Birmingham Physicists excited by hints of Higgs boson existence

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Birmingham particle physicists, along with a 3000 strong team of scientists from all over the world, are today trawling through the data from particle collisions at the Large Hadron Collider that could indicate the existence of the Higgs boson.

Against the regular backdrop of results from known processes, proton-proton collisions have produced considerable fluctuations that have intrigued scientists working at the ATLAS project in CERN.

The discovery of the Higgs boson could fill in a vital missing link in the 'standard model' which is the accepted theory of particle physics - it will tell scientists why everything in the universe has mass.

As a result of smashing high energy protons together about 100 trillion times the physicists have now been able to rule out the Higgs boson particle over an extensive mass range, in particular at large masses, where no previous studies have been possible. This has given them a better, more precise clue as to where this elusive particle might be found.

Professor Paul Newman, particle physicist from the University of Birmingham and member of the ATLAS collaboration said: '*We have a very successful theory that describes all of the known elementary particles and the forces that act between them. However, it doesn't give the particles any mass, so we need to add one more ingredient to this theory which is where the Higgs boson comes in.*

'No one has seen it and no one knows how heavy it is, so that is why we have been searching in such a wide mass range for it. The new results have narrowed down this mass range quite considerably. However the biggest excitement is for masses around 130 - 150 gigaelectron volts (about 150 times heavier than a proton) where we are seeing more events than would be expected from background sources alone. We need more data before we can say for sure that this is the Higgs boson rather than a fluke. For now we can only say that if there is a Higgs boson at around this mass, it would give this sort of signal.'

Birmingham physicists are part of a 3000 strong team of scientists who have been working on the ATLAS experiment at the Large Hadron Collider. Birmingham has made a significant contribution to this project by designing and building some of the sophisticated trigger electronics that are selecting the important particle collisions in the detector. The collisions that are chosen by these triggers help scientists to concentrate on the data most likely to yield new discoveries.

Another experiment at the LHC, the CMS detector, has also seen similar results, which corroborate the findings at ATLAS. Professor Dave Charlton, Birmingham physicist and deputy spokesperson for the international ATLAS collaboration, said: *'The fact that both experiments see similar results makes it even more intriguing. We have some way to go and a lot more data to collect before we can confidently say if we have found the Higgs – or if it doesn't exist. But by the end of 2012 we expect to have the answer. In the meantime this is some of the most exciting news to come from the LHC experiments.'*

Professor Pete Watkins from the University of Birmingham's School of Physics and Astronomy said: *'It is very exciting to see all the work that the Birmingham Particle Physics group has invested in the design, construction and testing of the selections of collisions for recording with the ATLAS detector making crucial contributions to these new results.'*

Physicists expect to have about 10 times more data by the end of the current LHC run later next year. This should be sufficient to clarify the results announced today and to determine whether there is a Higgs boson over the full range of possible masses.

Notes to Editors

The Large Hadron Collider at CERN, the European Laboratory for Particle Physics, in Geneva, is in an underground tunnel of 27 kilometres that runs underneath the French/Swiss border where Birmingham scientists are playing key roles in large international collaborations which will examine particle collisions at three detectors ALICE, ATLAS and LHCb. Scientists hope to uncover the mysteries of the universe by measuring particle collisions under conditions that would have existed less than a millionth of a second after the Big Bang.

For further information

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