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SA tech for Large Hadron Collider experiment

Citizen Reporter

The Large Hadron Collider owned by the European Organisation for Nuclear Research. Image courtesy home.web.cern.ch

The first South African piece of hardware has been contributed to the Large Hadron Collider (LHC) this week.

The LHC is a massive particle accelerator, owned by the European Organisation for Nuclear Research (CERN). Last year, CERN announced that they had discovered a particle which may be the elusive Higgs-Boson, a sub-atomic particle that is thought to give matter its mass.

It is one of the largest and most complex experimental facilities ever built. The super-conducting magnets in the accelerator propel two beams of particles around the hadron's 27km ring and smash them into each other in a bid to understand the particles that constitute matter.

Wits PhD student Robert Reed designed a High Voltage board (HV board) that was delivered to the ATLAS team in Geneva, Switzerland this week.

Professor Bruce Mellado from the School of Physics at Wits said manufacturing the HV board is proof "that we in South Africa can deliver with similar standards as our European counterparts. It is also not only an academic exercise, but a real product that will be used for real detector maintenance of the ATLAS detector."

The LHC shut down in February this year for a two-year maintenance and upgrade programme to boost the level of energy that it uses to

smash protons together. It will be back online in 2015. In the meantime, new and upgraded technologies are being developed to assist with the high-level maintenance.

The HV board is located inside the Mobile Drawer Integrity Checking (MobiDICK) system – a mobile version of the test bench which was used during the electronics production at CERN. The HV board is used to produce high voltage to the Photo Multiplier Tubes (PMTs) which are used in the simulation of data taking in order to test the front end electronics of the detector.

The HV board that Reed has designed are used in new mobile testing equipment – a mobile drawer integrity checking system – and its main function is to produce high voltage accurately and reliably.

“On the ATLAS detector you have these drawers of electronics that do all the filtering of the raw data that comes out of the detector. These electronics have to be verified and checked before the LHC starts-up in 2015,” Reed explained. “The new mobile testing equipment basically is a mobile box which the detector maintenance people will use to connect to the detector which would run the test on this drawer of electronics,”

Reed and the High Energy Physics Group will be producing a total of six HV boards for the mobile testing equipment that will be used to test the detector before ATLAS is deployed again for a high energy run.

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