

cb(3P): New particle at the Large Hadron Collider discovered by ATLAS experiment

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(PhysOrg.com) -- Researchers from the University of Birmingham and Lancaster University, analysing data taken by the ATLAS experiment, have been at the centre of what is believed to be the first clear observation of a new particle at the Large Hadron Collider. The research is published today on the online repository *arXiv*.

The particle, the $c_b(3P)$ [pronounced kye-bee three P], is a new way of combining a beauty quark and its [antiquark](#) so that they bind together. Like the more famous Higgs particle, the $c_b(3P)$ is a boson. However, whereas the Higgs is not made up of smaller [particles](#), the $c_b(3P)$ combines two very heavy objects via the same ‘strong force’ which holds the atomic nucleus together.

Andy Chisholm, a PhD student from the University of Birmingham who worked on the analysis said: ‘Analysing the billions of particle collisions at the LHC is fascinating. There are potentially all kinds of interesting things buried in the data, and we were lucky to look in the right place at the right time.’

‘The $c_b(3P)$ is a particle that was predicted by many theorists, but was not observed at previous experiments, such as in my previous work on the D-Zero experiment in Chicago,’ continued Dr James Walder, a Lancaster research associate who worked on the analysis.

Dr Miriam Watson, a research fellow working in the Birmingham group observed: ‘The lighter partners of the $c_b(3P)$ were observed around 25

years ago. Our new measurements are a great way to test theoretical calculations of the forces that act on fundamental particles, and will move us a step closer to understanding how the universe is held together.’

Professor Roger Jones, Head of the Lancaster ATLAS group said:
"While people are rightly interested in the Higgs boson, which we believe gives particles their mass and may have started to reveal itself, a lot of the mass of everyday objects comes from the strong interaction we are investigating using the c_b ."

More information: The paper is published here at arxiv.org/abs/1112.5154

Provided by University of Birmingham

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