Trigger news from the MTCC

ID	Task Name
1	YB+2 S10,11 chambers commissioned --- DONE
2	YB+1 S10 chambers commissioned --- DONE
3	YB+2 S10,11 cabled
4	YB+1 S10 cabled
5	test LV
6	HV
7	cooling
8	gas
9	SECTOR COMMISSIONING
10	second ROS8 in VME crate of commissioning set-up
11	DAQ synch with 4 chambers
12	data display
13	SECTOR TEST local mode
14	Sector Collector Crate in CIEMAT --- DONE
15	TIM in CIEMAT --- DONE
16	ROS 25 in CIEMAT
17	move 1st Sector Collector crate to Legnaro
18	DAQ, DCS, data monitor in Legnaro
19	trigger Sector Collector in Bologna
20	test ROS-trigger Sector Collector in Legnaro
21	tower racks at CERN
22	move set-up at CERN
23	Sector syncronisation and local cosmics data taking
24	SECTOR TEST regional mode
25	DTTF crate and DTTF boards
26	integration with Wedge and Barrel Sorters at CERN
27	test SectColl-DTTF optical transmission at CERN
28	integration with LTC
29	TTC system at cern (cabling, fanout)
30	regional trigger / DAQ integration
31	synchronization / LV1A distribution
32	3-SECTOR TEST
33	3 ROS25, 3TrigSectColl, 3DTTF
34	move 2nd sector collector crate to Legnaro
35	DAQ 2ROS/2TrigSectColl in same crate (i.e. wheel)
36	???move 3rd sector collector crate to Legnaro
37	DAQ with 2 Sector Collector crates (i.e. 2 wheels)
38	move 2nd sector collector crate to CERN
39	3 sector synch & cosmics trigger logic
40	FED integration
41	DDU
42	test ROS-DDU optotransmission in Torino (& Legnaro?)
43	DDU integration tests at Legnaro
44	DDU integration at CERN

DT MTCC preparation plan

- DT MTCC project ramp-up in steps:

Sector Commissioning

- goal: autotrigger on one chamber and acquire data from 4 chambers, DAQ synchronisation, first look at cosmics traversing a sector
- note: chamber commissioning electronics

Sector Test –local mode

- goal: final tower electronics, local autotrigger logic with 4(5) chambers, read ROS25 with local DAQ (no FED)
- note: TTC system as in commissioning set-tup

Sector Test –regional mode

- goal: provide trigger to CMS, integrate regional trigger, use final TTC system

Jun 7

3-Sector Test

- goal: cosmics trigger with three sectors

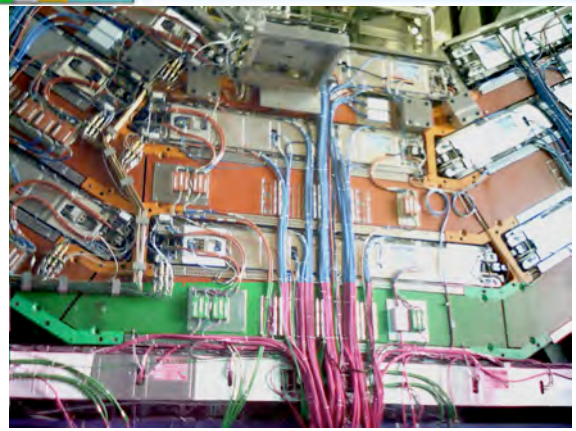
FED Integration

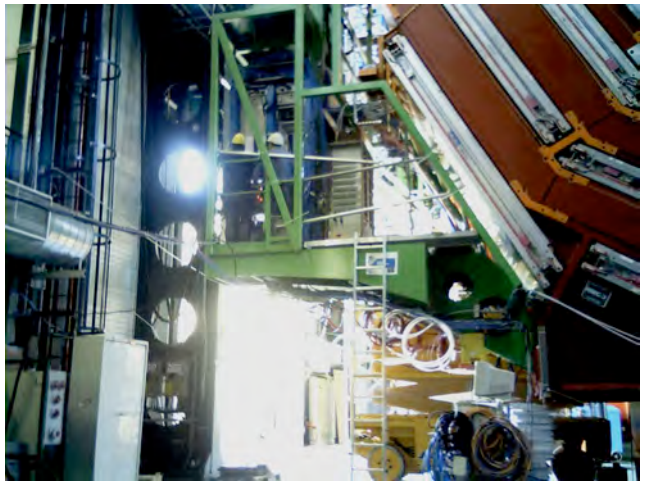
- goal: data flow from ROS through DDU to global DAQ

