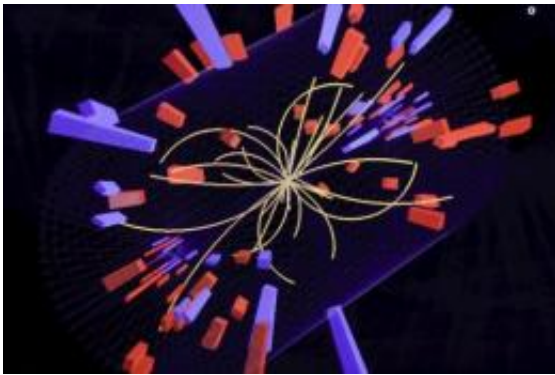


US atom smasher may have found new force of nature (Update 4)

April 6 2011



A monitor showing ultra high-energy collisions of protons. US physicists are to announce that data from a major atom smasher lab may have revealed a new elementary particle, or potentially a new force of nature

Data from a major US atom smasher lab may have revealed a new elementary particle, or potentially a new force of nature that could expand our knowledge of the properties of matter, physicists say.

The science world was abuzz with excitement Wednesday over the findings, which could offer clues to the persistent riddle of mass and how objects obtain it -- one of the most sought-after answers in all of physics.

But experts cautioned that more analysis was needed over the next several months to uncover the true nature of the observation, which

comes as part of an ongoing experiment with proton and antiproton collisions to understand the workings of the universe.

"There could be some new force beyond the force that we know," said Giovanni Punzi, a physicist with the international research team that is analyzing the data from the US Department of Energy's Fermi National Accelerator Laboratory.

"If it is confirmed, it could point to a whole new world of interactions," he told AFP.

While much remains a mystery, researchers agree that this is not the "God Particle," or the Higgs-boson, a hypothetical elementary particle that has long eluded physicists who believe it could explain why objects have mass.

"The Higgs-boson is a piece that goes into the puzzle that we already have," said Punzi. "Whereas this is something that goes a little bit beyond that -- a new interaction, a new force."

Punzi said the new observation behaves differently than the Higgs-boson, which would be decaying into heavy quarks, or particles.

The new discovery "is decaying in normal quarks," Punzi said. "It has different features," he added.

"One thing we know for sure -- it is not the Higgs-boson. That is the only thing we know for sure."

For more than a year physicists have been studying what appears to be a "bump" in the data from the Illinois-based Fermi lab, which operates the powerful particle accelerator, or atom-smasher, Tevatron.

The Tevatron was once the most powerful machine in the world for such purposes until 2008 when the Large Hadron Collider (LHC) became operational at the European Organization for Nuclear Research, which goes by the acronym CERN.

The US machine began its work in the mid 1980s, and is scheduled for shutdown later this year when its funding runs dry.

"These results are certainly tantalizing," said Nigel Lockyer, director of Canada's national laboratory for particle and nuclear physics, TRIUMF.

"It is too early to say for sure what the Fermilab team has observed," he added in an email.

"On the one hand, there is clear evidence for something unexplained, and on the other, there is a long list of alternative explanations for what might be causing this subtle observation.

"My personal judgment is that this excitement is adding fuel to the fire for the next generation of results and discoveries that will be made at the LHC (in Europe) and elsewhere. We are so close to learning something profound."

Lockyer, a former spokesman for the Collider Detector at Fermilab (CDF), which made the announcement, said there is another major experiment going on at Tevatron, a sister project known as D-Zero (D0), which could help confirm the data.

"They are both multipurpose detectors. They both have the capability of seeing this," he said, predicting a rush of opinions by theoretical physicists in the coming days, and more data that could shed more light on the finding by summer.

"It will become very much clearer in the next few months. You won't have to wait years."

According to D0 physicist Gregorio Bernardi, the presentation of the findings created a stir.

"This is not yet what we call a discovery, since this is possibly a statistical fluctuation, but it is already quite significant, and could be evidence for physics beyond the standard model," he said.

"While experimentalists are careful when a signal is extracted above a large background as it is the case here, the theorists were all quite excited and several papers are being submitted today or tomorrow."

D0 will release a similar study in the coming weeks.

"In the previous D0 publication on such events, with four times less statistics, no such peak was visible," Bernardi said.

More information: View an online video presentation [here](#).

(c) 2011 AFP

Citation: US atom smasher may have found new force of nature (Update 4) (2011, April 6) retrieved 26 April 2024 from <https://phys.org/news/2011-04-atom-smasher-nature.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.