



CSCTF status and plans for technical stop

By Anna Kropivnitskaya

on behalf of CSCTF group:

D. Acosta, G.P. Di Giovanni, M. Fisher, I. Furic, J. Gartner,
K. Kotov, A. Kropivnitskaya, A. Madorksy, M. Mateev,
P. Padley, L. Redjimi, B. Scurlock, L. Uvarov

- FMM Errors Monitoring
- DT-CSC Communication
- L1TdeCSCTF: CSCTF Data vs. Emulator monitoring
- Plans for the technical stop
- PtLUTs at Point 5
- Conclusion

CSCTF FMM Errors

CSCTF work rather stable during DATA taking

At the DAQ doctor monitoring system we could monitor FMM Errors:

<http://cmsdaqweb.cms/cgi-bin/daqpro/subsystemErrors.cgi>

CSCTF Endcap+: SP1-SP6 -> FED 890 - 895

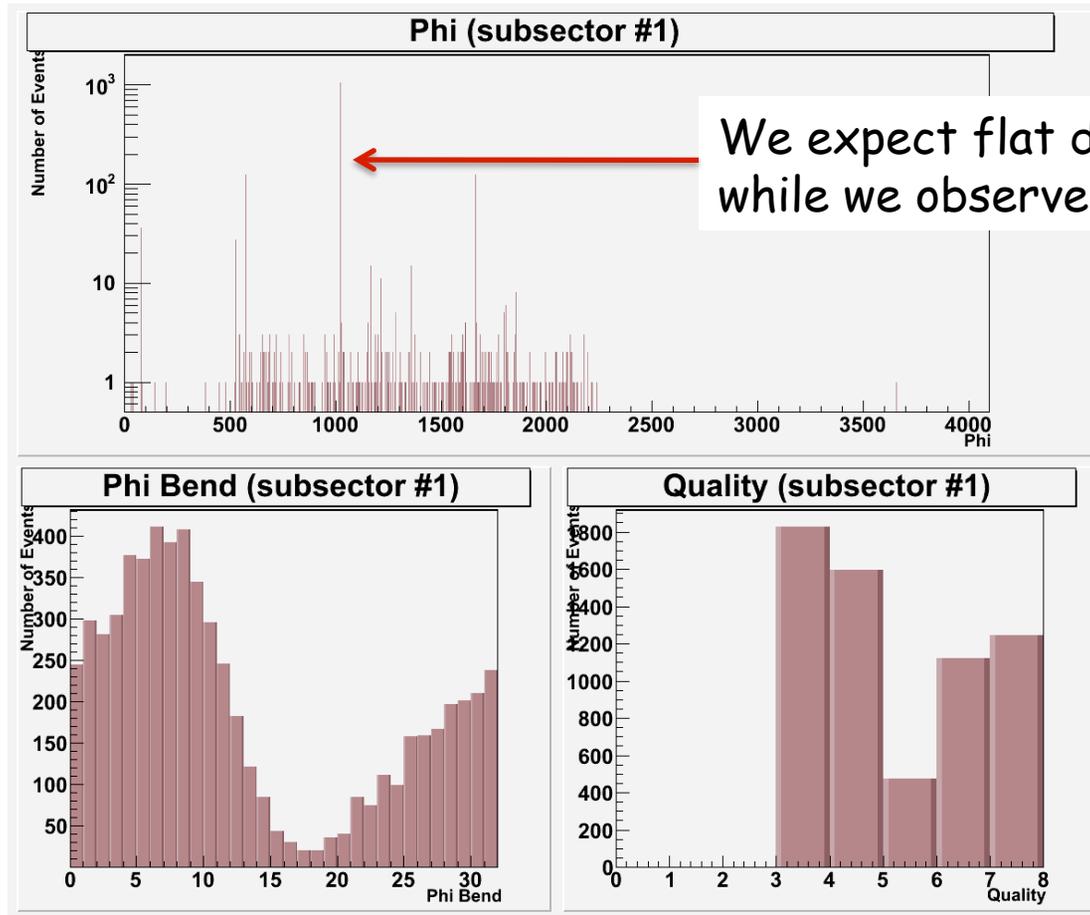
Endcap-: SP7-SP12 -> FED 896 - 901

- ✓ CSCTF during runs has only TTSSync errors and only during LHC status: Ramp, Injection Physics, Ramp Down, Recovery, Injection probe beam
could be pointer to the unstable clock during this LHC status
- ✓ Most TTSSync errors come from Endcap -
- ✓ No CSCTF errors during Stable beam since 13.04.2010
while CSC sent ~24 errors during last 1.5 months
- ✓ 18.06.2010 we got only one CSCTF error during SQUEEZE (FEDs: 890 & 901)
- ✓ Now we couldn't monitor what exactly was the problem is.