See Dallavalle's Talk at the Trigger Annual Review

Argument of This talk:
Trigger data
Preliminary
Outlook

Setup (1)



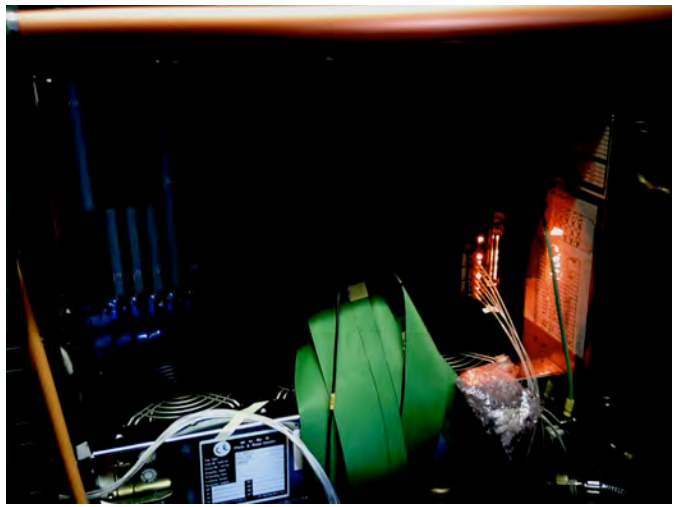


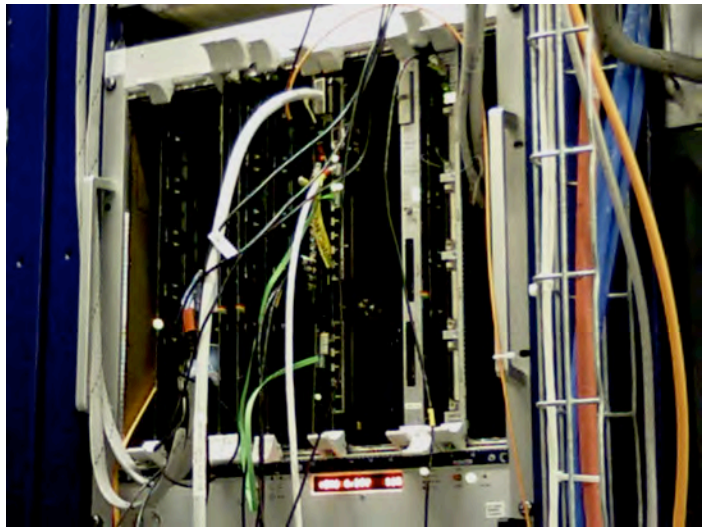
YB+1 ; sector 10
MB1 – MB2 – MB3 chamber

Trigger and R-O data to Sector Collector
And ROS on the tower

Sector Collector Synchronizes Trigger Data
From chambers and send them to the PHTF
In the Green Barrack
(opto transmission 1.6 GHz)

Setup (2)





Opto RX in the PHTF backplane

DTTF:
Makes trigger with coincidence
2 out of 3 (only looking at the
Trigger quality)

DTTF output to
WS -> BS -> Lemo Trigger output (L1A)

