ECAL Laser Monitoring

- **Status of the system and validation of the Laser Corrections**
  - **Stability of the system**
  - **Prompt validation loop**
  - **Offline corrections**
- **History plots**

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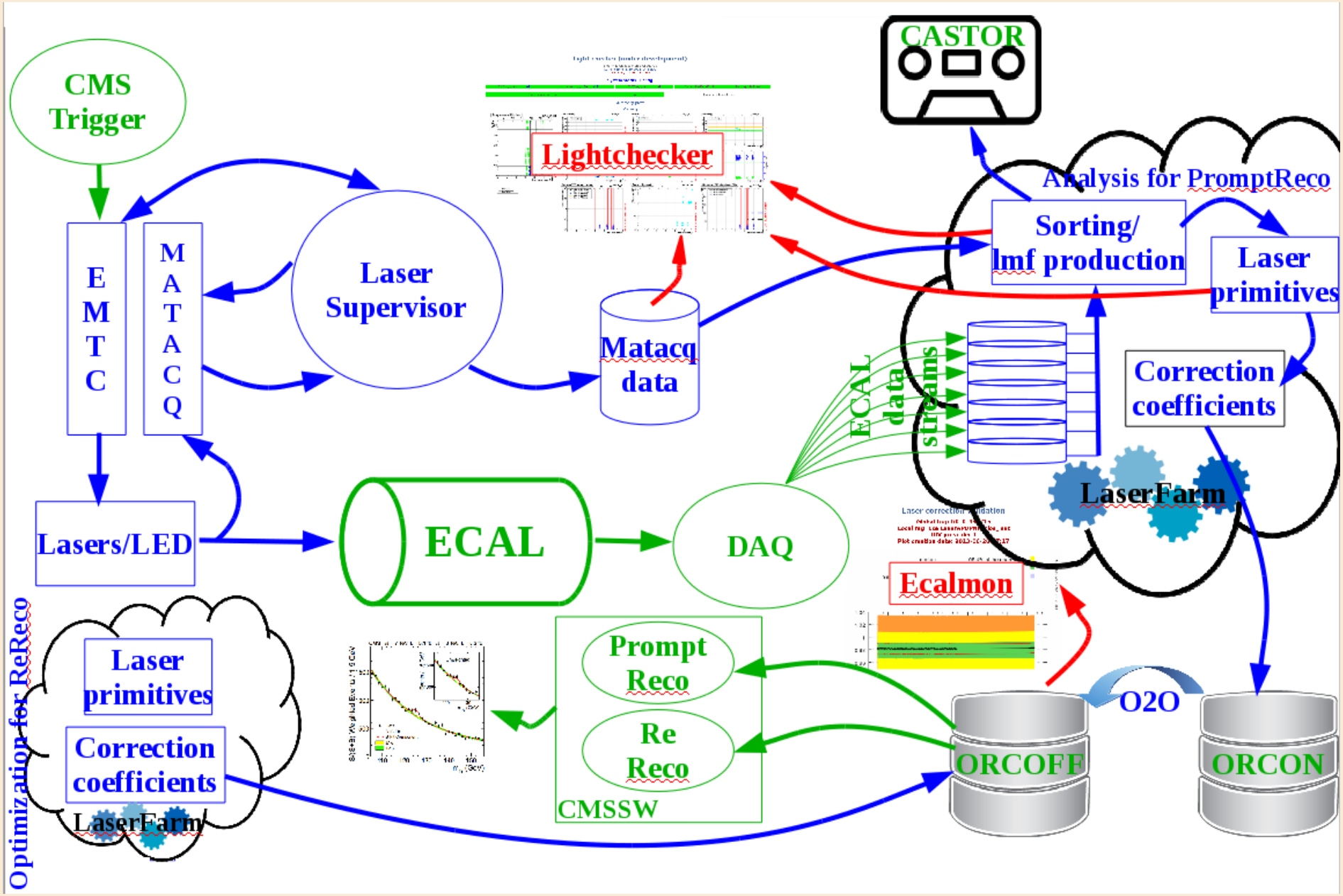
cea/IRFU - Saclay

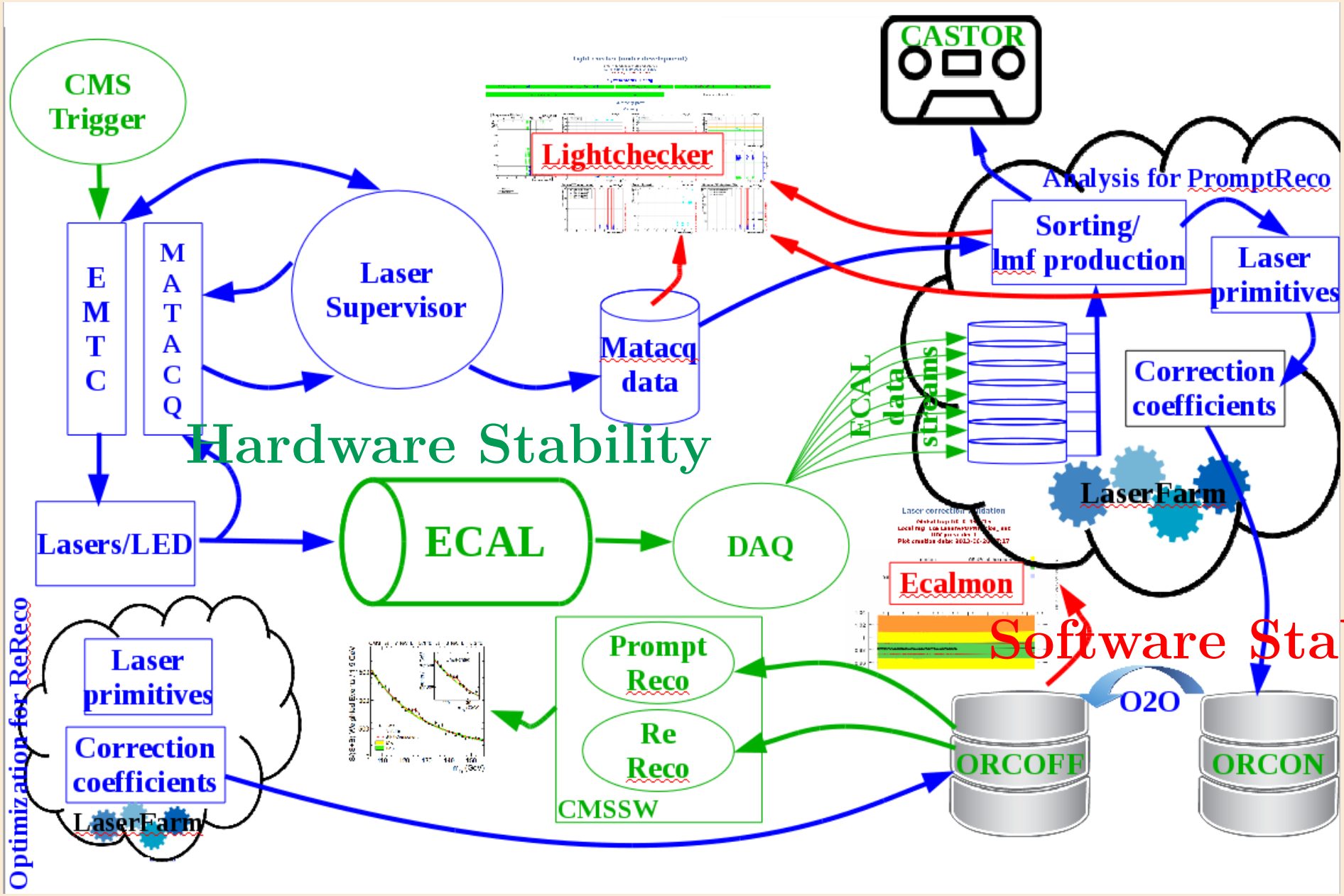
The Monitoring Loop



The Monitoring Loop

- MATACQ: Laser monitoring data aquisition triggered by the CMS trigger
- LaserSupervisor: gets the data from MATACQ system and transfers it to the Laser Farm for processing
- Laser Farm Processing : consists of data sorting, laser primitives production and crystals transparency corrections computations
- Status of all these processes is displayed on the LightChecker(**LightChecker**)
- Database Filling: FillCorr process checks if runs are from GDAQ and not empty, gets the corresponding corrections files and transfers them to the OMDS database
- A second copy of the corrections is performed, and ready to be transfered to ORCOFF when validated
- Prompt Validation Loop
- Ready for Prompt Reco
- There is also an additional offline process that provides corrections for Offline ReReco

