

# Large Hadron Collider sends beams in 2 directions

November 23 2009, By ALEXANDER G. HIGGINS , Associated Press  
Writer

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In this photo released by the European Organization for Nuclear Research (CERN) on Saturday, Nov. 21, 2009, scientists react in the CERN Control Center after successfully restarting the Large Hadron Collider, in Geneva, Switzerland, Friday, Nov. 20, 2009. Scientists moved Saturday to prepare the world's largest atom smasher for exploring the depths of matter after successfully restarting the \$10 billion machine following more than a year of repairs. (AP Photo/Keystone, Brice, CERN)

(AP) -- The world's largest atom smasher made another leap forward Monday by circulating beams of protons in opposite directions at the same time in the \$10 billion machine after more than a year of repairs, organizers said.

New discoveries on the makeup of universe and its tiniest particles are

unlikely before next year, but the [Large Hadron Collider](#) has been advancing faster than expected in its startup phase that began Friday night, said Rolf Heuer, director-general of the European Organization for Nuclear Research.

Proton collisions could possibly begin within the next 10 days, officials said Monday.

"It went much faster than foreseen," said Fabiola Gianotti, who speaks for the Atlas experiment, one of four major detectors in rooms the size of cathedrals about 100 meters (300 feet) underground. "We're all very happy."

Ultimately, the collider aims to create conditions like they were 1 trillionth to 2 trillionths of a second after the Big Bang - which scientists think marked the creation of the universe billions of years ago. Physicists also hope the collider will help them see and understand other suspected phenomena, such as dark matter, [antimatter](#) and supersymmetry.

The collider was started with great fanfare Sept. 10, 2008, only to be heavily damaged by an [electrical fault](#) nine days later. It has taken 14 months to repair and add protection systems to the machine before it was restarted.

The protons on Monday were traveling at almost the speed of light - 11,000 times a second in each direction around the 27-kilometer (17-mile) tunnel under the Swiss-French border at Geneva. The scientists are still testing the machine before causing [proton](#) collisions, the heart of the research at the organization, known as CERN.

So far the machine is operating at 450 billion electron volts of energy, which is relatively low compared with its design capability of 14 times

that. It soon will overtake the world's current most powerful accelerator, the Tevatron at Fermilab outside Chicago, which operates at 1 trillion electron volts, or TeV.

Steve Myers, the director for accelerators, said the CERN collider should be ramped up to 1.2 TeV by Christmas. CERN might decide to make the first collisions at the current low energy or at 1.2 TeV, but that will be more for calibration purposes than for making scientific discoveries.

Physicists said the discoveries could begin in the first half of next year when the collider reaches 3.5 TeV.

Myers said the collider may even go up to 5 TeV before the end of the year.

Tejinder S. Virdee, a physicist from London's Imperial College who represents more than 2,000 scientists on the experiment at CERN, said it could take several years before the collider discovers the elusive Higgs boson, a particle that theoretically gives mass to other subatomic particles, and thus everything in the universe.

That is because the Higgs boson is believed to be hard to see and needs powerful energy to be revealed, Virdee said.

"This is going to take a few years," he said.

The collider will eventually create conditions many millionths of a second closer than the previous closest to the Big Bang, at which matter is believed to have changed very quickly as the universe cooled rapidly and expanded.

"Nature is always more," said Gianotti. "There would be no charm if we

knew now."

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Citation: Large Hadron Collider sends beams in 2 directions (2009, November 23) retrieved 25 April 2024 from <https://phys.org/news/2009-11-large-hadron-collider.html>

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