LTC -> TTCci -> TTCex

Back to detector:
SC crate and Minicrates

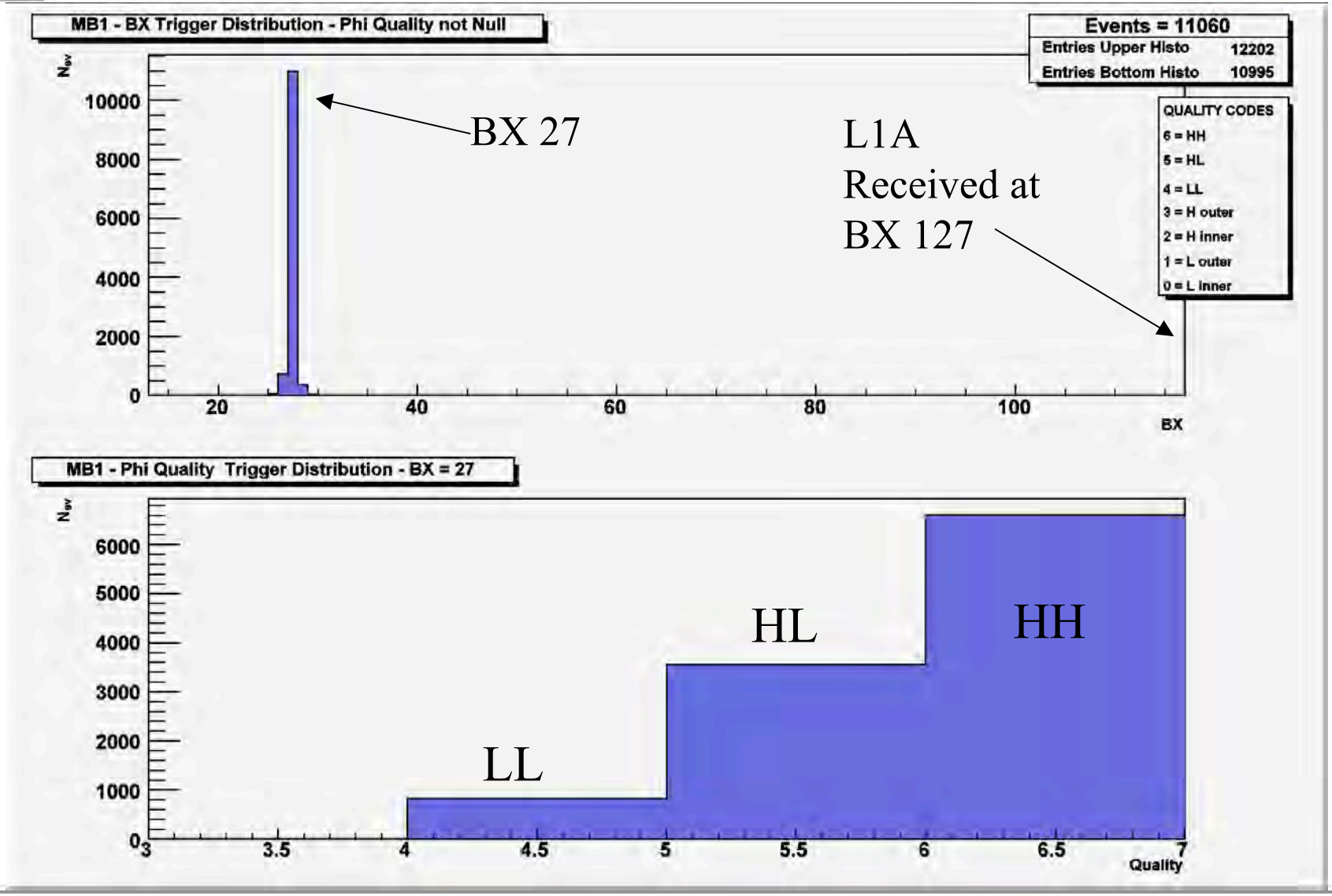
Which data?

TRIGGER CONFIGURATION
Minicrate trigger electronics configured to select only
high quality triggers.
PHTF coincidence 2 out of 3, with extrapolation seed having only high quality
=> Acquisition rate about 10 Hz