Matt is working on sending errors (monitoring) to a central logger which should be implemented during technical stop in August

DT → CSC communication

Khristian



DQM results have been showing evidence of "stuck" bits in DT data, so the decision was taken to make a hardware test of data transmission from DT to CSC

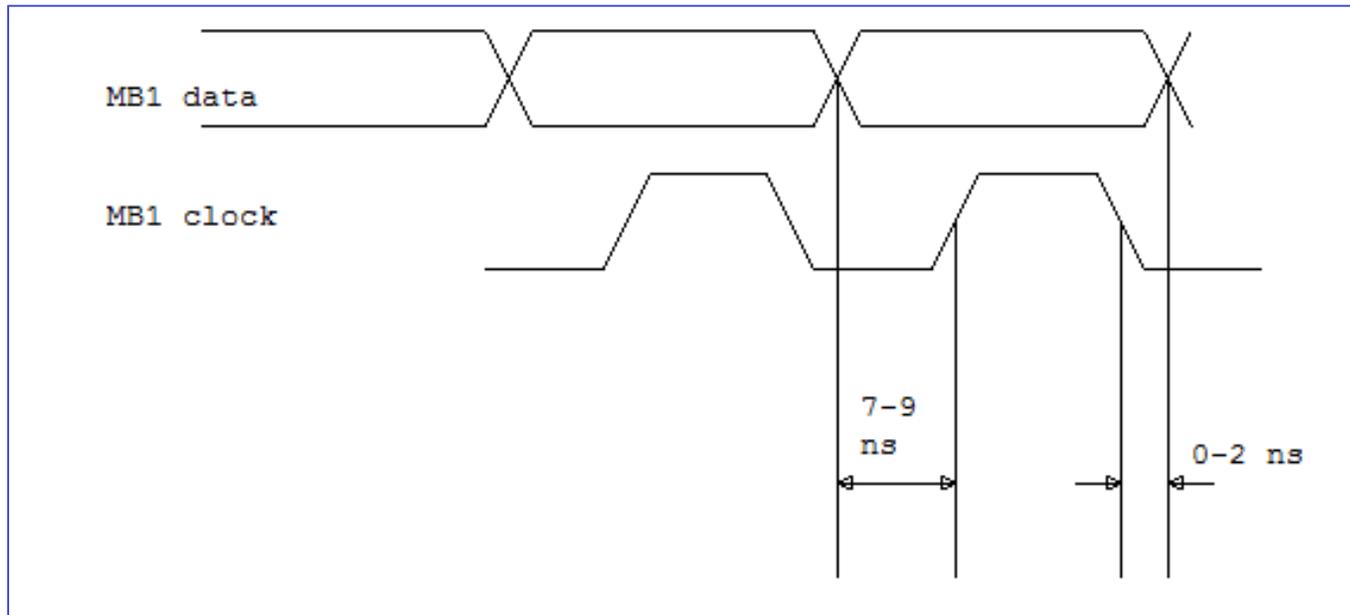
DT → CSC communication

Alex

- The best transmission line test is a long sequence of random numbers. However, DT cannot program a long sequence of patterns because of hardware limitations, the max number of test patterns is 3
- Alex asked DT people (Luigi Guiducci) to program a fixed alternating phi pattern into DT transmitters. The patterns were (binary) 101010101010 and 010101010101, which is all bits in phi changing value on each clock, and also alternating within each value.
- checked the data receiving timing with the scope on the DT→CSC transition card's test points, for the following slots in TF crate: 6, 11, 14. These are the only slots that can be accessed with the scope.

