

Status of the Inner Detector



Endcap A within ATLAS, May 2007

München, June 18, 2007

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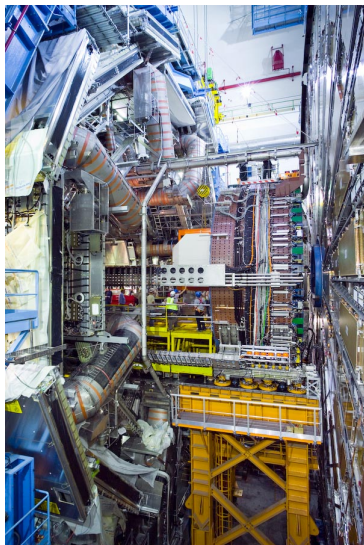
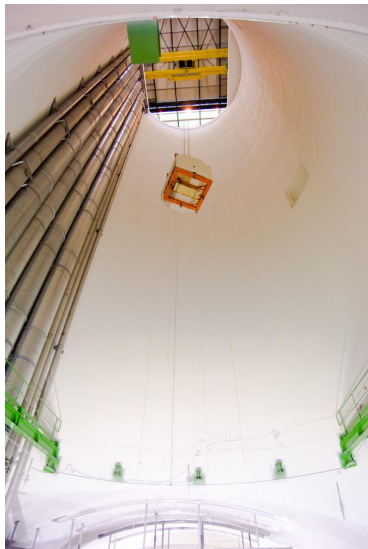
nisius@mppmu.mpg.de



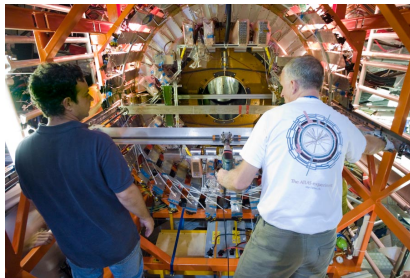
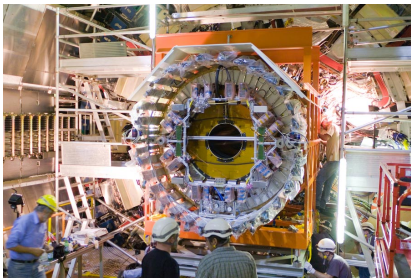
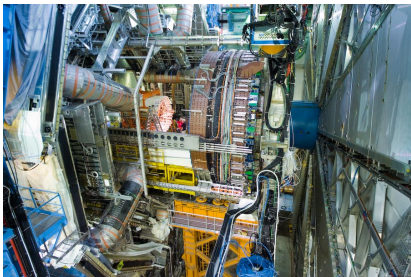
Endcap A Installation - From the SR1 building to the access shaft



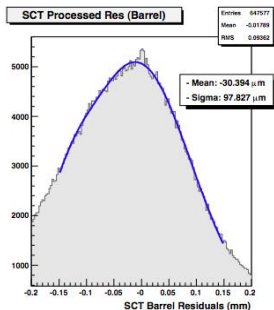
Endcap A Installation - From the shaft to the final position within ATLAS



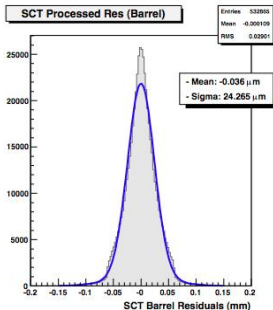
Endcap A Installation - The last meters



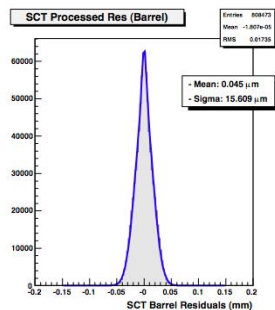
ID alignment software - CSC misaligned samples



assume nominal



L1+L2 misal. removed



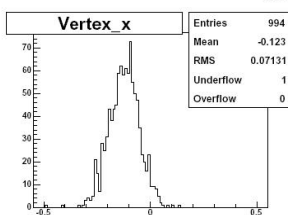
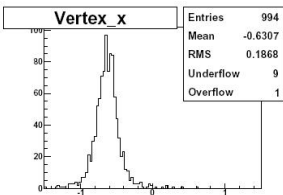
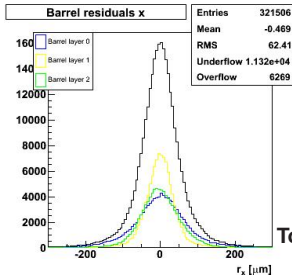
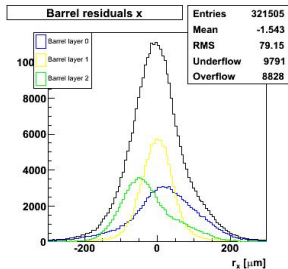
perfect aligned

- The alignment strategy changed from an all in one go approach to a three step procedure.
 - Level 1, e.g. Sct Endcap vs SCT Barrel, $\mathcal{O}(50)$ dof.
 - Level 2, e.g. SCT Barrel Layer 2 vs Layer 3, $\mathcal{O}(1k)$ dof.
 - Level 3, e.g. individual SCT modules, $\mathcal{O}(40k)$ dof.
- The vertex constraint has been implemented.