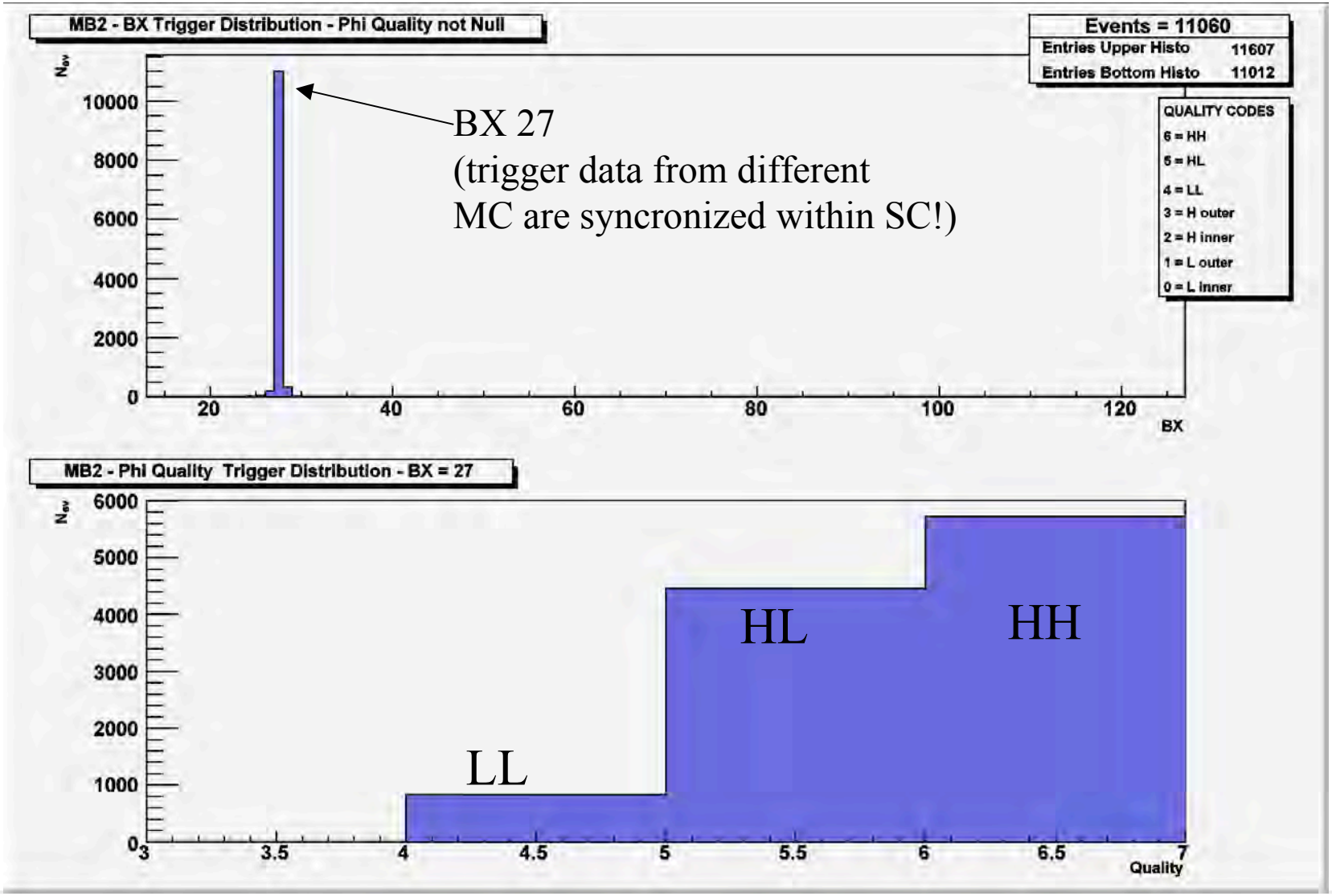
DATA TAKEN
Local DAQ done at the SC crate level (Caen VME bridge)
ROS has RO data from minicrates and portion of trigger data spied at the SC level

SC SPY DATA:
For each chamber there is a circular spying buffer (128 bx) which can be “frozen” with a L1A.
Following a ROS request the buffer can be sent to the DAQ.