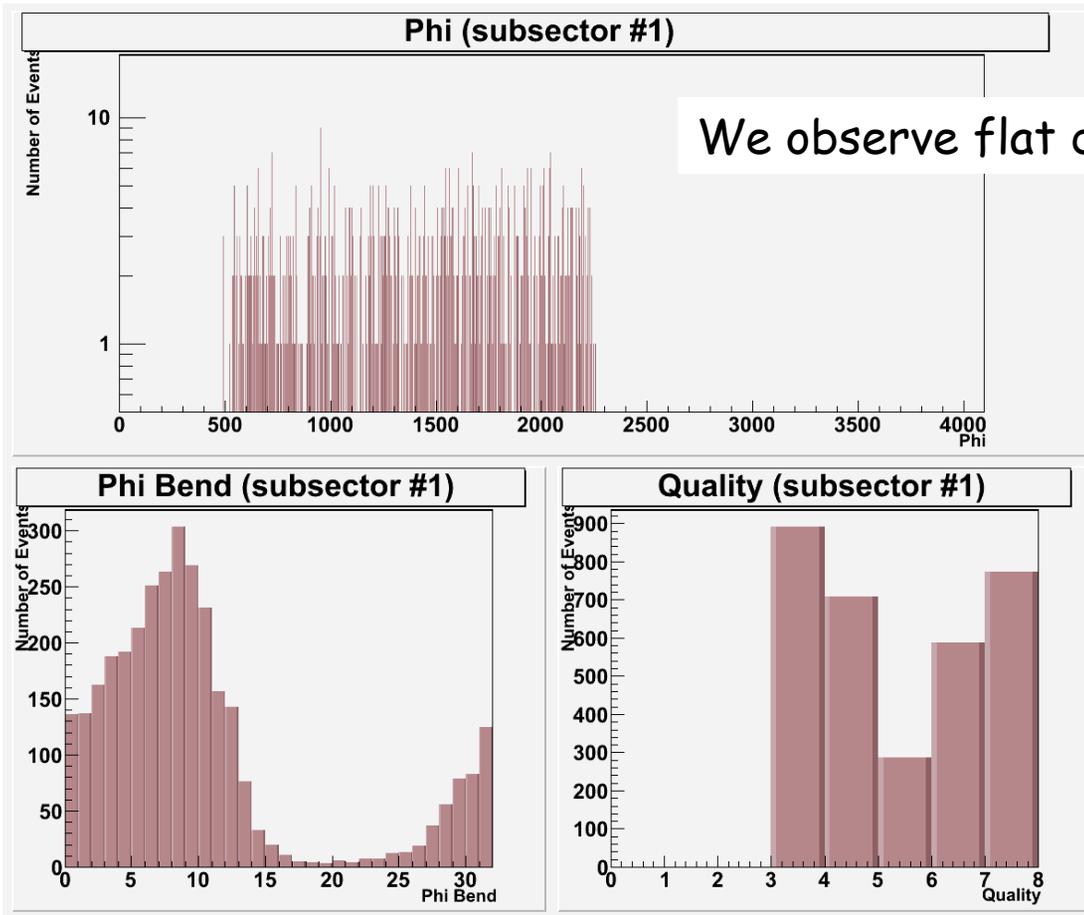
DT → CSC communication

Alex



- the data-to-clock timing has been found to be invalid for the clocking solution in SP firmware. In particular, the data bits' transitions are happening too close in time to the clock's falling edge.
- data interface in SP firmware has been modified to lock the data on the rising edge. Firmware was change at Point5 23 July 2010.

