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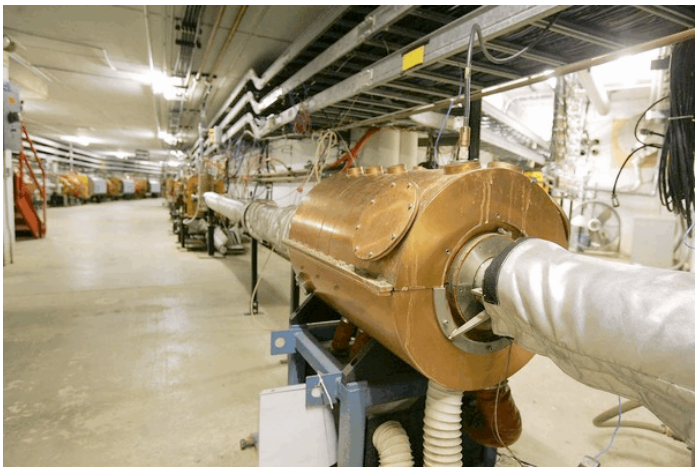
Fermi closes in on elusive God Particle

Scientists in Switzerland also see signs of Higgs boson



Scientists at Fermilab are using the Tevatron, a circular particle accelarator,… (Terry Harris, Chicago Tribune 2007)

July 27, 2011|By Robert McCoppin, Tribune reporter

Scientists at Fermi National Accelerator Laboratory say they've found hints of a particle that has eluded researchers for more than a decade, one of the last undiscovered building blocks of nature.

If found, the Higgs boson would provide crucial evidence that the current mainstream physicists' theory of how the universe works is correct, and it would help explain why matter has mass. Its invisible presence throughout the cosmos, if true, is so significant yet subtle that some call it the God Particle.

Fermilab scientists announced Wednesday that they have seen signs of the Higgs boson and are narrowing down parameters that could help them find it. In Chicago parlance, it's as if they have found the Lady in Red, the woman who accompanied John Dillinger before his capture, but have not yet spotted the gangster himself.

"We're getting quite close," said Dan Green, a senior scientist at Fermilab. "It's palpably exciting."

Such basic research has cost hundreds of millions of dollars over the years. The search has great implications for understanding how the tiniest particles work together to make elemental forces like electricity and magnetism work. While a discovery won't help invent the next X-Box or five-bladed razor, Green says it will push cutting-edge technology, which has helped lead to life-saving advancements in medicine like magnetic resonance imaging, or MRIs, and CAT and PET scans, as well as the Internet.

The news comes as time is running out for Fermilab. Because federal funding is ending for its main Tevatron particle accelerator, the underground, two-mile circular track is due to close Sept. 30. The lab, however, and its smaller accelerators will keep operating, and scientists will take another year or two to analyze the mountain of data they are collecting.

This latest discovery may boost Fermilab's profile during ongoing federal budget negotiations, officials there said, but lawmakers already rejected a proposal last year to extend Tevatron's life.

So in the time they have left, either this year or next, researchers will try to ascertain whether the Higgs boson exists, while a European counterpart races ahead collecting more data.

The Higgs boson, named for a British physicist who theorized it, is believed to be the particle that gives mass to subatomic particles, without which the world as we know it would not exist.

Specifically, researchers are trying to figure out the mass of the Higgs boson. By smashing protons and antiprotons together at Fermilab, the accelerator produces collisions that spew out a shower of subatomic particles. While researchers can't see the Higgs boson directly, they can measure the particles into which they believe it decays.

From 1 million such collisions every second, physicists at Fermilab have narrowed the range of the Higgs mass to about 108 to 156 gigaelectronvolts, or GeV. Each GeV is about equal to the mass of a proton.

The results were announced at a convention in France, where the European Organization for Nuclear Research, or CERN, announced a similar but more narrow range of 120 to 150 GeV, from experiments at the world's largest particle accelerator near Geneva.

The Fermi results and the European results each have a certainty of more than 95 percent. That sounds like a high probability, but Stefan Soldner-Rembold, spokesman for one of the Fermilab experiments, said physicists need far more certainty to declare a discovery. Just last year, Fermilab denied rumors they had found the particle.

By narrowing the range of mass for the Higgs boson, physicists know where to keep looking. But more sensitive results and analysis are needed to determine whether the

statistical bumps seen were the invisible target, another unidentified particle or a random event.

For all their progress, researchers caution, they have more work to do to nail down their elusive enigma.

"People are excited, perhaps rightfully so," Soldner-Rembold said. "But very rarely do you have 'aha!' moments. You're really combining the data, and a picture emerges. It's not like turning a switch; it's like something emerging from the fog."

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