Status ECAL Laser Monitoring
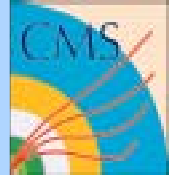
ECAL Days - CERN
16 July 2008

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For the Laser Monitoring Group

Overview

Recent past reports :

DPG 30. April 2008   General Status Monitoring (Adi)

Commissioning 20. June 2008 First CRUZET2 (Adi)

DPG 25. June 2008   Laser Farm Processing CRUZET2 (Julie)
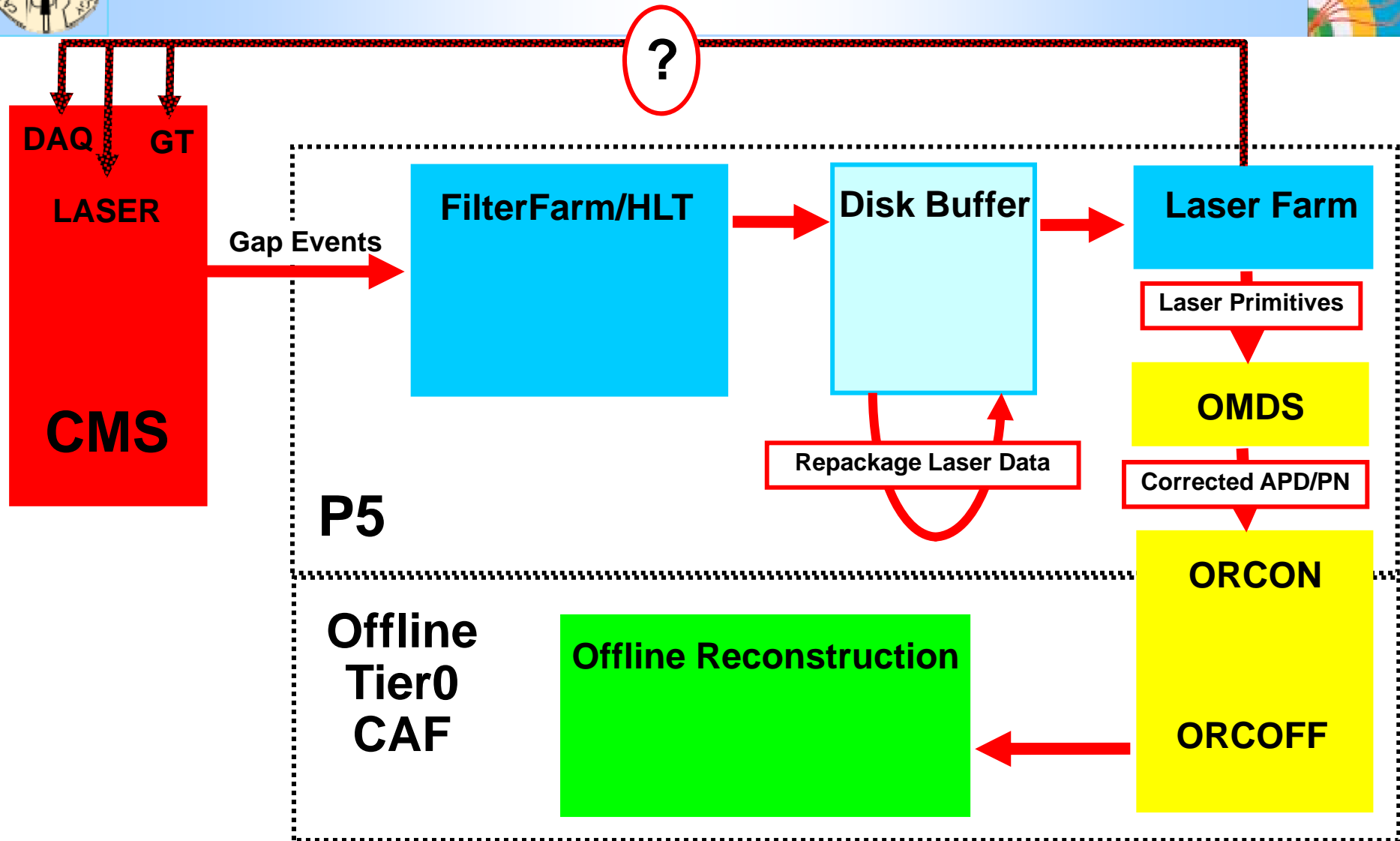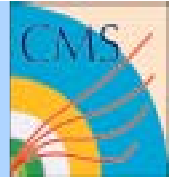
This time :