DT → CSC communication



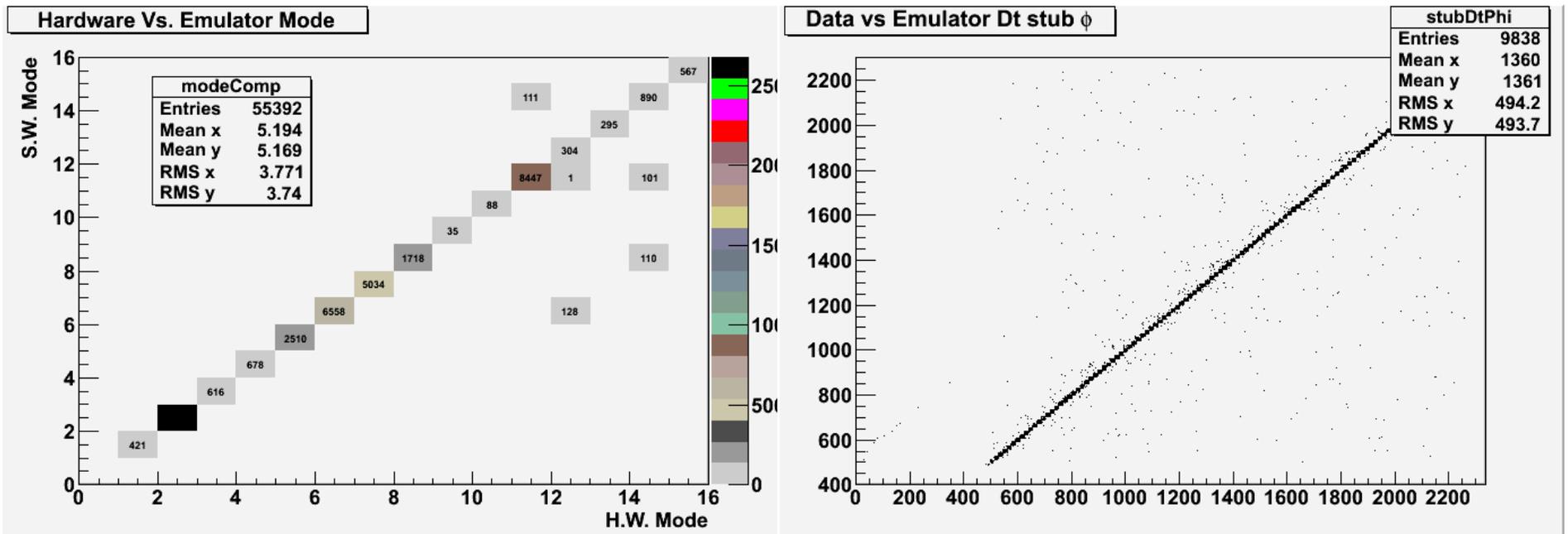
Christian

We observe flat distribution in phi

After the modification, the "stuck" bits have disappeared in DQM results. However, we still see mismatches in data coming from DT (see next slide)

DT → CSC communication in Emulator

Joe



There is still a problem with the track stubs being sent to the CSCTF by the DTTF.

We are able to do direct comparisons of what should and is being sent to us by comparing CSC DAQ stubs, and DT DAQ stubs which are then translated to DTTF coordinates by DTTF provided LUTs. This has shown us that there are transmission problems that need to be addressed.

L1TdeCSCTF: CSCTF Data vs. Emulator monitoring

Joe

Revision 1.1 - ([view](#)) ([download](#)) ([annotate](#)) - [[select for diffs](#)]

Thu Sep 24 08:26:20 2009 UTC (10 months, 4 weeks ago) by gartner

Branch: [MAIN](#)

Added Expert Level Hardware Vs. Emulator Module for CSCTF

- The first version of L1TdeCSCTF.cc has existed for almost a year.
- The code can be found in the DQM/L1TMonitor package.
- The code already includes many of the plots for the CSCTF performance
- We have almost 100% agreement between Data and Emulator except DT-CSC region what was shown on the previous slide
- The current emulator dynamically switches between the old (pre early August shut down) and new firmware rapper via configuration parameters
- New version of Emulator will be upload to CVS this Friday
- Long term plan: make Emulator available at Point 5

The plan for this technical stop

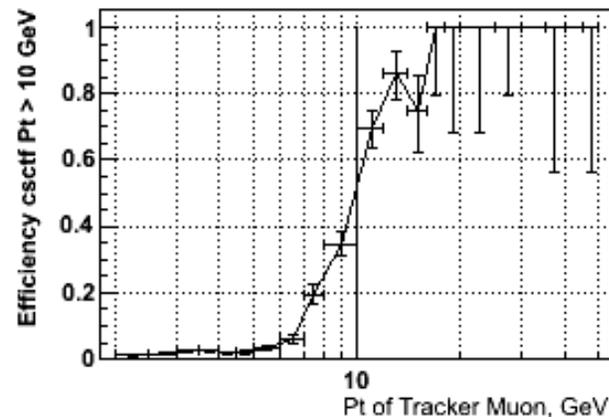
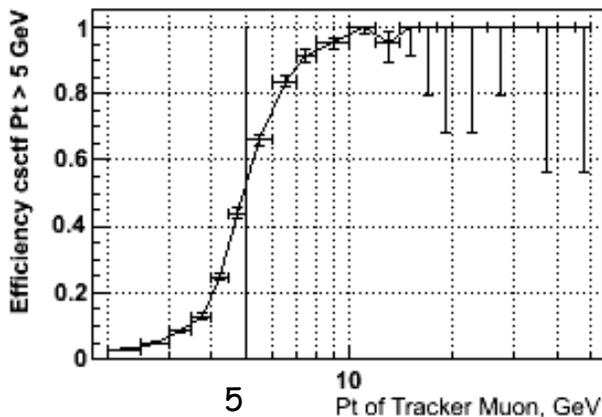
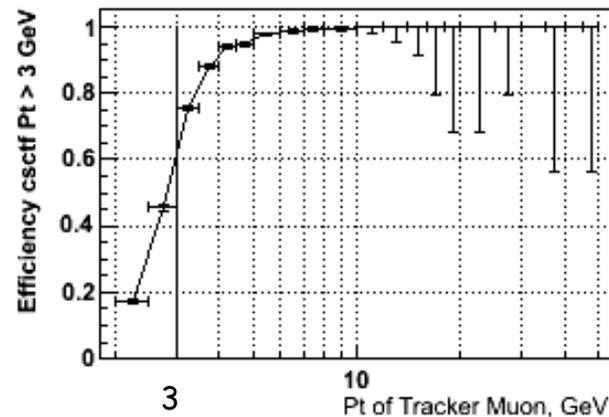
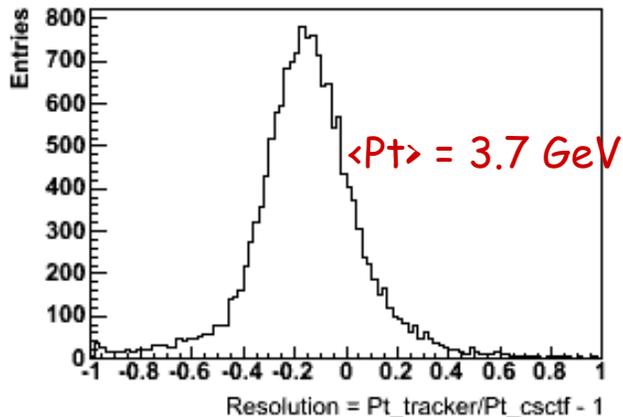
- ✓ DT -> CSC Communication
 - ask DT people (Janos) to program many different random 3-word patterns into their transmitters, one at a time
 - read them back using test FIFOs in SPs, make comparison
 - if we see distortions, check with a scope and identify the problem
 - the situation is made more complex by the fact the DT test pattern programming is so far unreliable. The software (or hardware) fails to program sometimes complete patterns, and sometimes parts of a pattern, seems to be random. Janos is going to work on that problem starting Monday.
- ✓ Upload software which will be monitor reasons of FMM errors.

