Compact Muon Solenoid Times

02 APRIL, 2007

Forthcoming activities

April

- Start EB- (first half of barrel ECAL) underground installation
- Installation of PP1 cable trays
- Installation of ECAL cooling

May

- End EB- underground installation
- Install -z Preshower windows
- Install -z forward beampipe
- Partial services (LV, gas) available in UXC

June

- Start of 2nd phase of lowering
- Start of EB/HB cabling
- EB+ underground installation

Updated information should be sent to cmstimes@cern.ch

Editorial

Dear friends

With the end of the first phase of lowering of CMS the emphasis is now switching to commissioning and operation. Many sub-detectors have already proven themselves to some extent in the 2006 Cosmic Challenge and now the HF has started to see cosmic rays underground. This major achievement is reported in this issue.

Tracker commissioning is also progressing well, with the various components all coming together (see article in this issue) and cosmic rays already seen (see article in next issue).

Concerning the next issue: we will be taking a rest during the Easter weekend, so the next edition of the CMS Times will be on 16th April.

David Barney
Marzena Lapka

People

University of Zurich (Switzerland) in CMS

A part of the CMS group at the University of Zurich.

The University of Zurich group is active in the CMS Experiment since 1995. The group participates in the development and construction of the CMS pixel detector and contributes to the reconstruction software for tracking and vertexing. Today the group led by Prof. Claude Amsler counts eleven members: postdocs Dr. Vincenzo

Feature Stories

BREAKING NEWS – HF is Alive and Taking Data in the Collision Hall

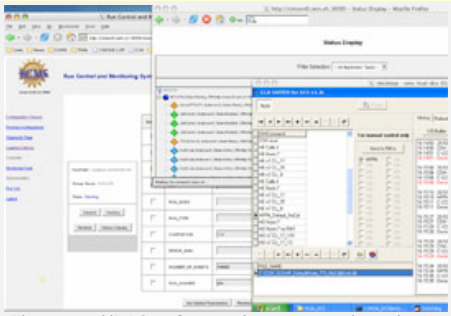
The forward calorimeter, HF, was the first CMS detector to be lowered into UX on Nov. 11, 2006.

HF lowering into the underground cavern, 11th November 2006.

Since that time the services have been hooked up and trunk cables have been connected. The off detector electronics have also been installed and commissioned in USC.

The pedestals (in GeV units) from the first data set.

All that preparation came together on March 28 when the first "slice test" data of HF in UX was taken. The figure beyond shows pedestals (in GeV units) from that first data set. This data uses the final hardware, front end electronics, cables, and DAQ electronics along with CMS run control. With this first CMS data taken in the Collision Hall, commissioning of CMS takes another big step.



The control/DAQ software that was used to obtain the result.

Submitted by:

Dan Green

News from Point 5

Both HBs inserted into YB0.

After the insertion of the HBs into YB0 the central piece sank as predicted, giving a final measurement of the position in CMS coordinate system by the survey group as follows:

X of YB0 is + 0.8mm in CMS (was +0.2 mm before HB insertion)
Y of YB0 is +0.1mm in CMS (was +3.2 mm before HB insertion)
Z of YB0 is +1.2mm in CMS (was +1.2 mm before HB insertion)

In the words of Alain Herve – we could not have dreamed of a better positioning!

The cavern is buzzing with simultaneous activities of cabling and piping pertaining to installation of gas and cooling.

On the surface feet Muon Chambers have been installed on YB minus 1.

Submitted by

Archana Sharma

Chiochia, Dr. Thomas Speer, Dr. Christian Regenfus and Dr. Peter Robmann; technicians Jacky Rochet and Stefan Steiner. The graduate students are Enver Alagoz, Tanja Rommerskirchen, Dimitrios Tsirigkas and Lotte Wilke.

The group has participated in the realization of the final sensor design, the front-end chip, the power distribution system, the construction of the barrel pixel detector and its mechanical support structure in the Institute workshop. This work was performed in collaboration with the Paul Scherrer Institut. Pixel sensor beam tests were conducted at the CERN-SPS. Studies on various prototypes focused on radiation hardness and position resolution.

Test beam data were used to develop novel hit reconstruction techniques and sophisticated models of charge collection in irradiated sensors. The group also contributed substantially to the vertex and track reconstruction software. Nowadays the group has a leading role in the CMS software project with V. Chiochia coordinating the Pixel Offline Software team and T. Speer convening the B-Tagging effort.

The group is also preparing for the analysis of the CMS data with emphasis on B-physics and searches for physics beyond the Standard Model.

Tanja Rommerskirchen

My name is Tanja Rommerskirchen. I was born in 1981 in a small town named Birkesdorf in Germany, somewhere close to Cologne. I grew up and went to school in Juelich, which is another nice small town but in which a quite known research center is located. In school I was interested in several subjects history and literature but also physics and mathematics.