- **Experience with Global Running (=CRUZETN)**

- **Needs short term** $\Rightarrow$ **For first beam. Things for which a firm plan exists.**

- **Needs medium term** $\Rightarrow$ **For 2009 running, to achieve design precision for transparency measurements on entire ECAL. Things for which a plan exists.**

- **Needs long term** $\Rightarrow$ **To achieve stability on the level of ~0.1%. Things we have to plan.**

Next presentations :

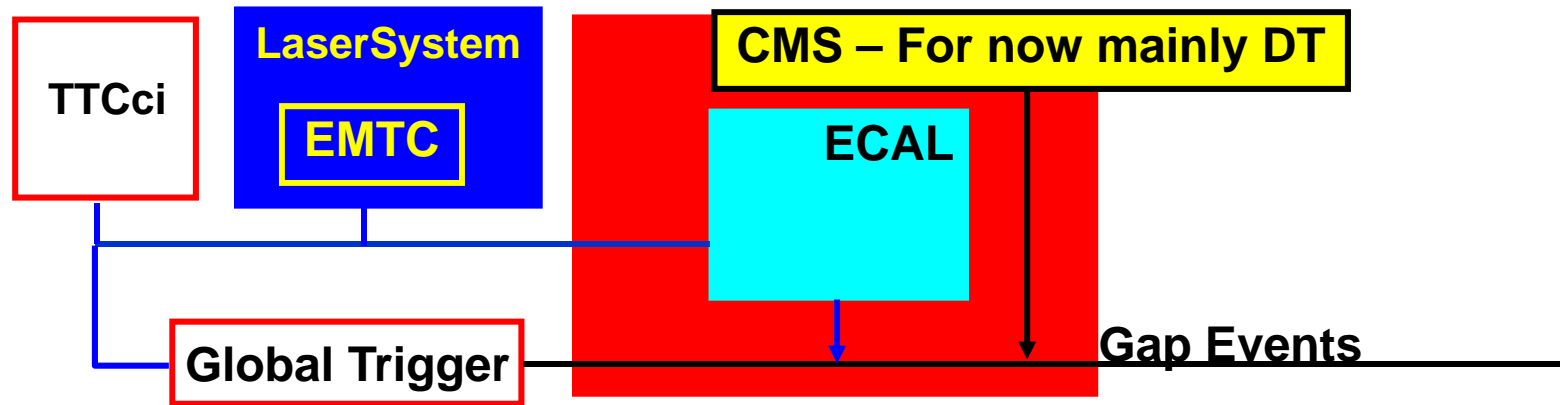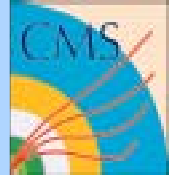**DPG 24. July 2008 Laser Farm Processing CRUZET3 (Julie)**

Laser Monitoring Workflow – Current Plan

?

DAQ   **GT**

LASER

CMS

Gap Events →

FilterFarm/HLT → **Disk Buffer** → **Laser Farm**

Laser Primitives

OMDS

Corrected APD/PN

Repackage Laser Data

P5

ORCON

Offline Tier0 CAF

Offline Reconstruction ← **ORCOFF**

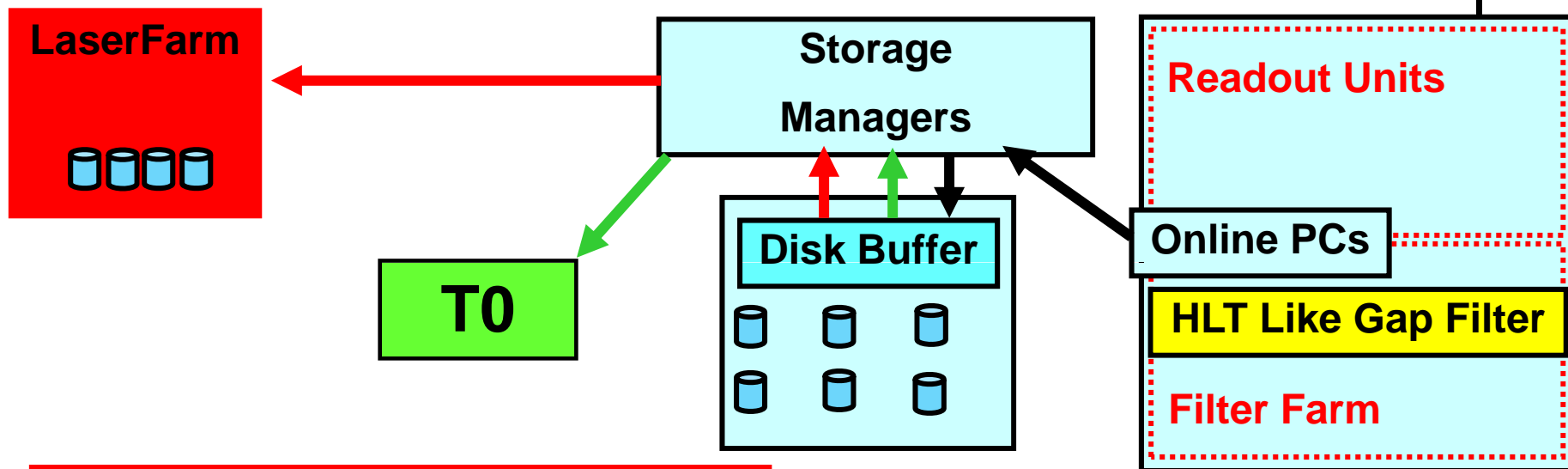**All steps of this chain are implemented at least as manual procedures and tested once.**
⇒ Move to fully automated procedure.

