

2nd CERN Baltic Group Meeting

Possibilities of Collaboration in CMS

in View of

Technical Coordination

Wolfram Zeuner

- Projects under direction of Technical Coordination
Infrastructure, Services, Modeling, Integration, Tooling
- Sub-detector Projects
Silicon-Tracker, Endcap Calorimeter, Muon Chambers, Barrel Electromagnetic Calorimeter,
Fast Timing Detectors, BRIL

Preamble

The Phase II upgrade will be the final major upgrade of CMS. It defines the ultimate physics performance of the detector for the years 2026 – ~2036. LHC is expected to deliver a data sample of unprecedented richness in terms of possibilities to explore (and discover new features of!!) the fundamental forces and constituents of nature.

Contributing to this upgrade will allow your institutes and many generations of your students being in a pivotal position of one of the most exciting scientific adventures.

It should be noted that for CMS the Phase II upgrades started in EYETS 2016/17 (HF and ME1/1 electronics) continues in LS2 (muon chamber electronics) and will be finished after LS3.

Projects under direction of Technical Coordination

Engineering & Integration Office - E&I Office – Contact: Andrea Gaddi

- 3D-modeling of CMS
Maintaining (or where necessary re-building) the as built model of CMS
- Verifying all planned mechanical changes to CMS
Integration of any changes to the mechanical layout of CMS
- Designing/verifying installation procedures
ex: New beam pipe for LS2 – review and adapt installation procedure and all tooling
- Designing/verifying routing of cable, fiber and pipe installations, both on the detector and in the hall.
- Changes/upgrades of infrastructure - relocation of installations, defining location of new installations
e.g. cooling plants, dry gas plants etc.
- Upgrade/improvement of radiation shielding

Profile – mechanical engineers or designers

Projects under direction of Technical Coordination

Heavy Movement and Lifting - Contact: Hubert Gerwig

- Operation, maintenance and modifications of the CMS opening system
- Tooling for handling of heavy components
 - Endcap calorimeter – Removal of YE1-noses
 - Lowering and mounting of new Endcap Calorimeter
 - Tooling for handling of heavy components during assembly

Profile: Mechanical Engineer or designer preferably with experience on hydraulics and heavy lifting

Survey - Contact: W.Z.

- Surveying CMS in different states of disassembly/assembly to verify correct work
 - Methods – standard theodolite, photogrammetry, laser scanning
- Survey of detector components during assembly

Work in close collaboration with the CERN survey team – usually one person of the team comes from CMS

Profile: Survey Engineer or assistant

Sub-detector Projects

Many sub-detectors of CMS will undergo major upgrades for phase II. Some of the upgrades will start in LS2 others in LS3.

The distribution of tasks and sub-projects is organized within the projects.

→ You have to contact the project management if you are interested to collaborate.

List of sub-detector upgrade projects

- Silicon Tracker

Both Si-strip tracker and the pixel detector will be replaced including all infrastructure

Both detectors will be cooled by a 2-phase CO₂ cooling.

Contact: Andrea Venturi or Frank Hartmann

- Endcap Calorimeter - more details in the talk by Karl Gill

The entire YE1 noses will be replaced by a conceptually new detector, a high granularity electromagnetic calorimeter with Si detectors as active layers, followed by a hadron section with scintillating tiles, readout with SiPMs.

Contact: Jim Virdee, Marcello Mannelli, Karl Gill

For tooling to handle heavy components – contact Hubert Gerwig

Sub-detector Projects

- Muon Chamber Upgrades
 - Installation of a layer of GEM chambers in YE1 noses (GE1/1) – foreseen for LS2
Contact: Archana Sharma
 - FE-Electronics upgrade of CSCs – ME1/1, 2/1, 3/1 – Foreseen for LS2
Contact: Armando Lanaro
 - Re-build Electronics for DT chambers - LS3
Contact: Ignacio Redondo
 - Construction and installation of low eta RPCs – RE3/1 & RE4/1 - YETS between LS2 & LS3
Contact: Anna Colaleo
 - More vague – ME0, GE2/1 - earliest LS3
Contact: Anna Colaleo

Sub-detector Projects

- Electronics Upgrade of Barrel Electromagnetic Calorimeter
Major logistics problem, will define the critical path of large parts of LS3
Contact: Etienne Auffray Hillemans, Werner Luster
- MIP Precision Timing Detectors for barrel and endcap
New sub-detector based on scintillating crystals (barrel) and special Si-detectors (endcap)
Allowing improvement of vertex estimation in high pile up environment.
Project still in formation phase.
Contact: Didier Contardo
- BRIL
The current concept of beam condition monitoring and online luminosity measurement will not work under the harsh HLHC conditions
New (very radiation hard) detectors and different R/O electronics will be needed.
R&D ongoing, ideas are welcome, lot of discussion ongoing.
Contact: David Stickland, Anne Dabrowski