PtLUTs at Point 5

- ✓ Results are presented for data with PtLUTs uploaded at Point 5 now
- ✓ CMSSW_3_6_1_patch4
with official Prompt Analysis code: /UserCode/L1TriggerDPG/
- ✓ "One Global Muon Skim" with at least one global muon in the event
done by (Chaouki Boulahouache) for "MinBias-GOODCOLL V9" and located at
/castor/cern.ch/user/c/cb5/AtLeastOneGlbMuV9_v2
- ✓ **GOODCOLL :**
 - BPTX Coincidence (0 AND (40 OR 41) AND NOT (36 OR 37 OR 38 OR 39)
AND NOT ((42 AND NOT 43) OR (43 AND NOT 42))
 - Good Vertex (ndf \geq 4, $|z| < 15$ cm, $|r| < 2$ cm)
 - no scraping beam background rejection requiring $\geq 25\%$ of high purity tracks
- ✓ Analyze only global muons which have matching with csctf tracks,
so-called **N_glob**

Threshold efficiency = $\{N_glob \text{ with csctf_Pt} > \text{Pt threshold}\} / N_glob$

PtLUTs at Point 5: Q2&Q3, $1.2 < |\eta| < 2.1$



- + Good resolution ($\sim 22\%$) and threshold efficiency for golden region of eta
 - Threshold efficiency start for the threshold Pt cut less than 0.9 (should be investigated)
- Most tracks in the golden eta region is 3 stations with Station 1-2-3

ME11a structure

ME1/1 view (from CMS IN-2007/024)

