more complete picture of the fundamental laws of nature, the origins of the matter, the intricacies of space-time and the structure of our universe.



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