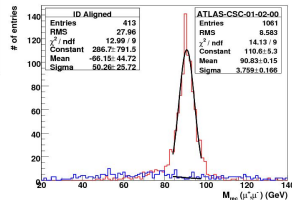
Analyzing the CSC misaligned samples is the biggest task at the moment.

ID alignment software - some CSC results

Si L2 align (multi μ), no vertex constraint, keep TRT fixed.



Mass Z $\rightarrow \mu\mu$



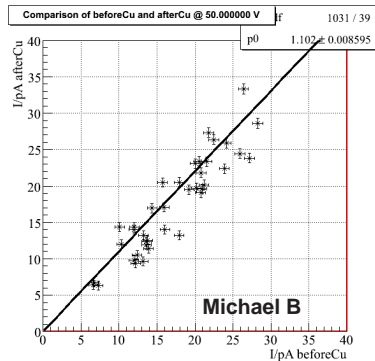
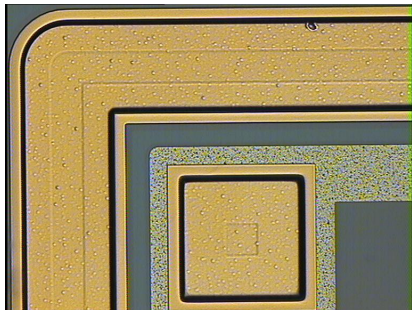
Tobias G.

Sophio P.

- Minimising residuals is needed but not sufficient.
- The vertex constraint helps quite a lot, resolution improves $180 \rightarrow 70 \mu\text{m}$, but still not centered.

The mixture of track samples is a very essential ingredient to be carefully chosen.

SLHC pixel upgrade - the status



First investigations together with the IZM

- Two wafers with simple diodes were prepared by L. Andricek at HLL.
- At IZM, the wafers were treated with TiW, Cu and Sn, as needed for the SLID process.
- The leakage currents before and after treatment are small and consistent. This means there is no Cu diffusion into the silicon.

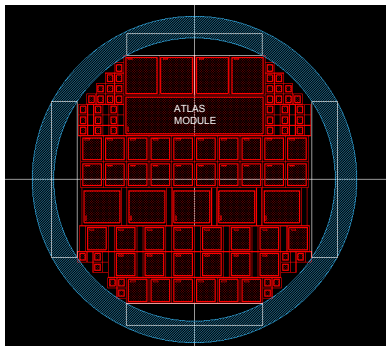
The results of the first step are very promising, so lets proceed.

SLHC pixel upgrade - the future

Some details on the project

- The revised proposal to ATLAS is under scrutiny.
- The Universities of BN, DO, Oslo and Interon have joined.
- Within RD50 we also collaborate with CERN, DO, HH and Ljubljana on thin planar sensors.
- A new production run of the present ATLAS pixel chip will be launched.
- A number of test wafers of various thicknesses will be produced at HLL.
- Structures have been designed that eventually will be connected to the ATLAS pixel chips, the Medipix chip(?), and a custom made chip(?) by Einar Nygard at Interon.

The present wafer layout



1 ATLAS MODULE
 26 ATLAS CASE A
 14 ATLAS CASE B
 4 MEDIPIX CASE A
 5 MEDIPIX CASE B
 26 NYGARD CASE A
 24 NYGARD CASE B

Anna M.

The project is well underway

Conclusions and Outlook

Hardware

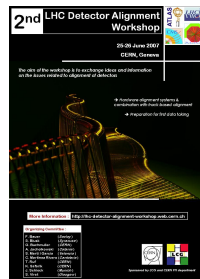
- The Inner Detector installation work is coming to an end.
- The second endcap is being installed as we speak.
- The SLHC pixel upgrade program is gaining speed.

Alignment Software

- The CSC alignment is well underway and we continue to make significant conceptual inputs.
- The CTB alignment paper is ready for comments.
- The 2nd LHC Detector alignment Workshop will be held at CERN, June 25–26, 2007.

Physics Analyses

- At the moment, we are contributing to three top CSC notes, namely the ones on the top mass, the $t\bar{t}$ -cross-section and the trigger in semileptonic $t\bar{t}$ events.



The Inner Detector group at the MPP is very active and still growing.