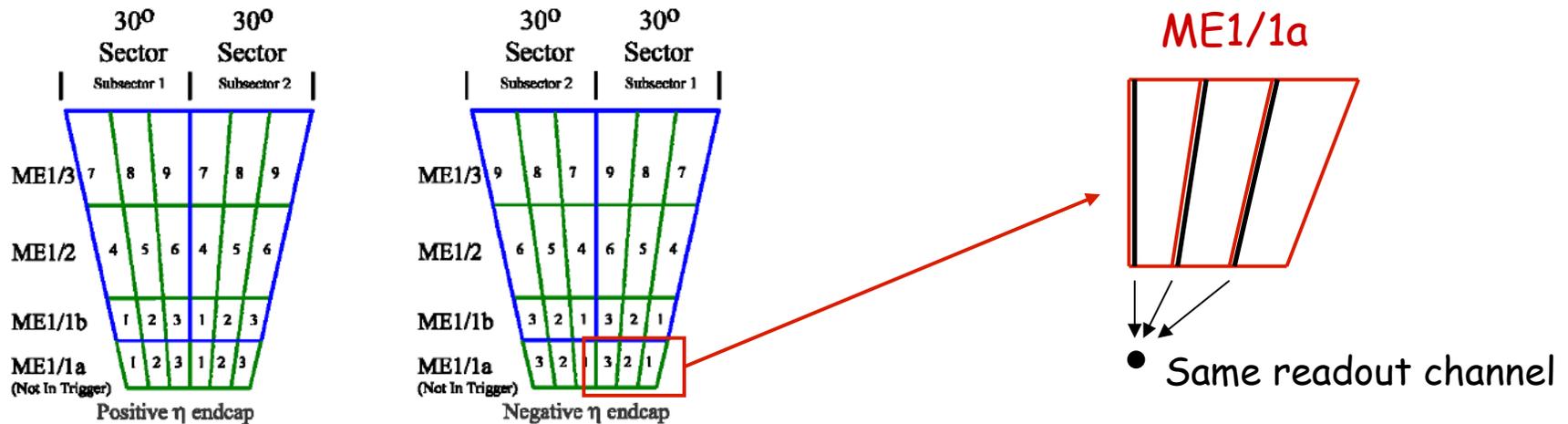
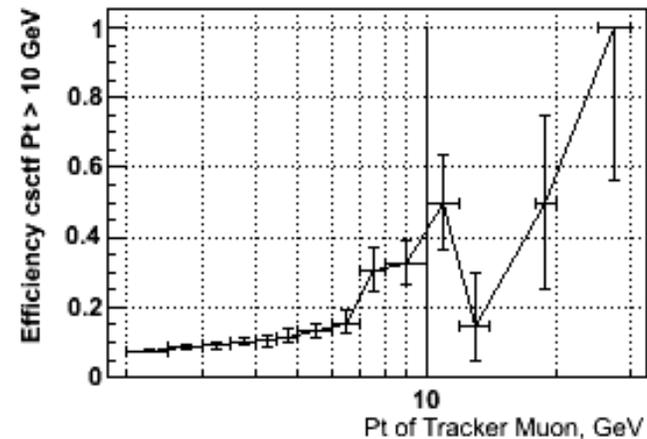
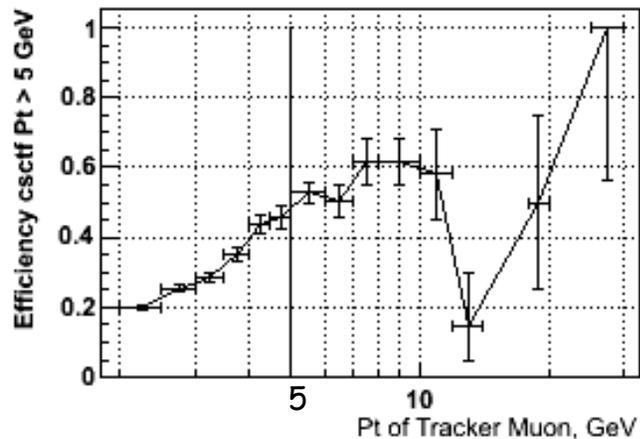
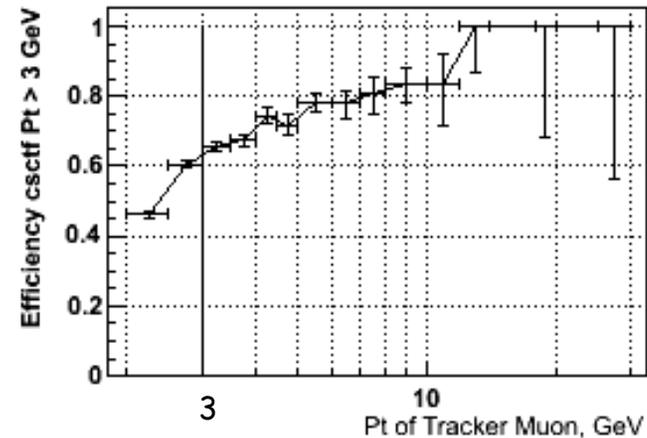
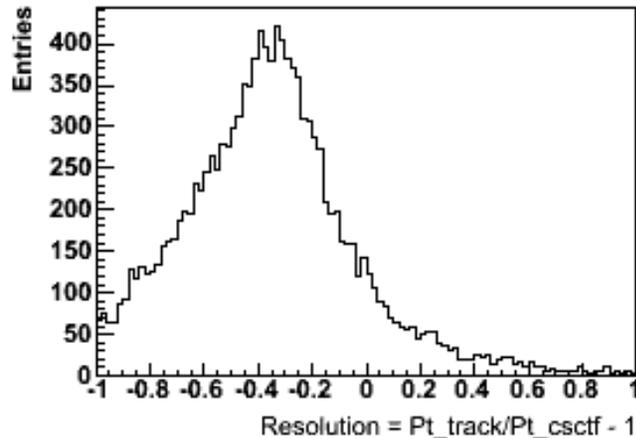


Figure 9. Numbering of CSC chambers within ME1 trigger sectors, as viewed from the IP.