The Monitoring Loop



The System Stability

SOFTWARE

- Incidents since the beginning of run-II
  - Incident: DB filling too slow: corresponding to corrupted indexes in the Laser DB
  - LightChecker stuck (may 22nd,2015), ecal-laser-room-03 died, now running on srv-ecal-laser-13(laser farm)
  - By july, we were also hit by Magnet switch on and off(Bon/Boff)
  - July 2nd, decision was taken in DPG, not to apply magnet corrections running FillCorr, but while running the Reco process
    * A feature of the FillCorr process (bad handling of the Bon/Boff transition step (mainly for EE), july 3rd,2015)-any step might still cause problems-to be improved.
    * HLT weekly averaged corrections needed a stable and realistic set of corrections. On a weekly basis, Bon/Boff steps not manageable due

The System Stability

to the frequency of the switch.

- July 9th, 2015, due to these two points, DPG decided to apply the Bon/Boff corrections to the Boff data (Bon_data_corr=1.)
- For the prompt tag: B=0T corrections are applied since friday July the 17th @9am corresponding to the magnet ramp down
- Incident: Stop of the DB filling, while FillCorr seemed Ok: couldn't find the new runs due to the trigger field in the DB not filled anymore (sept. 14th,2015), warned by the PFG shifter

- Software improvements
  - Included FillCorr status in the lightchecker (in May-after first incident)
  - Added references for the recovered Channels in FillCorr
  - Added latest normalisations including refined bestPNchoice
  - Refined quality criteria to deal with issues such as HV instabilities...(after July incident)

The System Stability

  - Changed the selection of the valid runs, to cope with the database missing trigger field (after September incident)

- Software Stability
  - Monitored very closely with the LightChecker by Saclay-group and PFG shifters
  - Warnings are sent in time, after issue occurrence
  - Fast recovery of the normal situation for usual issues (any process stop...)
  - Only three major issues with no major consequence on the Prompt Reco (luckily during cosmics runs)
  - STABLE :-)

The System Stability

HARDWARE

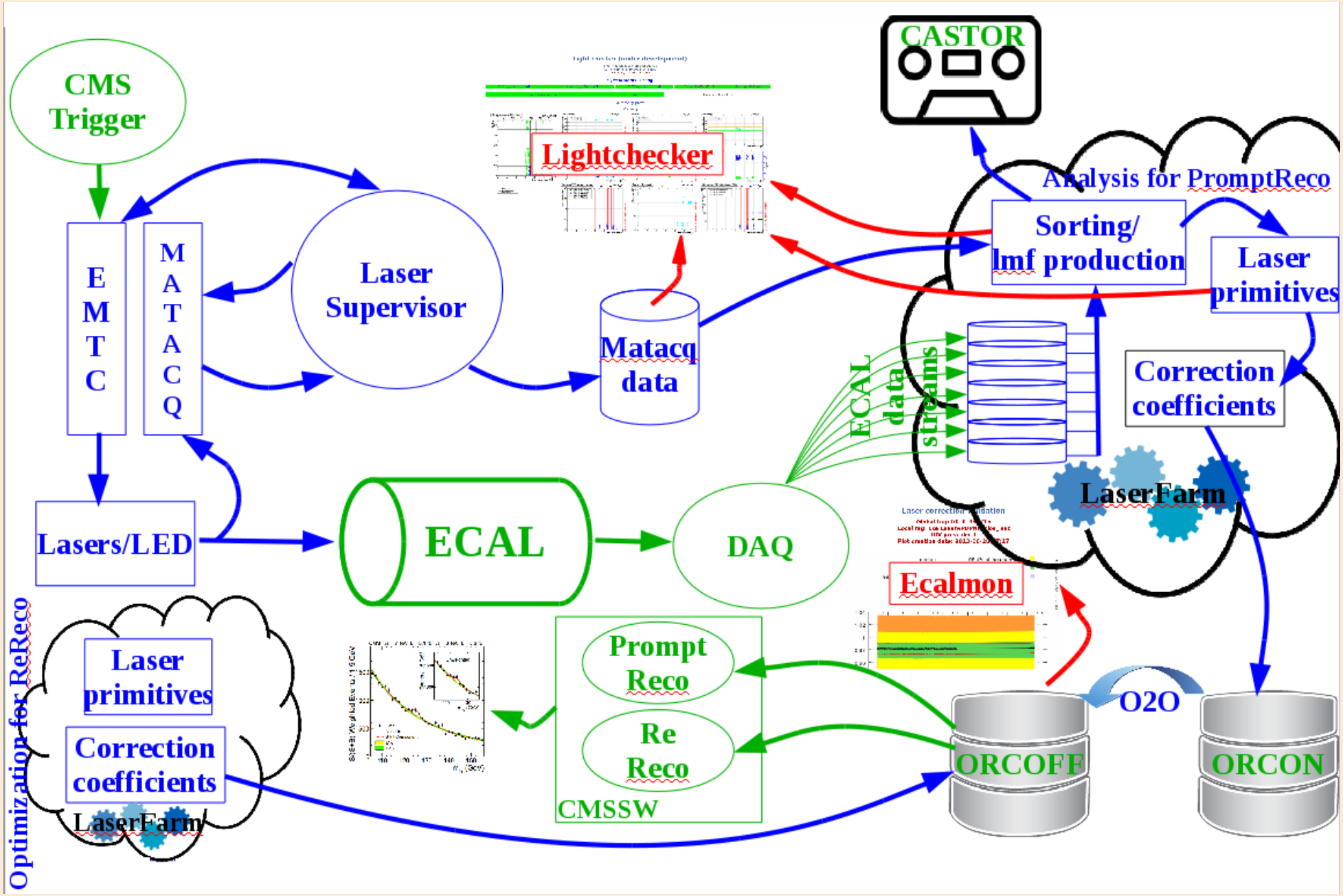
- Most recent incidents during run-II
  - Incident: Crash of the ecal-laser-room-03 PC.(may 2015)
  - Incident: oct. 3rd, 2015, loss of communication between the PC and the VME card in the laser room, during a Sunday long run (12 hours)
  - Induced a failure in the computation of the laser corrections
  - Automatic recovery if the run is stopped
  - Data recovery is tedious
  - Fibers have been cleaned on oct. 8th, and no new occurrence since
  - Incident: oct. 12th, 2015, one out of 3 laser measurements (1 Fed/3) into error, not yet understood
  - Ok, since immediate reboot at P5
- Improvements

The System Stability

- Documented the recovery of the laser corrections after the communication incident
  - The "Matacq FastFeedBack" icon will turn to Magenta
  - The procedure to follow in order to recover the data described in detail, in the LightChecker troubleshooting page, accessed directly from the "Matacq FastFeedBack" icon (**LightChecker**)

- Stability
  - Laser hardware is in good shape and stable apart from the two reported incidents

