

Chapter 12

Conclusions

The Compact Muon Solenoid detector has been described in detail. The expected physics performance of the apparatus has been described elsewhere [17].

At the time of this paper, the apparatus is essentially completed and installed.

After more than 10 years of design and construction, the CMS magnet has been constructed and successfully tested. Most of the magnetic, electrical, mechanical, and cryogenics parameters measured during the tests are in good agreement with calculated values. The CMS magnet is the largest superconducting solenoid ever built for a physics experiment in terms of bending power for physics, total stored energy, and stored energy per unit of cold mass.

The silicon-strip inner tracker, with about 200 m² of active silicon, has been integrated into its support tube, commissioned, and thoroughly tested with cosmic rays. Its performance is excellent, fulfilling the design specifications. The silicon tracker was installed into CMS in december 2007. All the pixel modules are completed; it is planned to install the Pixel detector into CMS in mid-2008.

The ECAL, comprising over 75 000 lead tungstate crystals, is the largest crystal calorimeter ever built. The crystals in the barrel part, comprising over 60 000 crystals, have been intercalibrated using cosmic rays and about a third in particle beams, demonstrating the ability to measure the energies ranging from those deposited by minimum ionising particles to high-energy electrons. An energy resolution of 0.5% for 120 GeV electrons has been attained. The ECAL barrel has been installed in the experiment and is being commissioned. The endcaps are foreseen to be inserted into the experiment in 2008.

The entire HCAL has been completed and commissioned on the surface. The HCAL modules are currently being commissioned in the experiment proper.

The various components of the Muon System (drift tubes, cathode strip chambers, resistive plate chambers) have been completed. A significant fraction of the Muon System has been commissioned and tested on surface with cosmic rays, and it is now being integrated into the experiment and being commissioned in-situ.

In the very forward region, the Zero Degree Calorimeter has been completed and CASTOR is expected to be completed in 2008.

The off-detector electronics are currently being installed and operations for trigger commissioning are taking place.

Common data-acquisition runs with various sub-detectors, sometimes using cosmic rays, are regularly taking place at the experiment and will continue into spring 2008 in anticipation of collisions at LHC in mid-2008.