LaserSystem

TTCci

EMTC

CMS – For now mainly DT

ECAL

Global Trigger

Gap Events

Everything tested and worked in April ⇒ Hardware declared 'commissioned'.

LaserFarm

Storage Managers

Readout Units

T0

Disk Buffer

Online PCs

HLT Like Gap Filter

Filter Farm

SM pushes gap stream to filter farm

Laser Monitoring in Global Running
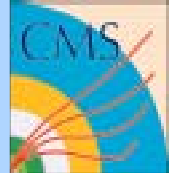
CRUZET1 :
➢ One run with gap sequence triggers only taken, data streaming to temporary laser farm established.
➢ Drink champagne and celebrate first global monitoring data ever.

CRUZET2 :
➢ One day (20 hours) with gap sequence triggers and physics triggers (except ECAL triggers).
➢ Data processed after data taking finished.
➢ ~700 Gb raw data streamed, 1.5×10^6 laser triggers.
➢ Event sorting very inefficient.
➢ Results see Julies report on 25.06.2008 DPG – not monitoring quality yet.

CRUZET3 :
➢ One week - some interruptions for triggers test with and without gap triggers
  ~1100 Gb raw data streamed. 5.0×10^6 laser triggers.
➢ Laser farm PCs only available on day one of CRUZET3 – decided not to change SM configuration.
➢ Data processing activated while data being streamed.
➢ Streaming load alone to high for temporary laser farm – stopped processing after 2 days – moved processing to new PCs and copy data over whenever possible.
➢ Issues observed with integrity of MEM data – being investigated.
➢ First ~day of laser data has non-optimal timing.
➢ Very little (maybe non) of the data has monitoring quality.

