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PR-WITS-ATLAS-EXPERIMENT SAPA PR -- WITS SCIENTISTS PLAY A KEY ROLE IN HISTORIC OBSERVATION ...

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4 JULY 2012

WITS SCIENTISTS PLAY A KEY ROLE IN HISTORIC OBSERVATION OF A PARTICLE CONSISTENT WITH THE HIGGS BOSON

A Wits team who plays a visible and strong role in the search for the Higgs boson at the ATLAS detector, is part of a team of researchers at the European Organization of Nuclear Research (CERN) who today announced that they have observed a particle consistent with the Higgs boson.

The announcement that started at 09:00 South African time in Geneva, Switzerland, this morning, is hailed as the birth of a new era in the field of fundamental physics.

According to the Wits team, tantalizing hints of a new particle with a mass around 126 GeV were reported in December 2011. The ATLAS experiment has confirmed this excess with data taken in 2012. This is consistent with reports from the CMS experiment. The observed excess is consistent with the existence of a Higgs-like particle.

The statistical significance of the measurement is 5 sigma. The size of the statistical significance makes it unlikely that the excess observed is due to a statistical fluctuation (by less than a one in a million chance).

"More data will be required to understand if this particle corresponds to the Higgs boson of the Standard Model or whether it is connected to new physics. Regardless of the outcome, we can say with confidence that a new era in the field of fundamental physics has just begun. The study of this new particle, its properties and its interactions, will last for decades and will be connected with the development of new technologies to face the new challenges posed by this endeavour. We are happy to see a solid involvement from Wits in this amazing experience," says Wits team leader, Dr Trevor Vickey.

The Wits team comprising of lead physicists Dr Trevor Vickey and Dr Dana Boeriu (who both relocated to South Africa to lead the University's involvement in the ATLAS experiment), includes several Wits staff members, postgraduate students and post-doctoral scholars. They will soon be joined by Prof. Bruce Mellado who will take up the position of Associate Professor in the School of Physics.

"We have a permanent presence in Geneva in the sense that we rotate our staff and students to contribute to different tasks and maintenance of our detector on site, but through the world-class technology and advanced computer systems, we can analyse our data from almost anywhere in the world," says Dr Vickey.

"We are investigating a wide range of physics, including the search for the Higgs boson (the product of the theory which explains the origin of particle mass), exotic particles and black holes."

The Wits team plans to develop a robust effort for the maintenance, operation and upgrade of the ATLAS detector. This includes building a world-class electronics laboratory on the Wits campus. This is a great opportunity for the training of students and staff in state-of-the-art techniques for high-throughput data-transfer.

There are over one-hundred thousand computers working all over the world analysing data recorded by the CERN detectors. "In particular, Wits is expanding the Tier-3 centre where we can store large volumes of the ATLAS data and host the Monte Carlo simulation needed to perform our different search analyses," says Dr Boeriu.

The Department of Science and Technology and the SA-CERN program has enabled South Africans to participate in the generation of cutting edge science and technology. "Investment in basic science is a fundamental characteristic of any future knowledge economy and we are proud of this international association that puts South Africa on the map," explains Prof. Joao Rodrigues, former Head of the Wits School of Physics. "This is the breeding ground for innovation, for generating new discoveries and for training future scientists to work in global intellectual communities on the most sophisticated equipment in the world. More importantly, our participation at this level puts South Africa on the scientific map globally."

Dr Vickey has been exploring different search techniques at ATLAS since 2005. He has contributed to searches of the Higgs decay into two tau particles (tau particles are heavier and unstable cousins of the electron). He is currently leading the ATLAS team searching for the Higgs boson with this decay signature.

Dr Boeriu joined the ATLAS experiment in 2010 and has been involved together with her postdoc in searches for exotic particles theoretically known as leptoquarks, which are believed to be the link between leptons and quarks (the smallest building blocks of matter) in the early stages of the Universe.

One of the PhD students under Dr. Vickey's supervision is currently working on a crucial simulation tool known as "BlackMax", which simulates the decay of microscopic black holes that could be produced in ATLAS as a result of the high-energy proton-proton collisions.

Dr Mellado joined the ATLAS experiment in 2001 and has focused on the development of techniques to search for the Higgs boson in several decay channels. He has attained a number of positions of responsibility in the ATLAS Higgs effort

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