The Prompt Validation Loop



The Prompt Validation Loop

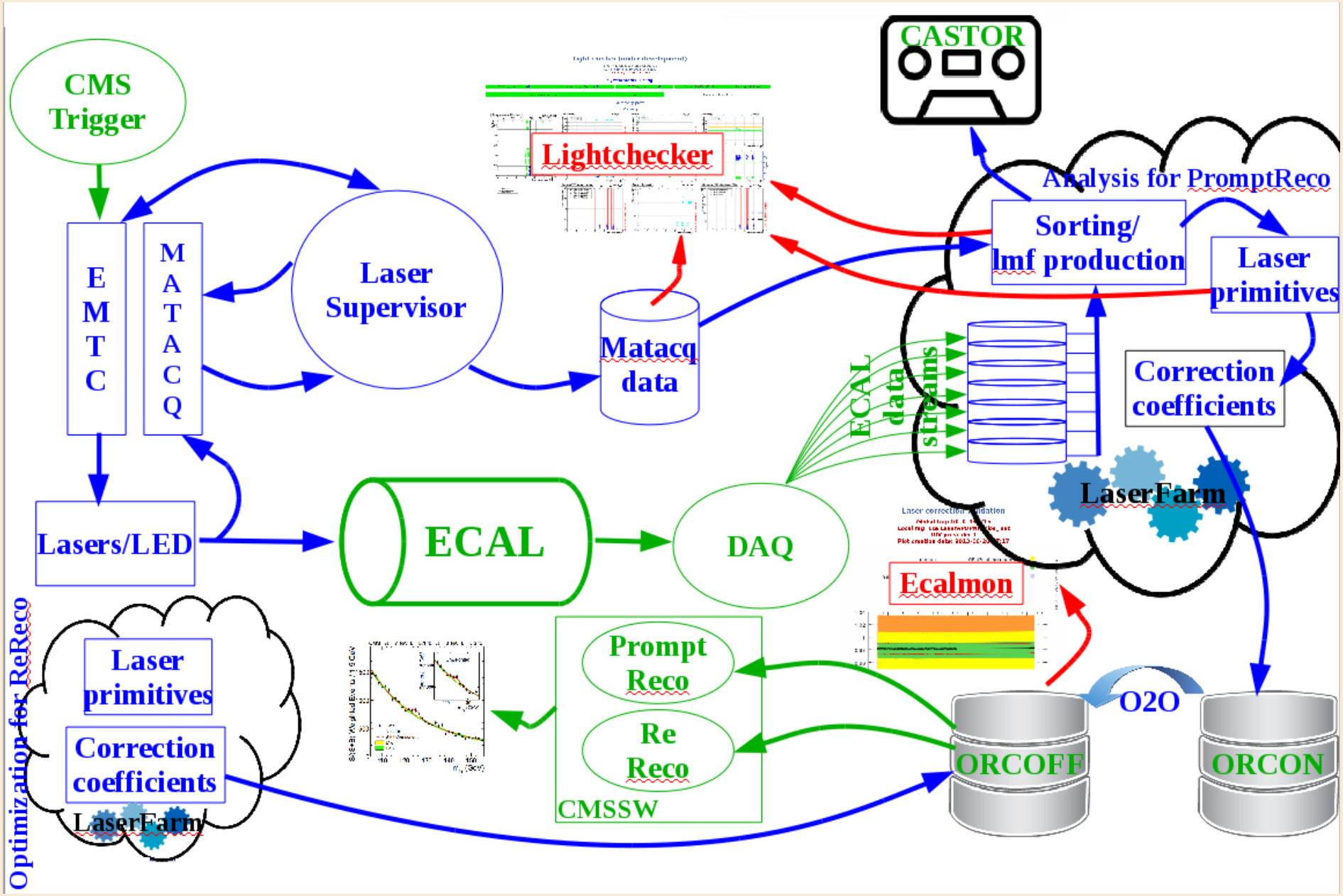
- The procedure
  - Before writing the laser corrections in the ORCOFF database, a validation process takes place
  - This process runs continuously on lxcms101 PC (bldg. 27)
  - Each hour, it wakes up and fetches the latest corrections put in ORCON
  - Plots are made for the last 72 hours for comparison with previous corrections
  - Validation is made by Saclay group on a basis of checks twice a day
  - If everything is OK, no action is required and all the laser corrections for the past runs up to 36 hours before the present time, are written in ORCOFF
  - If any problem, the transfer O2O (ORCON-to-ORCOFF) and

The Prompt Validation Loop

the Prompt Reco are stopped, until the fix

- The status
  - Runs smoothly most of the time
  - Easy to launch(**ECALMON**)

The Offline Validation Loop



The Offline Validation Loop

- The procedure
  - Runs on the laser farm (called OneShot)
  - Uses the same soft as FillCorr
  - Options are: Choice of the first run to consider, Bcorr, patch after the issue of database trigger field
  - Produces a txt file (2015: 4 hours) which is converted to db like file (40mns)
  - Db file transfered to lxplus (10mns)
  - Same validation as Prompt with ECALMON (**ECALMONOFF**)
  - Needs expert's intervention to be inseted in the Database (usual dropbox not suited-size of the file: 8GB) (Many thanks to M. Musich and S. Di Guida)
- The status
  - Since it is used from time to time, may need some upgrade

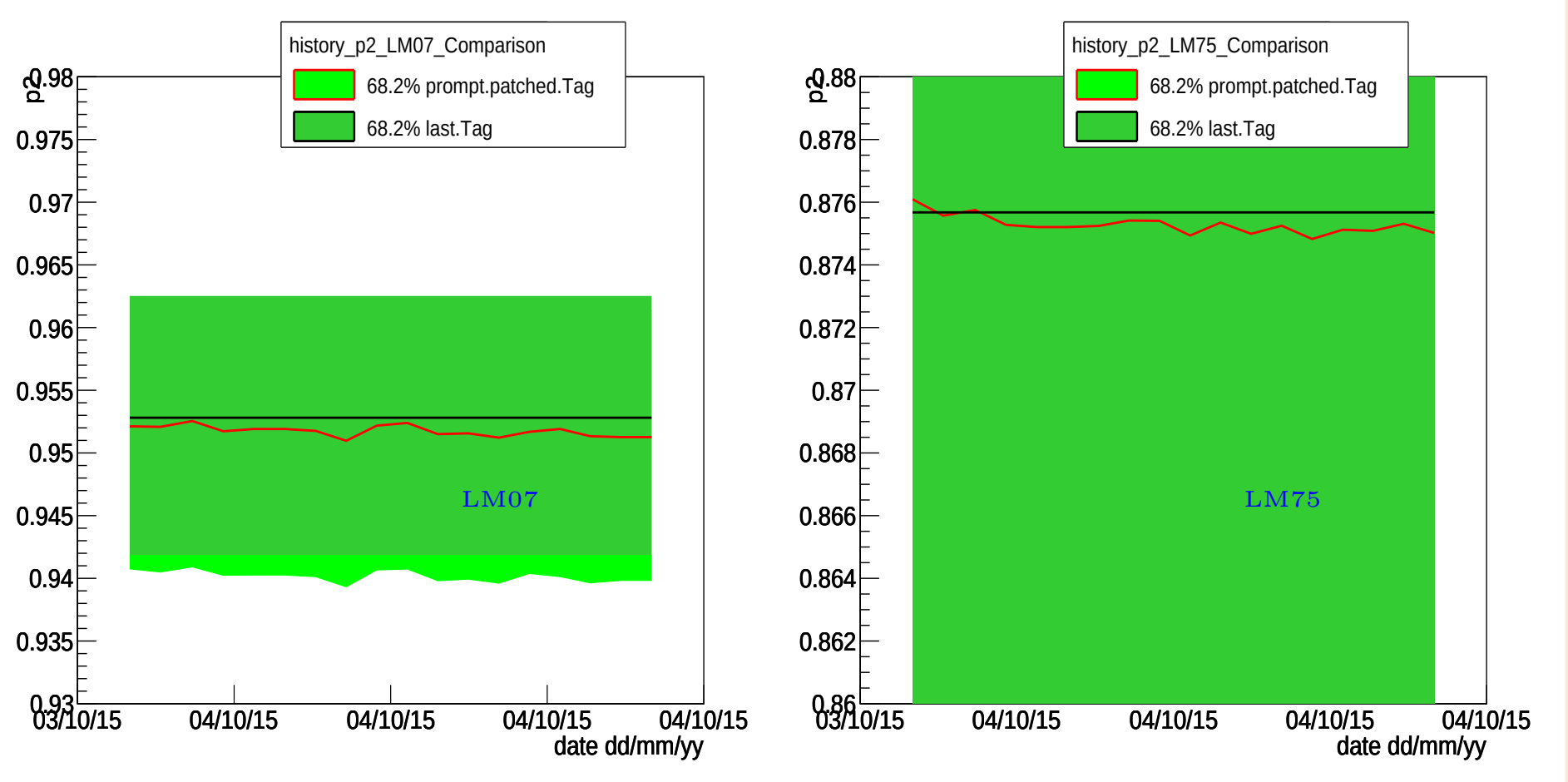
The Offline Validation Loop

when revived

- Heavy duty (disk space, time consuming...)
- Mainly used to produce optimized final corrections for the offline ReReco processing
- Also used for patches to prompt_db when necessary, see next slide.

