

Physics with the ATLAS at the LHC

Seminar Presentation by Dr. Simon K. Nderitu

simon.nderitu@mcgill.ca | simon.nderitu@calculquebec.ca

Scientific Computing Analyst / Analyste en calcul scientifique

McGill HPC Centre / Centre deCalcul Haute Performance de McGill

<http://www.hpc.mcgill.ca>

<https://www.computecanada.ca/>

Wednesday 14th February 2018, 11 am, Physics Lab 1, Department of Physics, Kenyatta University

Abstract:

The Large Hadron Collider (LHC) is the world's largest and most powerful particle accelerator. It first started up on 10 September 2008, and remains the latest addition to CERN's accelerator complex. The LHC consists of a 27-kilometre ring of superconducting magnets with a number of accelerating structures to boost the energy of the particles along the way. The machine was built to help understand the unanswered questions of the standard model of particle physics. One of the key predictions is the existence of the Higgs¹ particle which is responsible for the generation of mass. Four detectors were built to study the particle collisions which occur at speeds close to that of light. In my presentation I will cover the science at the Large Hadron Collider, introduce the detectors (ATLAS, CMS, ALICE and LHCb) with a following further discussion of the ATLAS detector which is the largest detector of the 4 and aimed at studying many topics of high energy physics. I will show the general technology used and also discuss the huge computing infrastructure built in support of the experiments. I will also show the spin off technologies that have emanated from the cutting-edge research and development done both in hardware and computing infrastructure that has benefited community at large. Through these experiments we have gained much knowledge of what the Universe is made of.

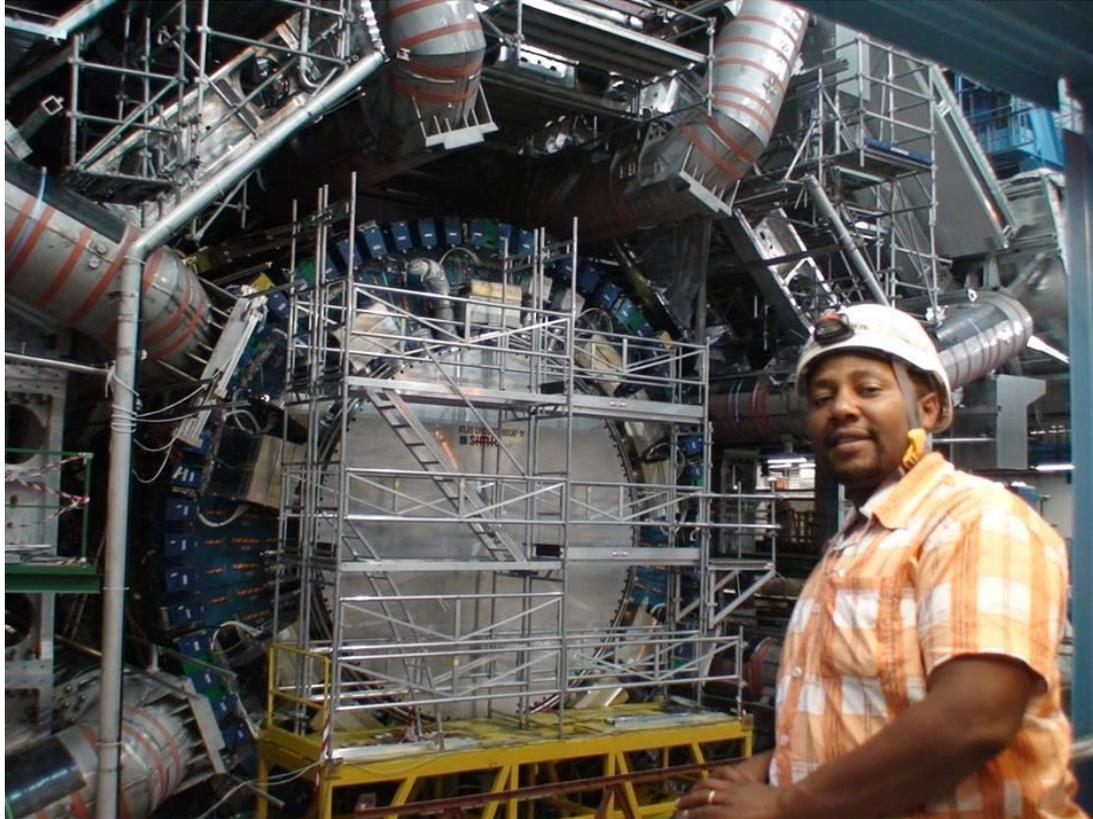
¹ named after Peter Higgs, 2013 Physics Nobel Prize jointly with François Englert "for the theoretical discovery of a mechanism that contributes to our understanding of the origin of mass of subatomic particles", and which recently was confirmed through the discovery of the predicted fundamental particle, by the ATLAS and CMS experiments at CERN's Large Hadron Collider

Useful Links:

<https://atlas.cern/>

<https://home.cern/>

https://www.nobelprize.org/nobel_prizes/physics/laureates/2013/



Dr. Simon K. Nderitu received a Bachelor degree in BEd Science at Kenyatta University with a major in physics in 1995. He has a Master of Science degree in particle and detector physics from the University of Siegen in Germany and an MSc. in nuclear application techniques from the University of Nairobi at the Institute of Nuclear Science. He then received a PhD in high energy physics from the University of Wuppertal in Germany with a specialization in detector physics at one of the Large Hadron Collider (LHC) experiments named ATLAS. The LHC is the largest particle accelerator in the world built at CERN in Geneva by collaboration of many countries and institutions. During his postdoc at the University of Bonn in Germany Dr. Nderitu specialized further in scientific computing in high-energy physics to building High Performance Computing (HPC) clusters both at the institute of Physics in Bonn and at the collaboration institutions in Germany to enable analysis of the large amount of particle physics data produced from the ATLAS detector. This included setting up from the ground a data center with large computing and disk-storage infrastructure and the software needed to carry out analysis by the high energy physics groups at the University of Bonn. Presently Dr. Nderitu is based at the University of McGill, in Montreal Canada as a researcher in support Advance research Computing (ARC) at McGill High Performance Computing facility. This is one of the 5 major large facilities in Canada under Compute Canada in support of scientific research computing. His main interest is in support of high energy physics experiments such as ATLAS, SNOPLUS, BELLE2 and IceCube as well as other Astrophysics projects. Among other tasks Dr. Nderitu helps researchers to optimize their codes to enhance data analysis on large computer clusters and clouds.