- The 48 strips of ME1/1a are ganged 3:1 in 16 readout channels
- e.g. strips 1 (2), 17 (18) and 33 (34) are ganged together into the 1st (2nd) readout channel
- In the CSCTF LUTs the ϕ value is shifted to the middle of the CFEB
- We will mistake the ϕ assignment at most by 1/3 (with the older assignment up to 2/3)

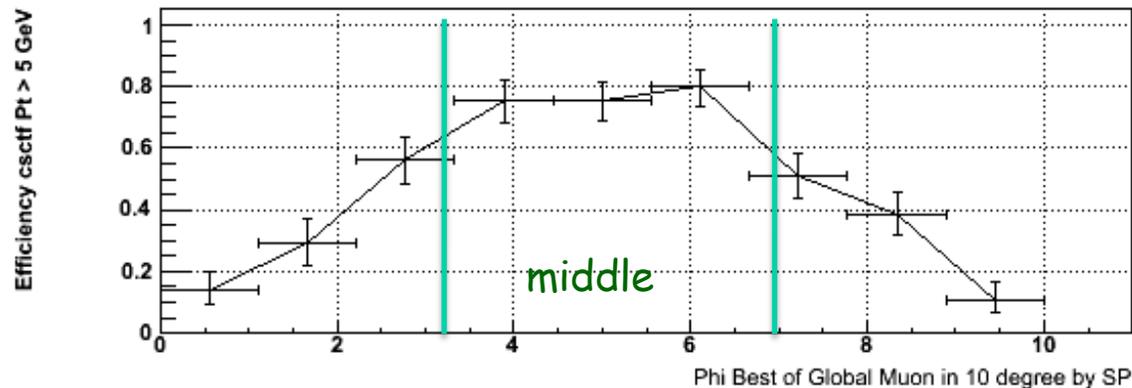
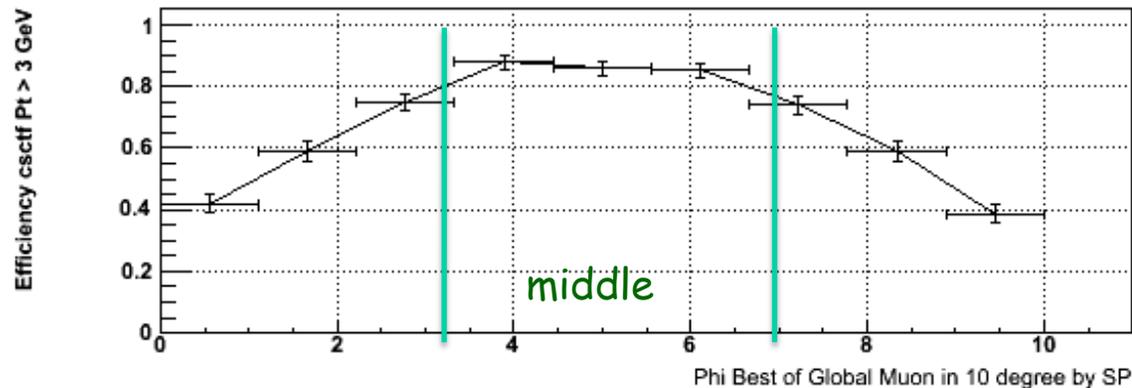
New PtLUTs (ME11a): Q2&Q3, high $|\eta| > 2.1$



Resolution ($\sim 38\%$) and high threshold efficiency in high eta region
Bad resolution due to 3 links reading from ME11a