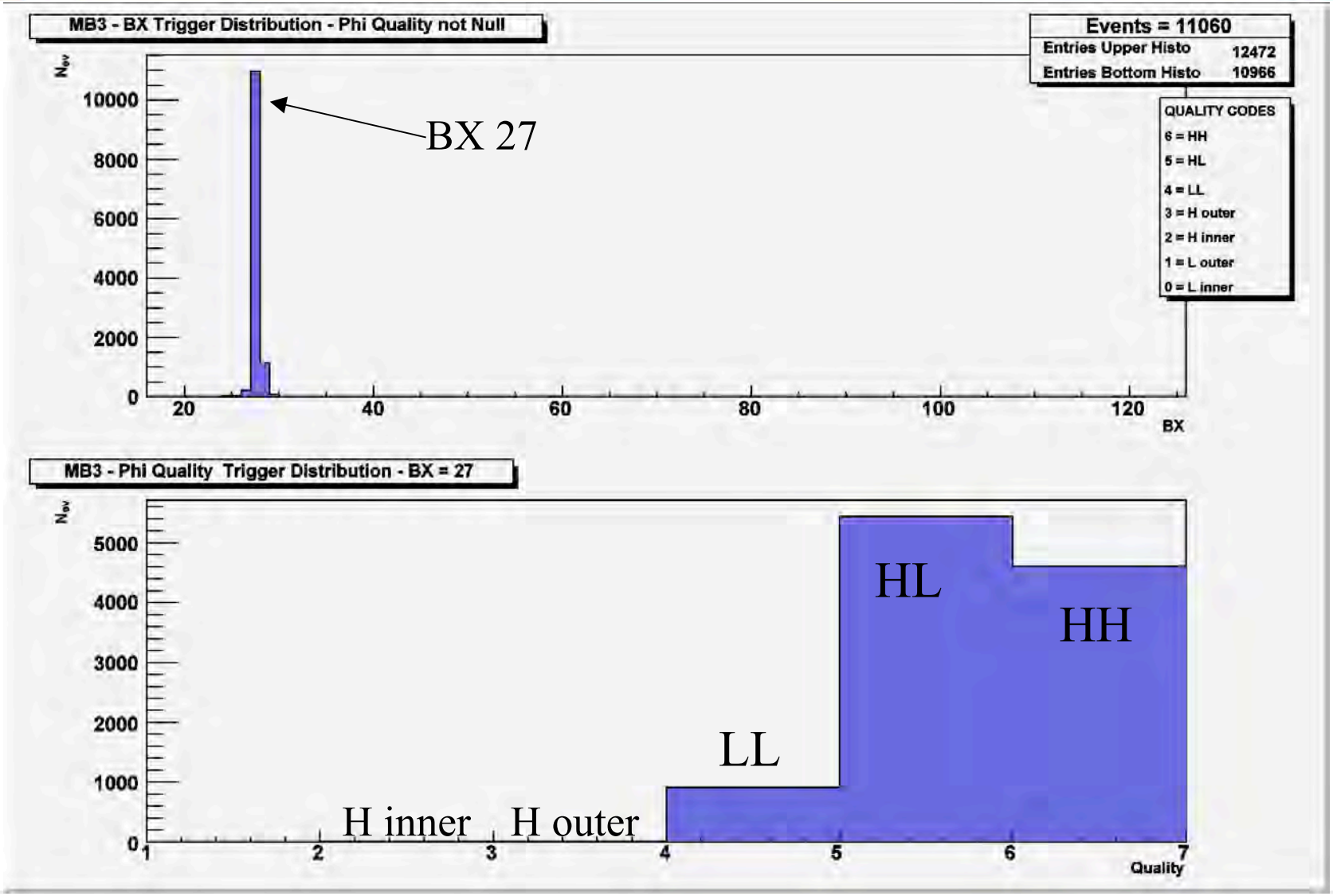
Trigger data : MB1



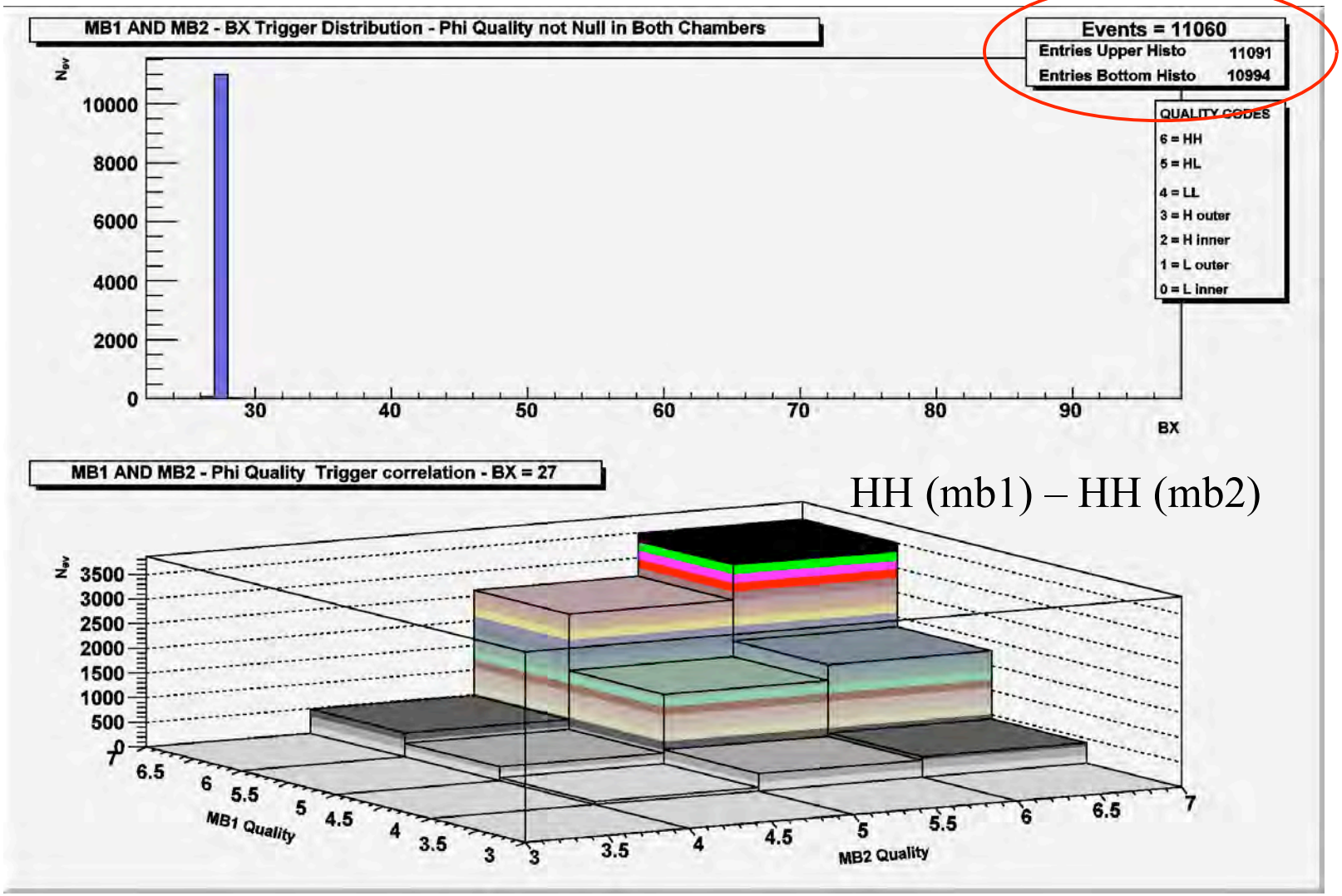
MB2


MB2 - BX Trigger Distribution - Phi Quality not Null
Events = 11060
Entries Upper Histo 11607
Entries Bottom Histo 11012
QUALITY CODES
6 = HH
5 = HL
4 = LL
3 = H outer
2 = H inner
1 = L outer
0 = L inner
BX 27
(trigger data from different
MC are syncronized within SC!)
BX
MB2 - Phi Quality Trigger Distribution - BX = 27
HL
HH
LL
Quality