I chose to study physics due to my physic teacher of that time and a book of Kip S. Thorne I got into contact with the fancy ideas of modern physics like space-time curvature, special relativity and more. So as most other physic students I know I was fascinated and I wanted to see how far I could get in understanding these things.

I started to study physics in Aachen University in the year 2000. During my undergraduate studies I benefited from the Erasmus program to spend one year in the great city of Manchester.
There I specialized in Astrophysics and Particle Physics. Back in Aachen I started with my diploma thesis in Higgs physics with the CMS detector. The topic of my thesis was a study about the possibility to detect pair-produced doubly charged Higgs bosons which decay subsequently into muon-pairs. Pair-produced Higgs bosons are predicted e.g. by the Higgs triplet model and could give an explanation as to why neutrinos are not massless.

It was during this time that I visited CERN for the first time. I liked very much the special atmosphere of this place, where people from all over the world are working together towards the day when LHC will start.

As I always wanted to go to another country after finishing my diploma but also wanted to stay in the experiment I was very glad that I could start my PhD thesis under the supervision of Prof. C. Amsler (University of Zurich).

In September 2007 I moved to Geneva and I am now working at CERN. After three months, during which I helped in the analysis of the 2007 pixel test beam data, I am now setting up an analysis

TEC insertion completes silicon strip tracker

On 21st of March, the "minus z" tracker end cap TEC- was successfully inserted into the tracker support tube, joining the inner and outer barrel parts and its twin TEC+, which had been inserted in February. With both TECs installed, the strip tracker is now complete.

TEC+ just before installation of the final front disk. It is only in this moment that the petals mounted on the front face of disk1 are visible.

For the TEC the insertion represented the last and most spectacular step after several months of intense preparation work at the TIF. One after the other both tracker end caps were extensively tested at CERN at CMS tracker operating conditions. This cold test took place in a dedicated cold room, which is capable of cooling down to a temperature of -25ºC. Silicon sensor temperatures of around -10ºC were reached. During the cold test, 36 petals or 800 silicon strip modules were read out at once, corresponding to 25% of a TEC or 5% of the whole strip tracker. In total 50% of TEC+ and 50% of TEC- were tested cold. About 15 people from the TEC community, including mainly physicists from Aachen, Lyon and Vienna, participated in the preparation, testing and data analysis. The noise performance was very good, and in fact very similar to the performance observed in previous tests during end cap integration. From the part read out in the cold test, the fraction of operating channels in the cold environment amounts to 99.4% for TEC+ and 99.8% for TEC-.

TEC- being pushed into the tracker support tube.

After the cold test, the TECs were moved to the tracker integration facility, where they were prepared for insertion into the tracker support tube. During these preparations, for the first and only time the innermost of the nine carbon fiber disks was visible with petals mounted. The insertion itself was a delicate operation, since the nominal clearance to the other subdetectors and their cables and optical ribbons amounts to a few millimetres only. In addition, the optimal orientation of the end caps and the overall symmetry of the whole tracker system had to be assured. Several metrology measurements were performed by the CERN metrology group and in the end both TECs met their calculated optimal position on the level of a few hundred microns.

The next step for the TEC is the tracker slice test in the TIF. Two sectors of TEC+ are participating and are currently being commissioned. The TEC team is looking forward to several weeks of detailed noise quality and grounding studies and cosmic muon data taking.

Submitted by:

Katja Klein

and Gaelle Boudoul

CMS Outreach, Visits and Media

From Symmetry Magazine (jenuary/february 07):

Deconstruction: CMS assembly

The cover of the *Symmetry* magazin jenuary/february edition.

The Compact Muon Solenoid (CMS) detector is one of the two general purpose particle detectors being constructed at CERN's Large Hadron Collider (LHC) outside Geneva, Switzerland. The conceptual design of CMS started taking shape 16 years ago with physicists trying to work out how to build such a large detector and install it underground...

Read more: http://symmetrymagazine.org/cms/?pid=1000428

From *Les Dernières Nouvelles d'Alsace*, 24.03.2007:

Le plus grand outil du monde

(…) Cette semaine à Genève a été célèbrée la descente du plus gros morceau de ce puzzle: il pèse près de 2000 tonnes (…)

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From *La Provence*, 25.03.2007:

Des Marseillais sondent les secrets de la matière

Des flocons de neige volettent dans le ciel de la campagne autour de Genève. A premier vue, rien ne distingue d'une autre cette plaine agricole mi-suisse mi-française coincée entre le lac Léman et les monts du Jura...

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to look for a light super symmetric Higgs boson at the CMS detector. In the basic form of the theory of supersymmetry the Standard model is extended by adding to each Standard model particle a heavier "superpartner". Supersymmetry would solve several problems within the standard model and point towards a deeper theory of nature. If supersymmetry would be realised in nature a light Higgs boson might be detectable in a cascade of supersymmetric particle very early after the start of the LHC.

Apart from work I like reading (at the moment especially english books), having nice evenings together with friends and discovering new places.

Download a podcast with Tanja (12 Mbyte mp4 file)

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