New PtLUTs (ME11a): Mode2 (1-2-3), high $|\eta| > 2.1$

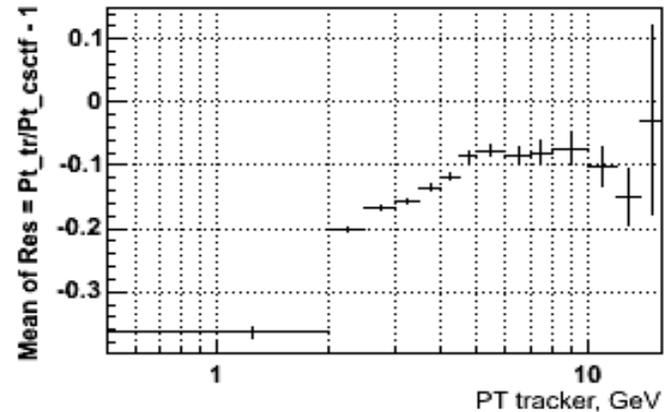
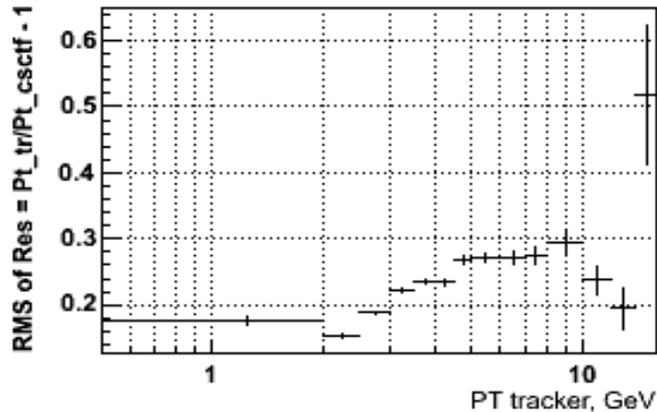
$$\text{Phi} = \text{fmod}([\text{Phi_global}-15], 10)$$



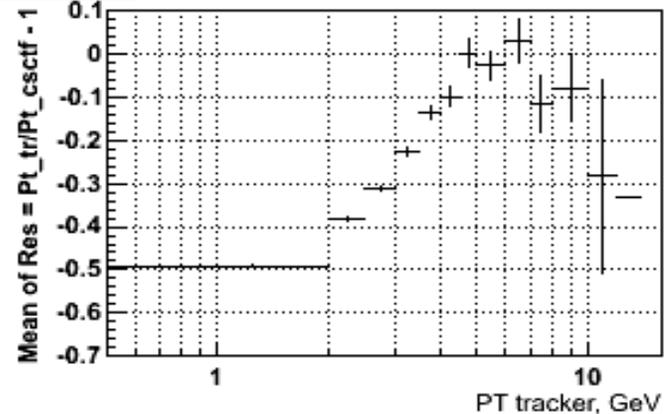
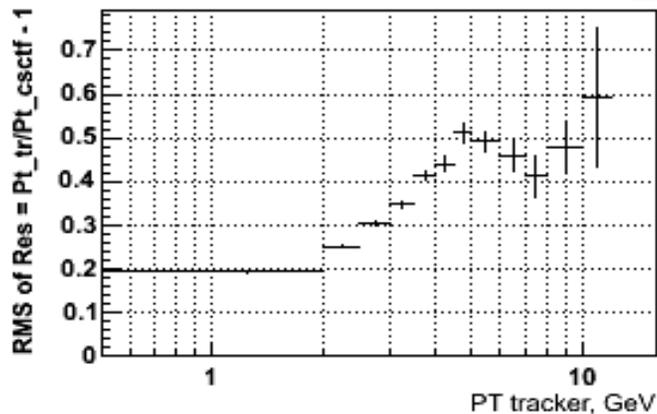
- ✓ Threshold efficiency is significantly higher in the middle than at the ages what is expected from merger of 3 links to 1 for ME11a and assign to phi of middle link

RMS and Mean of Resolution for muons Quality = 2 or 3

Golden $1.2 < \eta < 2.1$



High: $\eta > 2.1$



- ✓ Resolution at golden region is about 20-30%, at high eta region is about 30-50%
- ✓ This resolution could be improved:
 - new tuning with using data
 - take into account reading information from 3 links at once for ME11a case

Conclusion

- Overview of previous technical stop in July was presented
- Plans of the next technical stop (Aug. 30 - Sept. 4) was shown
- Status of PtLUTs at Point5 was presented. The resolution could be improved:
 - new tuning with using data
 - take into account reading information from 3 links at once for ME11a case

Back up slides

- Problems in pt assignment at high eta region for tracks with ME11a:
 - **method 1:** using corrected dphi12:
 - find minimum dphi12 using all 3 links for ME11a
 - > a lot of low pt tracks are assigned like high pt tracks
 - most of tracks with ME11a are with Mode = 2 (ME1-M2-ME3)
 - **method 2:** use only dphi23 for pt assignment for 3 station tracks with ME1 and method 1 for 2 station tracks.