Throughout CRUZETs, substantial effort from DAQ group to sort out timing and comand scheduling issues among GT-TTC-EMTC-DCC-CCS-WHATNOT !
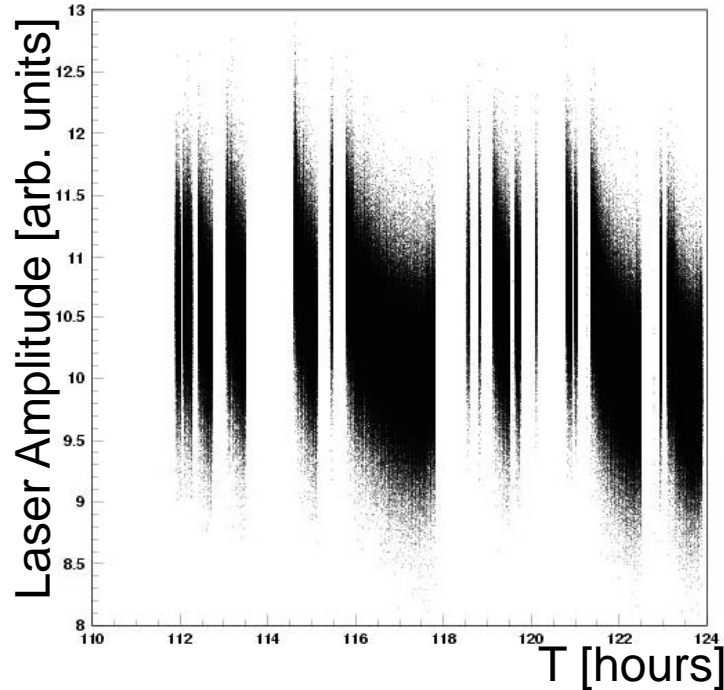Now all seems fine for laser – few remaining issues with TP and possibly GT/DCC header info.
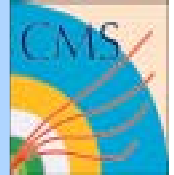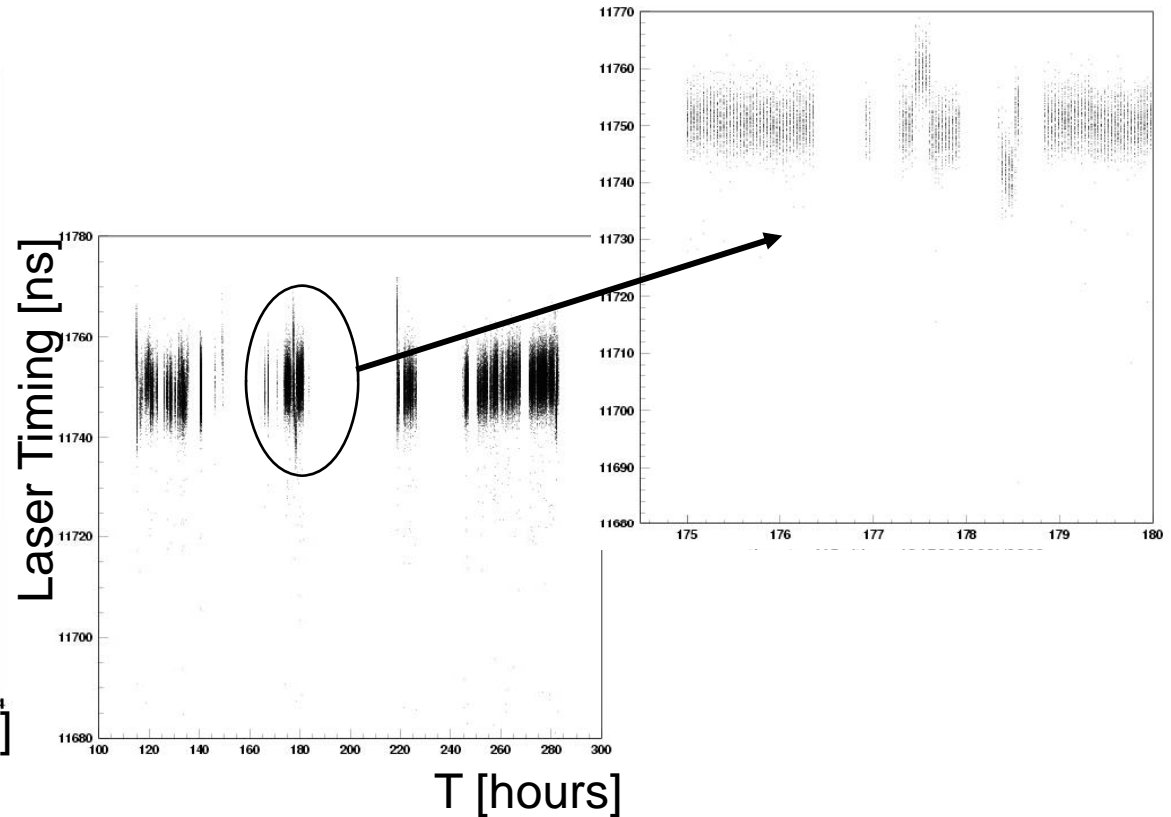
Extended Laser Running at 100 Hz

**TiS Laser adjusting to new thermal
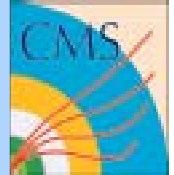equilibrium under full load.**

**Jumping Feedback due to cooling instabilites.
At least one observed case of laser trip coinciding with
temperature issues in crates.**

**Overall : Laser Performance as expected.
Note : Number of LM scans CRUZETs equivalent to 2 Years of TB.**

Gap Stream Data Handling Issues

Assumption :

➤ **40 Gb of 'essential' data (LASER ONLY) per day, raw data can be picked up 'somewhere'.**

Reality :

➤ **Up to 700 Gb raw data dumped on our feet. Note : Resources needed to sort and repackage data scale with input volume.**

40 Gb :

➤ **At the test beam one half module worth of laser events corresponds to 13 Mb raw data. This would correspond to ~3.2 Gb/h (assuming 3 cycles of 80 LM per hour) which is ~40Gb/12h for the entire ECAL.**

