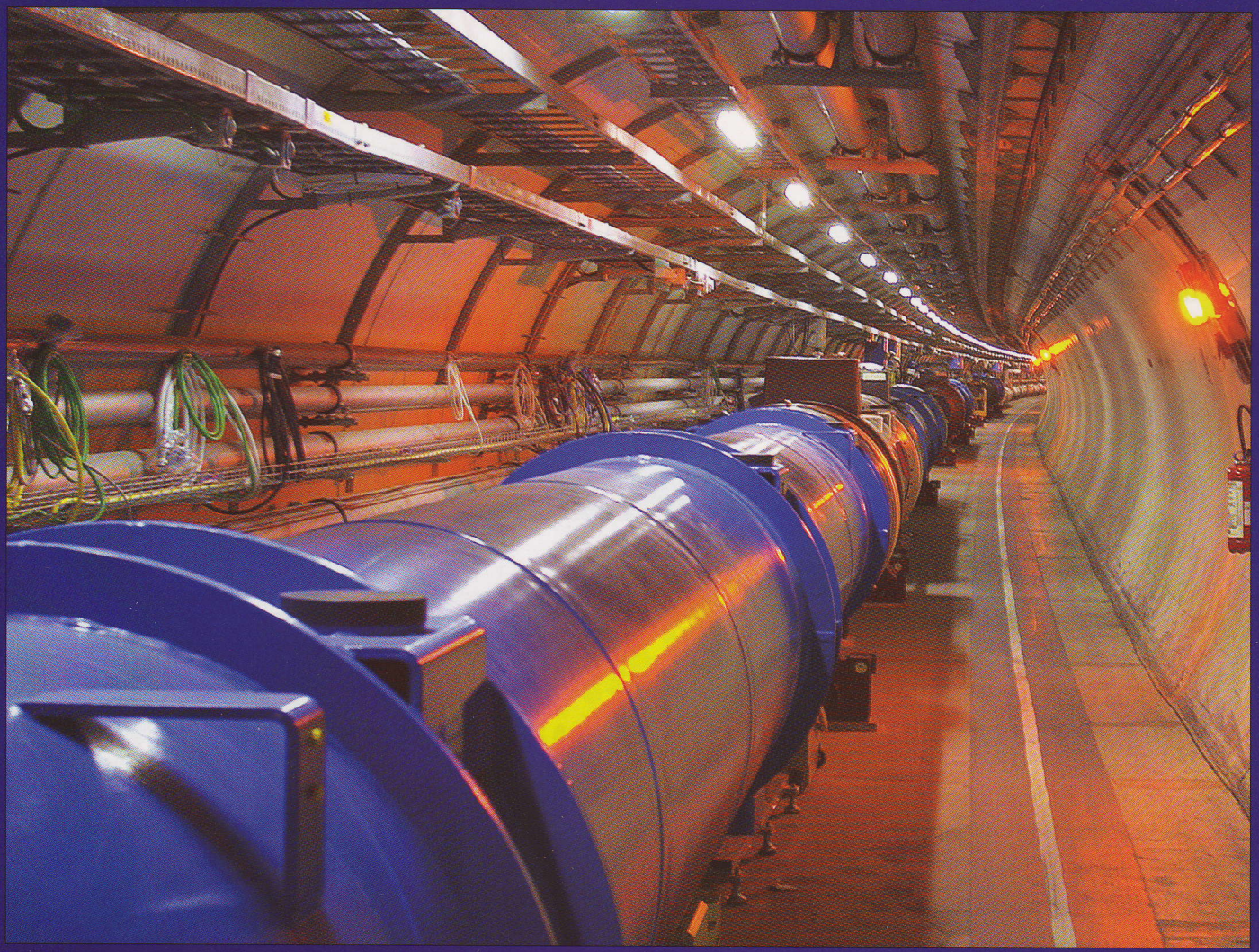
INTERNATIONAL JOURNAL OF HIGH-ENERGY PHYSICS

CERN COURIER

B Verlaat

VOLUME 46 NUMBER 8 OCTOBER 2006



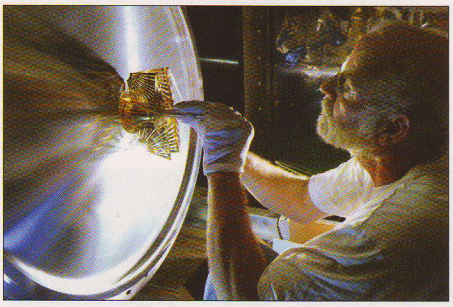
LHC dipoles – arrival on time

LHC EXPERIMENTS

LHCb installs bridge and beampipe section...

