South Africa marks ten years of collaboration with CERN

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South Africa this week celebrated its ten-year collaboration with CERN, the European Organisation for Nuclear Research, best known for major breakthroughs such as the discovery of the Higgs-Boson particle in 2012.

South Africa's science community, together with the ambassadors from the French and Swiss embassies, gathered at the iThemba LABS, near Cape Town, on Monday, for the milestone conference to celebrate the collaboration.

CERN's main function is to provide the infrastructure needed for high-energy physics research. As a result, numerous experiments are conducted at CERN as a result of international collaborations. South Africa is actively taking part in several of these, particularly using the ALICE and ATLAS detectors at CERN's Large Hadron Collider (LHC), as well as experiments at the Isotope Mass Separator On-line Facility.

The ATLAS experiment seeks answers to fundamental questions of nature. The aim of ALICE is to study the physics of strongly interacting matter at the highest energy densities reached so far in the laboratory.

CERN research and computing director **Eckhard Elsen** said South Africa had been a key partner in collaborations and had been very effective in fostering an interest in physics. The South African research community was also making exciting strides in its Centre for High Performance Computing (CHPC), which provides significant resources to the Worldwide LHC Computing Grid.

Due to South Africa's world-class supercomputing, data management and storage, and high-speed data transmission capabilities, as well as its active participation in the LHC experiments, a Tier 2 data node was established in South Africa that allowed the country to become part of a global network for hosting and managing CERN data. The Tier 2 node is located at the CHPC.

The LHC Tier 2 data node at the CHPC processes over 1 600 computing jobs a day for the ATLAS and ALICE experiments.

"Many challenges can be solved by coming up with modern algorithms and finding energy efficient installations that can deal with the computing problems we face. The gates are all open," said Elsen.

Since the launch of the SA-CERN programme in December 2008, South Africa has established a very strong footprint and visibility at Geneva-based CERN. South African researchers have also made a significant contribution to the discovery of the Higgs-Boson. The particle completed the Standard Model of Particle Physics, the current best theory of understanding nature at the level of particles.

Currently, about 29 senior researchers, 13 postdoctoral fellows and 50 masters and doctoral students from South Africa participate in five experiments linked with CERN.

"Over the past three years, the number of postgraduate students has increased from about 30 to over 50, and is

said Department of Science and Technology (DST) research development and support deputy director-general **Thomas Auf der Heyde**.

“The Master’s and Doctoral students are of the highest international standing and all students graduated thus far have been able to find employment in South African universities and research councils, as well as various private sector institutions,” he added.

He said the number of visits from postgraduate students in South Africa to CERN’s headquarters, in Geneva, was expected to treble from 2013 to 2019. Black student representation is expected to increase from 35% in 2014 to 65% in 2019.

Auf der Heyde said another important outcome had been the partnership between the ATLAS Group and the work of Professor **Bruce Mellado**, of the University of the Witwatersrand (Wits), who has developed high-throughput electronic boards to handle the large amounts of data accumulated in the ATLAS experiment.

“This work has found expression in low-cost computers for school kids, and will most likely assist in developing the data management technologies and methodologies necessary to tame the flood of data from the MeerKAT and Square Kilometre Array projects. It has also led to new commercial partnership with the company Trax Interconnect, which specialises in the design and manufacture of printed circuit boards.”

In total, almost 13 600 scientists of 110 different nationalities use CERN’s facilities. They include scientists from all the Brics States – Brazil, Russia, India, China and South Africa.

Former iThemba LABS director and current Wits deputy Vice Chancellor Professor **Zeblon Vilakazi** said the

collaboration had also helped to draw more young people into science.

iThemba LABS employs senior scientists dedicated to the programme and offers word-class infrastructure and administrative support.

Vilakazi said its work with CERN had been extremely important for beneficiation and capacity building. But he said there was a need for more scientists from across the continent to get involved in cutting-edge research opportunities.

“Only about 0.5% of CERN users are African nationals. They are from South Africa, Morocco, Egypt and Nigeria. There is an opportunity to harness this untapped potential. It is a gap that needs to be addressed.”

Vilakazi added that there was low participation by African scholars in major research laboratories around the world.

National Research Foundation (NRF) deputy CEO **Clifford Nxomani**, meanwhile, said it was important to crystallise the investments in science and produce more excellent South African scientists.

Senior management from CERN and South African universities, as well as science councils, national facilities and the NRF and the DST are participating in the three-day milestone conference.

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