CMS celebrates the lowering of its final detector element

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In the early hours of the morning the final element of the Compact Muon Solenoid (CMS) detector began the descent into its underground experimental cavern in preparation for the start-up of CERN's Large Hadron Collider (LHC) this summer. This is a pivotal moment for the CMS collaboration, as the experiment is the first of its kind to be constructed above ground and then lowered, element by element, 100 metres below. It marks the culmination of eight years of work in the surface hall, and moves CMS into final commissioning before registering proton-proton collisions at the LHC.

The journey started 14 months ago, when the first of 15 elements of the CMS detector was carefully lowered, with just a few centimetres of leeway, by a huge gantry crane, custom-built by the VSL group. The final element is an asymmetrical cap that fits into the barrel element of the experiment and weighs around 1430 tonnes. It includes fragile detectors that will help identify and measure the energy of particles created in LHC collisions.

"CMS is unique in the way that the detector was constructed in very large elements in a surface assembly building and then lowered underground", explained Austin Ball, CMS Technical Coordinator. "This is likely to become a model for future experiments, as the technique can now be considered proven."

There are many advantages to planning an experiment in this way, such as the ability to save time by working simultaneously on the detector

while the experimental cavern was being excavated. There were also fewer risks when working on the surface, and elements of detector could be tested together before lowering them.

Experiments at the LHC will allow physicists to take a big leap on a journey that started with Newton's description of gravity. Gravity is ubiquitous since it acts on mass, but so far science is unable to explain why particles have the masses they have. Experiments such as CMS may provide the answer.

LHC experiments will also probe the mysterious missing mass and dark energy of the Universe, they will investigate the reason for nature's preference for matter over antimatter, probe matter as it existed close to the beginning of time and look for extra dimensions of spacetime.

“This is a very exciting time for physics,” said CMS spokesman Tejinder Virdee, “the LHC is poised to take us to a new level of understanding of our Universe.”

Source: CERN