700 Gb :

➤ **Read out one full SM per laser event (DCC constraint) (x2)**

➤ **Stream all 100 Hz of gap events (600 LASER, 400 TP, 400 PED) (x2.3)**

➤ **DT data contained in the gap stream. (x some factor)**

➤ **Not all data volume issues fully understood. (x some other factor)**

Temporary measures :

➤ **DT kindly agreed to reduce data volume until permanent reduction can be achieved.**

➤ **Expand buffer space on laser farm.**

ECAL Laser Monitoring Status - ECAL Days

Data Processing Issues
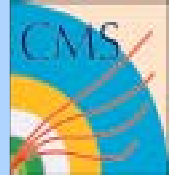
Data sorting :
- ➢ **Repackage data from streamer files to POOL file format (ROOT). Equivalent to T0 repackaging.**
- ➢ **Additionally, find 600 laser event belonging to one transparency measurement.**
- ➢ **Have a working solution, but needs optimisation (FED dropping).**
- ➢ **FED dropping in CDAQ prefered, but would require additional output stream.**

Data analysis :
- ➢ **Follow established tools used at TB2007.**

Data Quality :
- ➢ **MEM issues.**
- ➢ **Up to CRUZET3 timing issues, now resolved.**

Generally :
- ➢ **Entirely focused on procedures, too little effort on looking at stability.**
- ➢ **Establish export of laser primitives and involve PFG ? Already close work to exchange information – but only manually.**

Data Bases :
- ➢ **See presentation earlier today. STILL an issue with timestamps in DB. Without the concept of sub-run level IOVs laser monitoring does not work.**

ECAL Laser Monitoring Status - ECAL Days
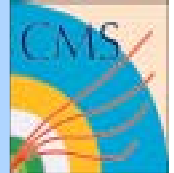
EE Monitoring

Hardware :
- ➤ **LED Pulser system is currently being installed, off-detector parts being defined and assembled.**
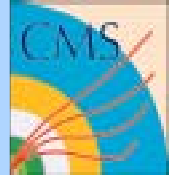
Operation :
- ➤ **Current plan is to run a blue LED as 'stabilizing soak light' and a orange (600 nm) LED as secondary wavelength monitoring.**
- ➤ **Current monitoring cycle would be extended to include a round of measurements with 600 nm on the endcaps after each full scan with blue laser. Details to be defined.**
- ➤ **It looks like EMTC card can handle additional/different needs of the LED system.**

Data handling :
- ➤ **Current plan would results in 600 nm data to appear in the laser farm just as blue data.**
- ➤ **For now, low level processing would proceed as for laser light – pulse reconstruction details need to be verified.**
- ➤ **High level correction will depend on the actual behaviour of the VPTs. Best case scenario : 600 nm is just used to monitor that VPTs in CMS indeed are stable. Otherwise, correct transparency measurements for VPT effects before filling offline DB.**

Open Issues

Short term :

➢ **Resolve possible MEM issues.**
➢ **Finish processing of CRUZET3 data, reduce sorted data to fit back up disk.**
➢ **Move and reconfigure laser farm PCs. If data volume for CRUZET4 is as for CRUZET3 should survive and allow mostly real time processing.**
➢ **For CRUZET4, run the 'Laser Calibration Parameters Expert on Call' MoA task.**
➢ **Run OnlineDB filling – possibly semi-manually.**
➢ **Expand laser farm by one more PC and a disk server (30 Tb).**
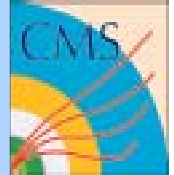
Medium Term :

➢ **Get PopCon fully working.**
➢ **Get mechanisms and responsibilities worked out for handling EE data.**

Long Term :

➢ **Define and get in place additional procedures handling the interplay between various 'stability measuring' procedures – PED, TP, LASER, dynamic PEDs, etc.**
➢ **Define and get in place procedures to correct VPT effect if it exists in CMS.**

Summary

➢ **Successful participation in all CRUZETS with increasing complexity.**

➢ **Laser data taking is ensured – default procedure for CMS running.**

➢ **Automated running of the laser data processing being ramped up. Some more work needed towards CRUZET4.**

➢ **Further automatization of online DB filling, PopCon, quality checks for data taking, data quality, processing etc. require more work.**

➢ **As soon as continuous data taking starts, man power will be stretched since continued development and optimization will overlap with shift like task to ensure proper monitoring.**