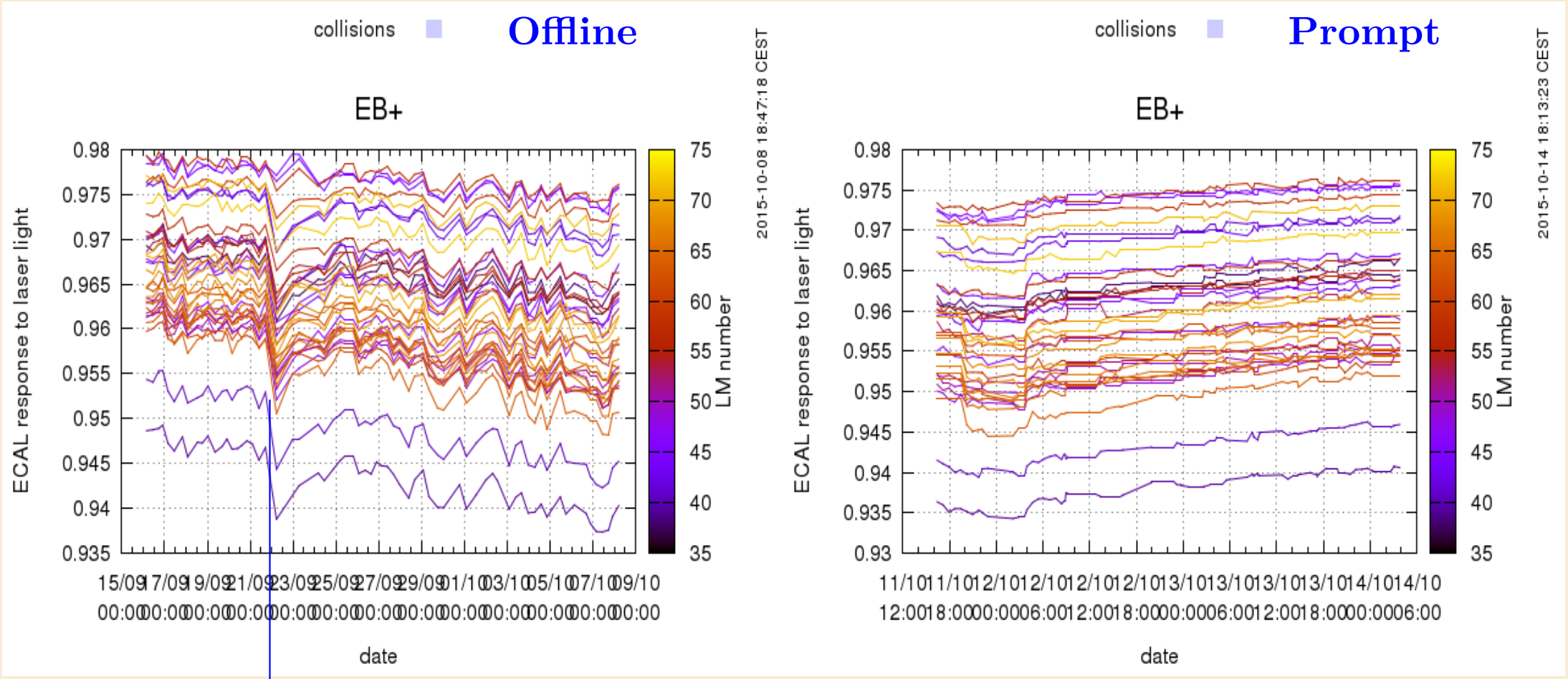
Prompt DB patch

Comparison between last_db and prompt_db : LM history plots



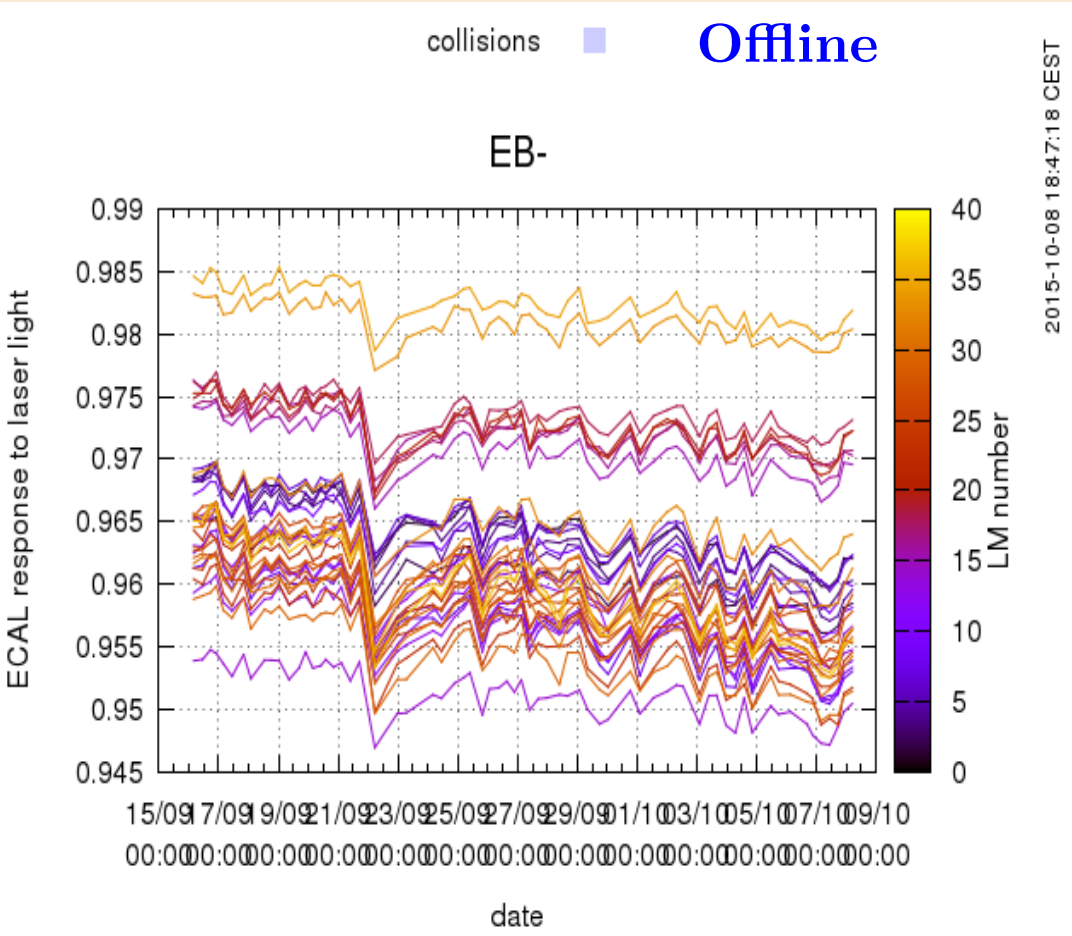
Patch of "prompt_db" produced after the communication problem that occurred during run 258177 (long run of the oct. 03-04 night)

