

ATLAS completes world's largest jigsaw puzzle

February 29 2008



ATLAS detector

Today the ATLAS collaboration at CERN celebrates the lowering of its last large detector element. The ATLAS detector is the world's largest general-purpose particle detector, measuring 46 metres long, 25 metres high and 25 metres wide; it weighs 7000 tonnes and consists of 100 million sensors that measure particles produced in proton-proton collisions in CERN's Large Hadron Collider (LHC).

The first piece of ATLAS was installed in 2003 and since then many detector elements have journeyed down the 100 metre shaft into the ATLAS underground cavern. This last piece completes this gigantic puzzle.

“This is an exciting day for us,” said Marzio Nessi, ATLAS technical coordinator. “The installation process is coming to its conclusion and we are gearing up to start a new programme of physics research.”

Known as the small wheel, this is the final element to complete the ATLAS muon spectrometer, and will be journeying 100 metres into its underground experimental cavern. There are two ATLAS small wheels; though small in comparison to the rest of the ATLAS detector, they are each 9.3 metres in diameter and weigh 100 tonnes including massive shielding elements. They are covered with sensitive detectors to identify and measure the momentum of particles that will be created in the LHC collisions. The entire muon spectrometer system contains an area equal to three football fields, including 1.2 million independent electronic channels. As particles pass through a magnetic field produced by superconducting magnets, this detector has the ability to accurately track them to the width of a human hair.

“These fragile detectors comprise the largest measuring device ever constructed for high energy physics,” said George Mikenberg, ATLAS muon project leader.

“One of the major challenges is lowering the small wheel in a slow motion zigzag down the shaft,” explained Ariella Cattai, leader of the small wheel team, “and performing precision alignment of the detector within a millimetre of the other detectors already in the cavern.”

Comprising 450 physicists from 48 institutions, the ATLAS muon spectrometer group includes members from China, France, Germany, Greece, Israel, Italy, Japan, Netherlands, Russia and the United States of America. For them, this event marks the end of more than a decade of development, planning and construction of the muon spectrometer system. The shielding elements of the small wheels have been constructed in Armenia and Serbia.

The ATLAS collaboration will focus now on commissioning work in preparation for the start-up of the LHC this summer. 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 ATLAS may provide the answer. LHC experiments will also probe the mysterious dark matter and 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.

Source: CERN

Citation: ATLAS completes world's largest jigsaw puzzle (2008, February 29) retrieved 27 April 2024 from <https://phys.org/news/2008-02-atlas-world-largest-jigsaw-puzzle.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.