

Riddle of 'God particle' could be solved by 2012: CERN (Update)

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The Large Hadron Collider particle accelerator operated by European Organization for Nuclear Research near Geneva. Physicists at the European Organisation for Nuclear Research (CERN) say they believe that by the end of 2012 they will be able to determine whether a theorised particle called the Higgs boson, which has unleashed a gruelling decades-long hunt, exists or not.

Physicists said on Tuesday they believed that by the end of 2012 they could determine whether a theorised particle called the Higgs boson, which has unleashed a gruelling decades-long hunt, exists or not.

"I'm pretty confident that towards the end of 2012 we will have an answer to the Shakespeare question for the Higgs boson -- to be, or not to be?" Rolf-Dieter Heuer, director general of the European Organisation for Nuclear Research (CERN), told a press conference at Britain's Royal Society.

CERN has ordered the world's biggest particle collider to step up the quest to explain mass, one of the greatest puzzles in physics.

The key to this is believed to be the Higgs, a notional sub-atomic particle named after British physicist Peter Higgs who mooted its existence in 1964.

If it is found, one of the last pieces would be set in place in the famous Standard Model, which seeks to bring all the particles and forces in the Universe under a single, unified theory.

"By the end of 2012 we will either discover the Standard Model Higgs Boson, if it exists, or we will rule it out," said Fabiola Gianotti, who is the spokesman for CERN's biggest particle-collider lab, called Atlas.

CERN's Large Hadron Collider (LHC) is located in a 27-kilometre (16.9-mile) ring-shaped tunnel 100 metres (325 feet) below ground, straddling the French-Swiss border.

It is designed to accelerate protons to nearly the speed of light and then smash them together in house-sized labs where detectors record the seething sub-atomic debris.

The smashups briefly stoke temperatures 100,000 times hotter than the Sun, fleetingly replicating conditions which prevailed split-seconds after the "Big Bang" that created the Universe 13.7 billion years ago.

In this primordial soup, novel particles may lurk that will resolve mysteries clouding our understanding of fundamental matter, scientists say.

Enigmas include the Higgs -- dubbed "the God particle" for being mysterious yet ubiquitous -- as well as suspected "supersymmetrical"

particles that could explain dark matter, which comprises around 23 percent of the Universe.

The first proton collisions at the LHC occurred on September 10, 2008. The smasher then had to endure a 14-month shutdown to fix technical problems.

The LHC recently notched up the biggest-ever energy release from particle collisions, although this is still only half of its design capacity.

It had been due to shut down in early 2012 for work enabling it to crank up to full power.

However, a decision was made several weeks ago to delay closure for a year to help the search for the Higgs, said Gianotti.

The theory behind the Higgs is that mass does not derive from particles themselves.

Instead, mass comes from collisions between particles and a non-matter particle, or boson, called the Higgs. These collisions slow down some particles and give them mass, but other particles experience few collisions or none at all.

Europe and the United States have been jousting for Higgs glory -- and the competition is feverish right now, because the legendary Tevatron collider at Fermilab in Chicago will be shut down for good in 2011.

In late April, rumours circulated like wildfire that CERN had detected the shadow of a Higgs, but this was only a partial, draft result that was leaked on an Internet blog and turned out to be false, said Gianotti.

"It was wrong," she said. "We see no peak and no evidence of a Higgs

boson, unfortunately."

Explaining CERN's cautious scrutiny, she said: "Of course we are very keen to share results with the public... it's just that we don't want to produce the wrong results."

Finding the boson would be almost certainly a Nobel-winning exploit, for its discoverers and Higgs himself.

Determining that it does not exist would also be a success, although it would amount to a daunting challenge of the Standard Model, said Heuer.

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