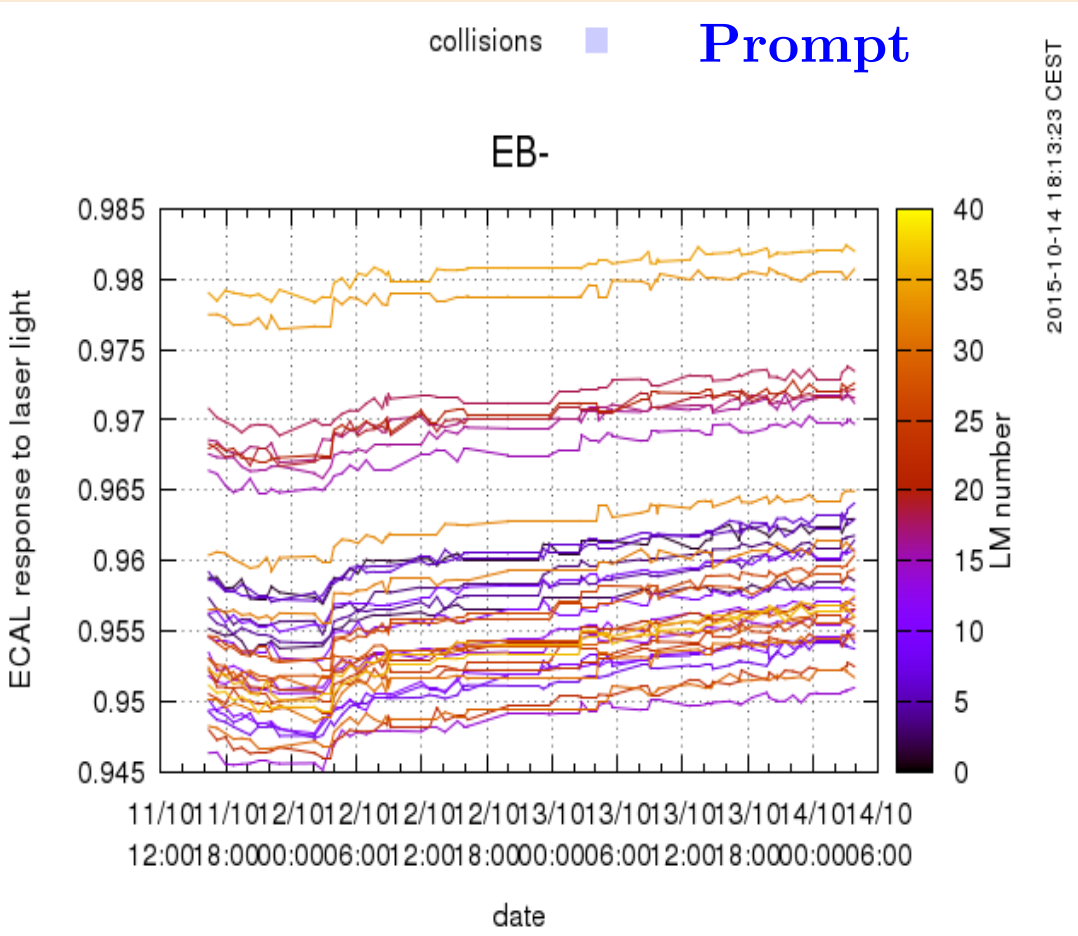
EB Transparency History Plots



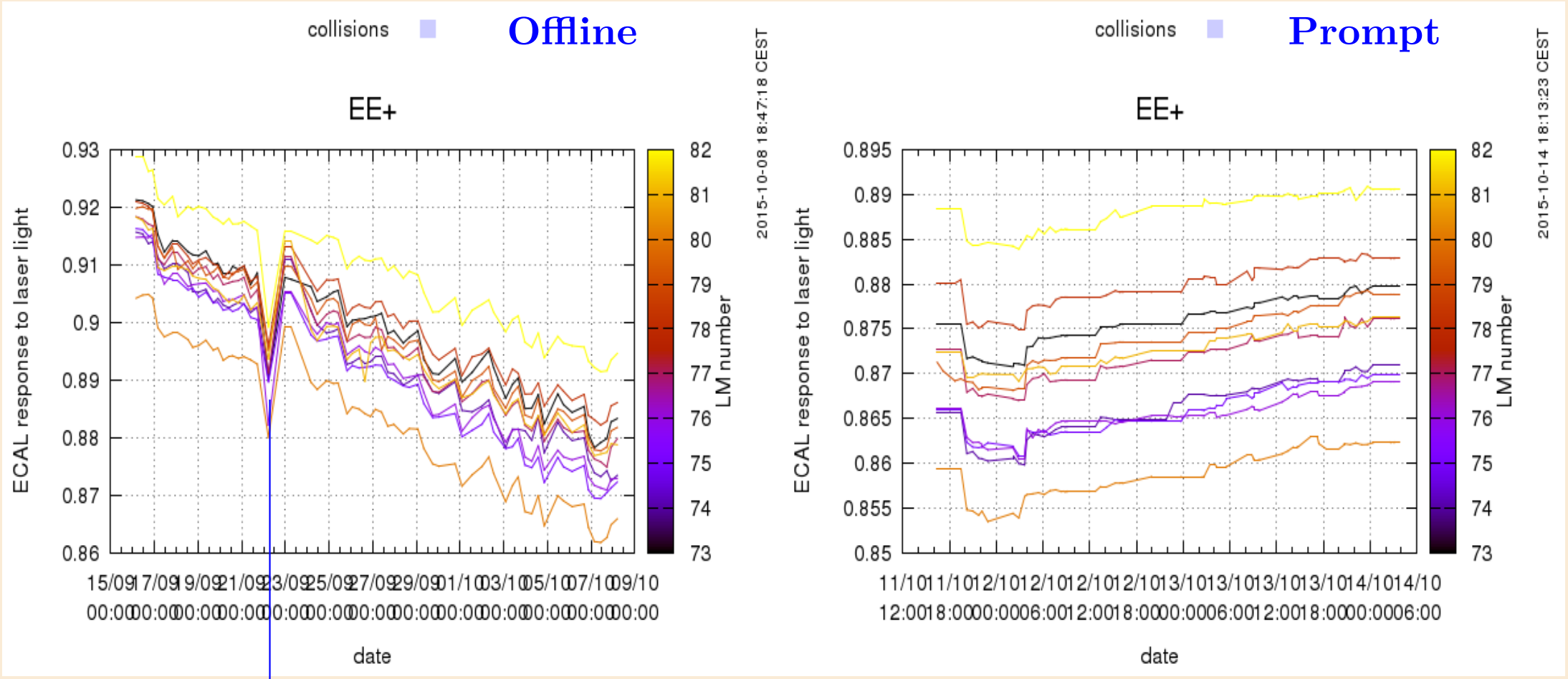
Magnet switches

EB Transparency History Plots



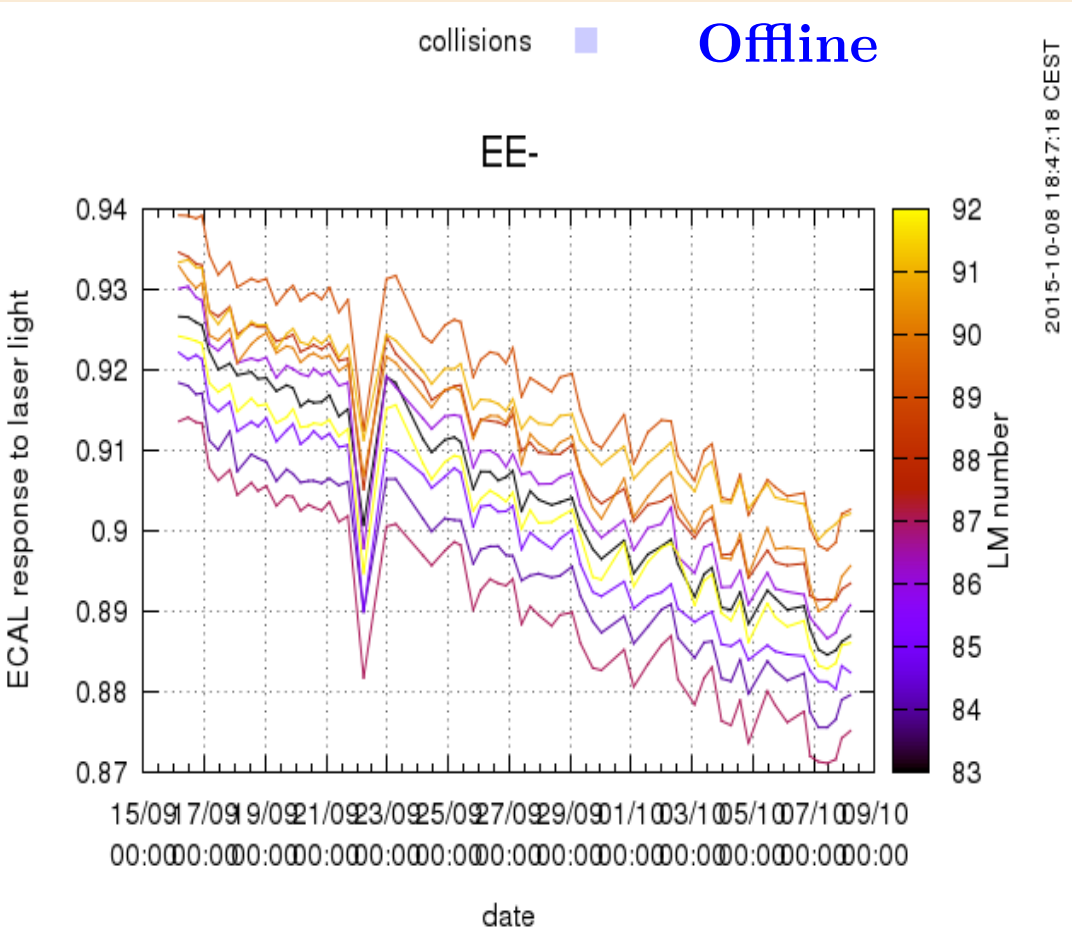


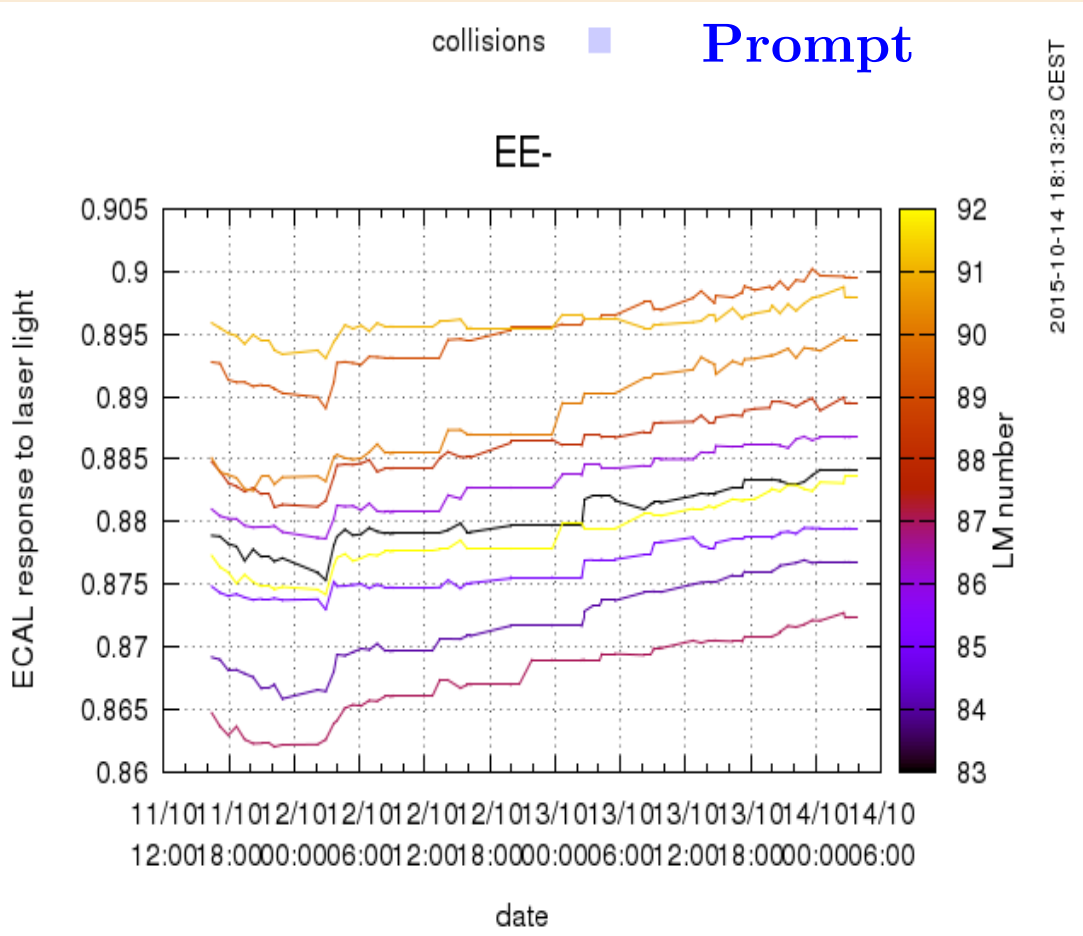
EE Transparency History Plots



