University of Birmingham

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Research Fellow

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About

Ludovica Aperio Bella 's research focuses on the physics of fundamental particles and forces at high energies. One of the outstanding mysteries is the mechanism by which particles acquire mass. The theory of gauge symmetry has been very successful in describing the known fundamental forces; however this theory is obviously incomplete because it requires all particles to be massless. In the summer 2012 both the ATLAS and CMS Collaborations reported a 5σ

excess of events in their 2011 and 2012 datasets of proton-proton collisions at center-of-mass energy √s = 7 TeV and √s = 8 TeV at the Large Hadron Collider at CERN (European Laboratory for Particle Physics) in Geneva. The decays to pairs of vector bosons whose net electric charge is zero identify the new particle as a neutral boson. Moreover, the

observation in the diphoton channel disfavours the spin-1 hypothesis. Ludovica interests are mainly focused on the studies of this new particle because although the current results are compatible with the hypothesis of the Standard Model Higgs boson, more data and detailed studies are needed to assess its nature in detail

Qualifications

- PhD in Particle Physics at LAPP, Annecy-le-Vieux, France. Thesis Title: “Search for Technihadrons in Dielectron channel and Alignments of the ATLAS Liquid Argon Electromagnetic Calorimeters” (2012)
- Master (Second level Degree) in Physics: 110 (out of 110) cum laude, University of Roma Tre, Rome, Italy. Experimental thesis about “Measurement of mean-life of KL meson using KL → π0π0 π0 decay in the DAΦNE e+ e− collider.” (2009)
- Bachelor (First level Degree) in Physics: 110 (out of 110) cum laude, University of Roma Tre, Rome, Italy.. Experimental thesis about Testing and installation of the MDT detectors of ATLAS experiment at CERN (2006). Thesis
- Internship at CERN (European Laboratory for Particle Physics), in Geneva, for 8 weeks in summer.

Biography

After the completion of her graduate studies at the University of Roma Tre in Rome Ludovica Aperio Bella has recently completed her Ph.D on the ATLAS experiment at the Laboratoire d'Annecy-le-Vieux de Physique des Particules (LAPP).

During the Ph.D Ludovica Aperio Bella participated to almost all the activities related to the ATLASexperiment: commissioning of the detector, studies of the performance associated with reconstruction of physics objects and finally conducting a search for new physics phenomena. Moreover, she has spent part of the time during her Ph.D at CERN (European Laboratory for Particle Physics).

Teaching

- Teaching assistant at the University Roma Tre in Rome for about 70 hours. Discipline: Classical Mechanics.
- During her Ph.D Ludovica Aperio Bella has also participated in several LAPP laboratory projects that aimed to attract very young students to the high energy particle physics domain.

Research

Research themes

1. Exotic searches for resonant deviations from the Standard Model in the high masses of the dilepton spectrum
2. Commissioning studies on the timing alignment of the ATLAS Liquid Argon Calorimeter
3. Performance studies to estimate the reconstruction and identification electron efficiencies.

Research activity

The ATLAS experiment at the Large Hadron Collider

Publications

- **ATLAS Author since 9 November 2010 (https://twiki.cern.ch/twiki/bin/view/AtlasPublic) .**

Some recent publication highlights:

- “Status of the Atlas Liquid Argon Calorimeter and its Performance after two years of LHC operation” Ludovica Aperio Bella - NIMA-PROCEEDINGS-D-12-00277
- “Searches for Exotics physics states in jets and boosted objects final states” Ludovica Aperio Bella - eConf, Proceedings of the Conference Physics at LHC-2012,

Vancouver, 2012

- “Search for high-mass resonances decaying to dilepton final states in pp collisions at a center-of-mass energy of 7 TeV with the ATLAS detector” - ATLAS Collaboration - JHEP (CERN-PH-EP-2012-190)\
- “Measurement of the high-mass Drell-Yan differential cross-section in the di-electron final state”- ATLAS Collaboration - PLB (ATL-COM-PHYS-2012-921)
- “Search for high-mass dilepton resonances in 6.1 fb−1 of pp collisions at s = √8 TeV with the ATLAS experiment”-ATLAS Collaboration - ATLAS-CONF-2012-129