The last large component of the Large Hadron Collider beauty (LHCb) experiment has descended into the cavern on the LHC ring, and the delicate installation of the important beryllium vacuum chambers has begun. LHCb will focus on the precision measurement of CP violation and rare decays of hadrons with b quarks, with a spectrometer covering only one side of the collisions in the LHC. Beryllium was chosen for 12 m of the 19 m long beampipe to minimize the level of background in the experiment.

The 10 tonne, 18 m long metal structure known as the bridge, which will support the LHCb tracking system, was lowered into the cavern in June. This was a challenge as there were only a few centimetres to spare as the structure was turned and moved into its final position. The bridge is made of stainless steel, which was chosen to avoid creating interference in the experiment as it is only slightly magnetic. It has rails onto which will slide the three stations of the silicon inner tracker and the three stations of the outer tracker consisting of straw-tube detectors.



A technician carefully inserts the wakefield suppressor into LHCb's beryllium beampipe.

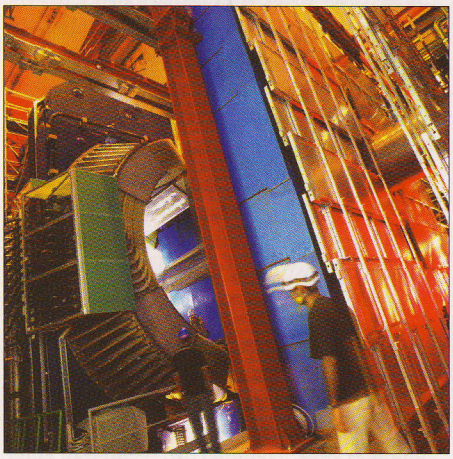
More recently, at the end of August, the first beryllium section of LHCb's beam vacuum chamber was installed. The three-day operation demanded patience and precision as the first of four sections of the beampipe was connected to the vacuum vessel of the vertex locator (VeLo). This first section comprises a conical tube of 1 mm thick beryllium, nearly 2 m long, and an 800 mm diameter spherical window made from 2 mm thick aluminium alloy. The window is connected to the conical part of the beampipe through an aluminium alloy bellow, which allows mechanical alignment once the assembly is installed.

For installation, the beampipe was placed on a frame that slides over rails to move it gently into position. A wakefield suppressor was then inserted and connected electrically, and finally the spherical window was connected to the VeLo vessel using a metal seal. After installation was completed, the system was pumped down and a leak test conducted. The aim is to reach an average pressure of 10^{-9} millibar with the beam passing through the beampipe.

...while ALICE installs the first detectors

In mid-July, the ALICE Collaboration reached important milestones with the installation of the trigger and tracking chambers of the muon spectrometer. They are the first detectors to be installed in their final position in the ALICE cavern of the Large Hadron Collider.

The role of the trigger detector is to select events containing a muon pair coming, for instance, from the decay of J/ψ or Υ resonances. All of the eight half-planes of the resistive plate chambers (RPCs) are now in position behind the muon filter. The company General Tecnica fabricated the internal parts of the RPCs, which are made of bakelite, and groups from INFN Torino and Alessandria are constructing the readout chambers The IN2P3 laboratory in Clermont-Ferrand has developed the front-end electronics and Subatech Nantes has produced the readout electronics.



An ALICE trigger chamber is moved into position in front of the muon wall, with the dipole magnet in the background.

At the same time, workers at ALICE have installed the first half-station of the tracking system a few metres before the muon wall. The main task of this system is to sample the trajectory of muons with a resolution better than 100 μm. It is composed of cathode-pad/strip chambers, among the first of their kind, made from composite material. Extremely thin but still very rigid, the composite material helps to minimize the scattering of the muons. INFN Cagliari, the Petersburg Nuclear Physics Institute in Gatchina, Subatech Nantes and CEA Saclay constructed the big chambers, while the Institut de Physique Nucléaire at Orsay, and the Saha Laboratory in Kolkata, India, made the smaller ones.

Les physiciens des particules du monde entier sont invités à apporter leurs contributions aux *CERN Courier*, en français ou en anglais. Les articles retenus seront publiés dans la langue d'origine. Si vous souhaitez proposer un article, faites part de vos suggestions à la rédaction à l'adresse cern.courier@cern.ch.

CERN Courier welcomes contributions from the international particle-physics community. These can be written in English or French, and will be published in the same language. If you have a suggestion for an article, please send your proposal to the editor at cern.courier@cern.ch.