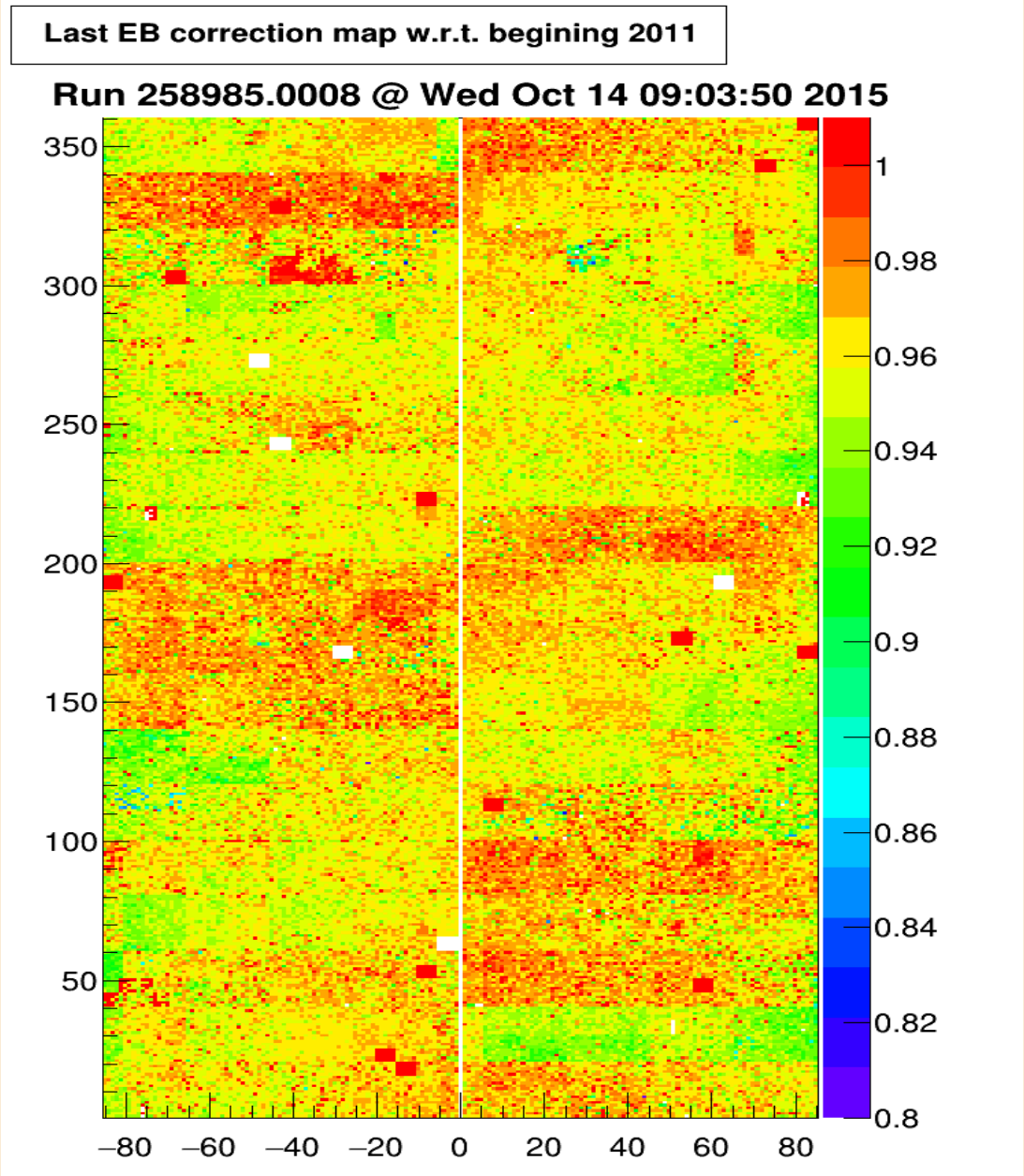
Magnet switches

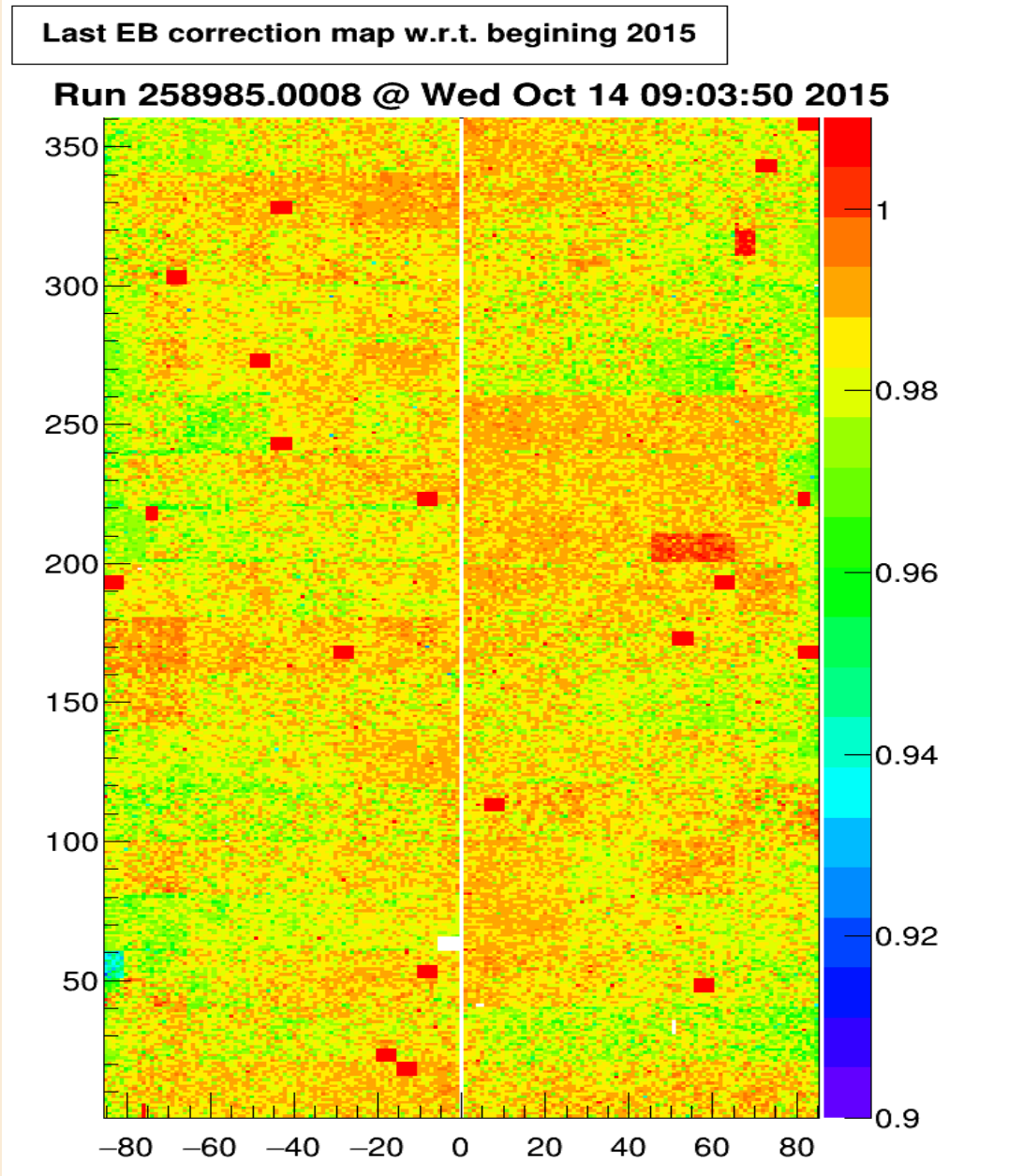
EE Transparency History Plots



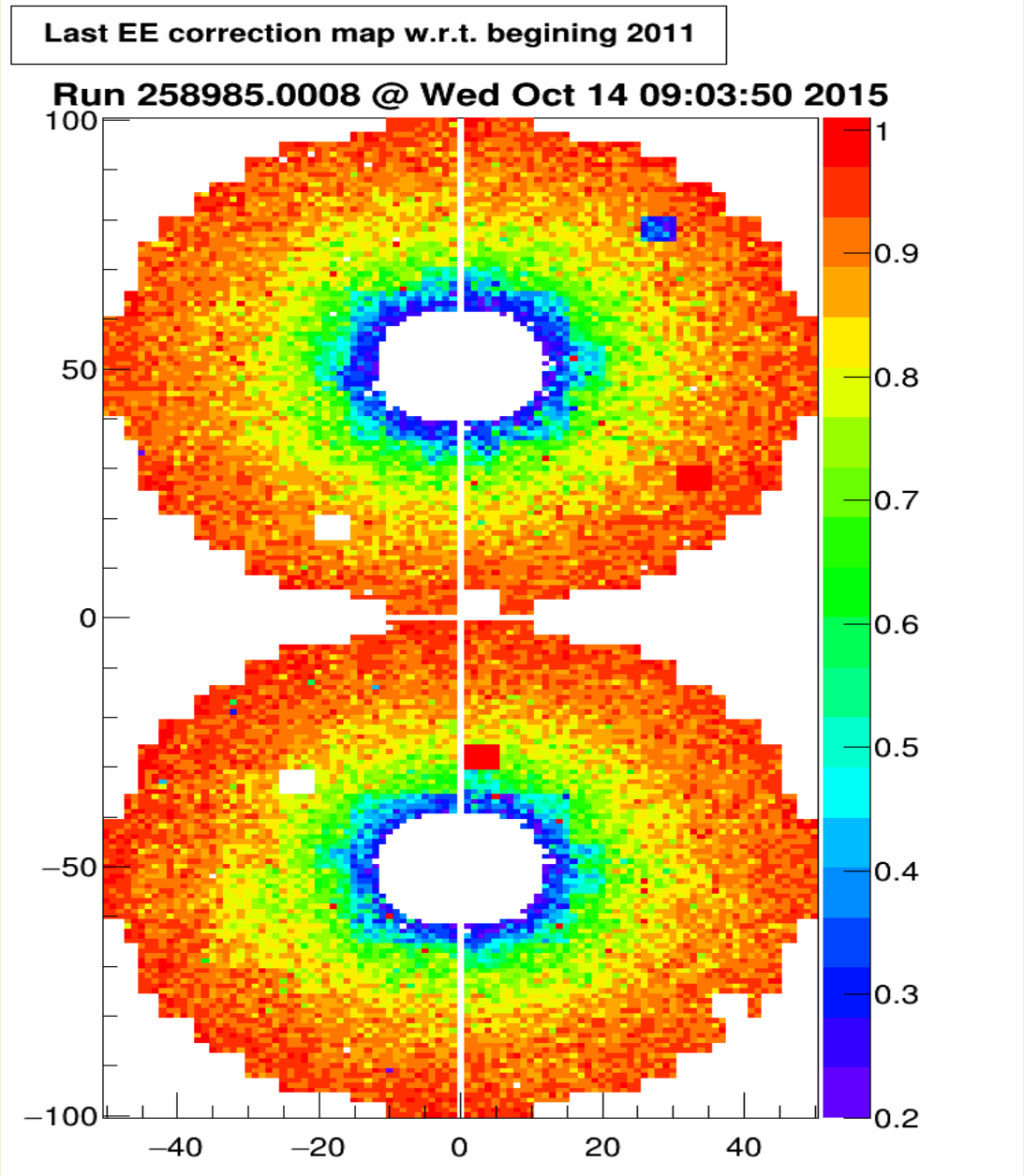


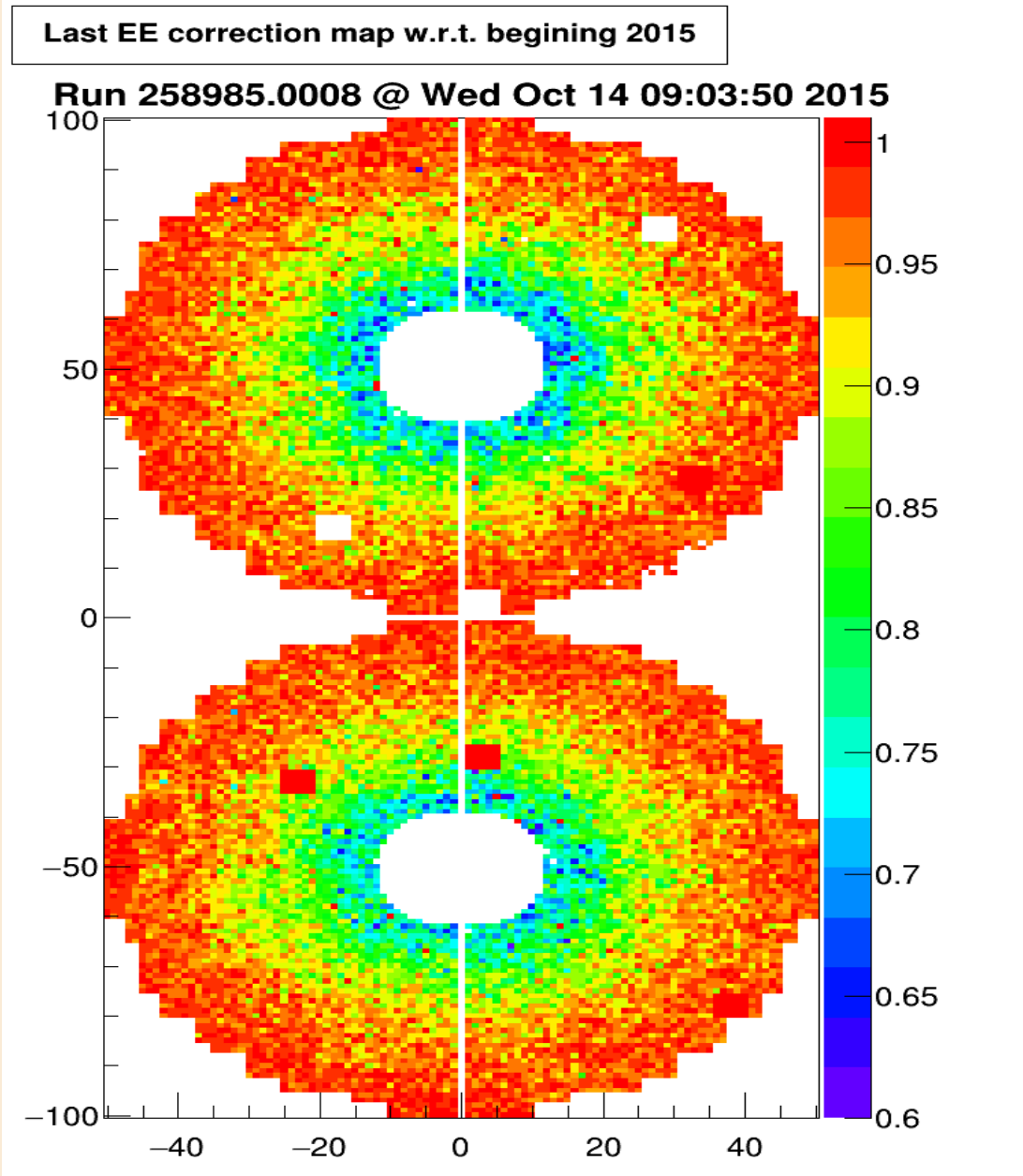
EB Transparency History Maps



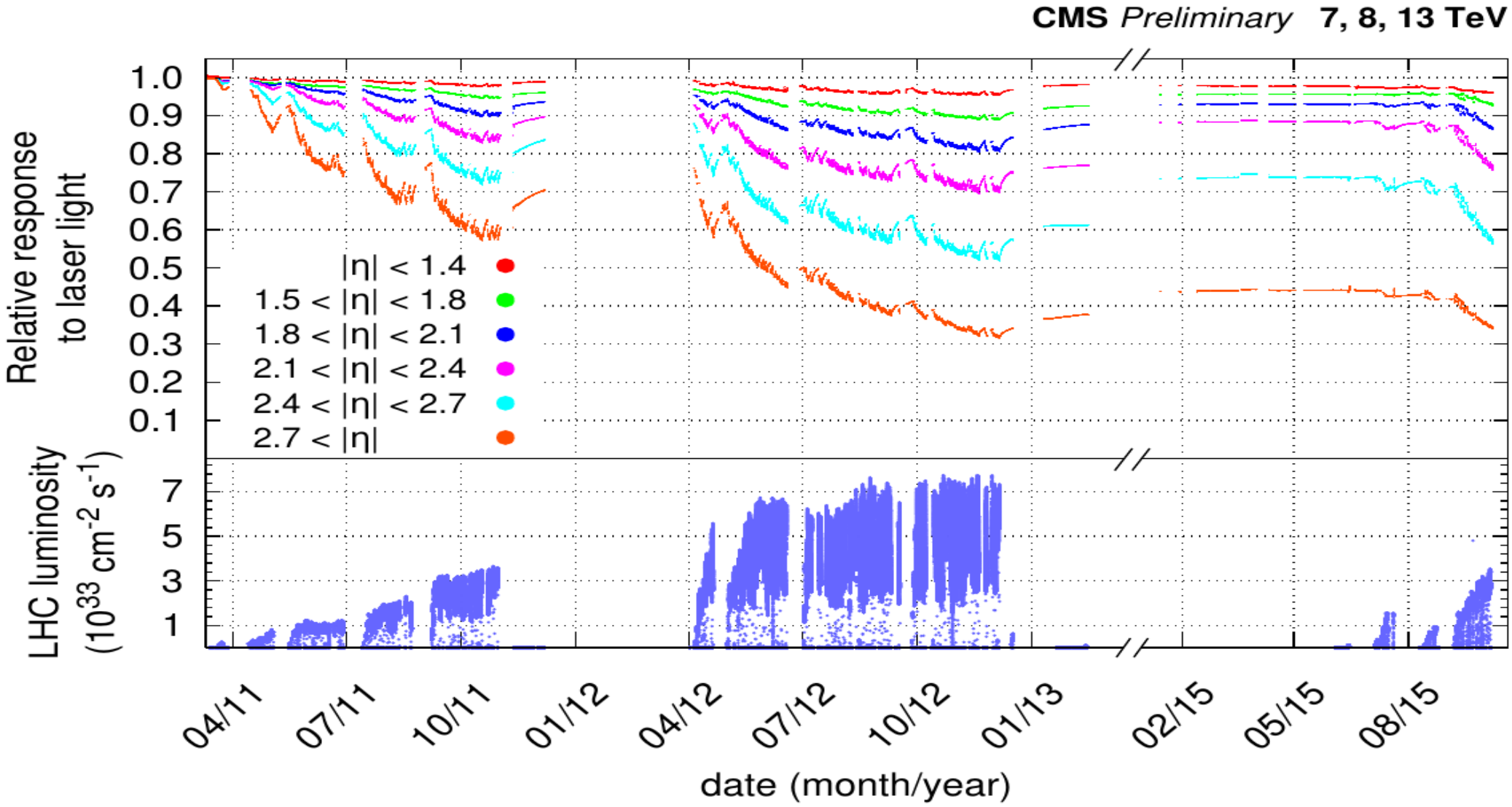


EE Transparency History Maps





Complete η History



Summary

- The hardware of the laser monitoring system was in good shape during this year
- The software was consolidated during the second quarter of the year and now is ok, although it needs one or two improvements(steps handling, and run selection...)
- Prompt validation loop is running ok
- Offline corrections are produced up to run 258507 (2015.10.08 08:33:19 -UTC)
- Offline corrections will be updated and validated after the end of pp collisions run.
- Many thanks to PFG shifters and to DB managers(Salvatore D.G. and Marco M.)