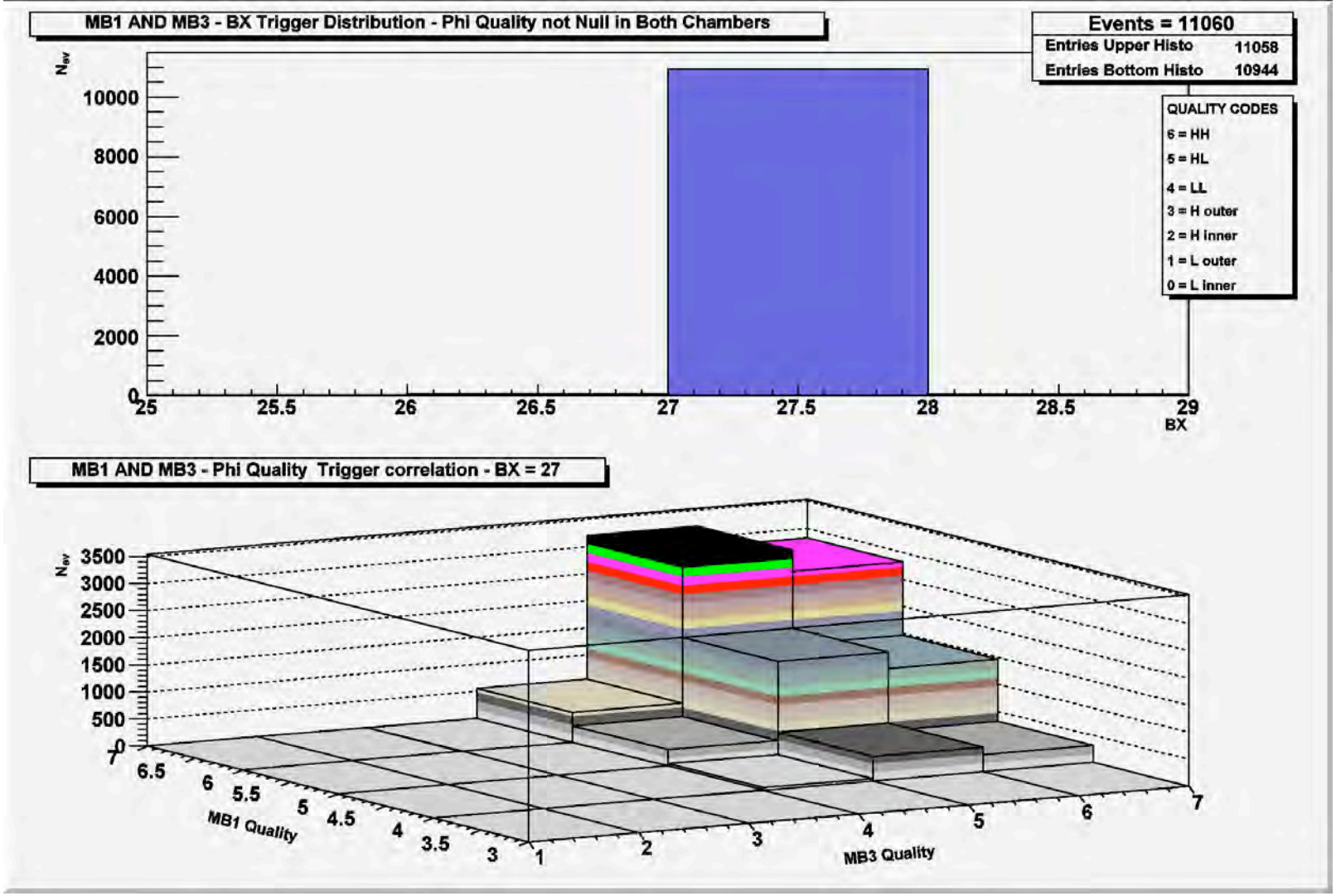
MB3


MB3 - BX Trigger Distribution - Phi Quality not Null
Events = 11060
Entries Upper Histo 12472
Entries Bottom Histo 10966
QUALITY CODES
6 = HH
5 = HL
4 = LL
3 = H outer
2 = H inner
1 = L outer
0 = L inner
BX 27
Nev
BX
MB3 - Phi Quality Trigger Distribution - BX = 27
HL
HH
LL
H inner
H outer
Quality

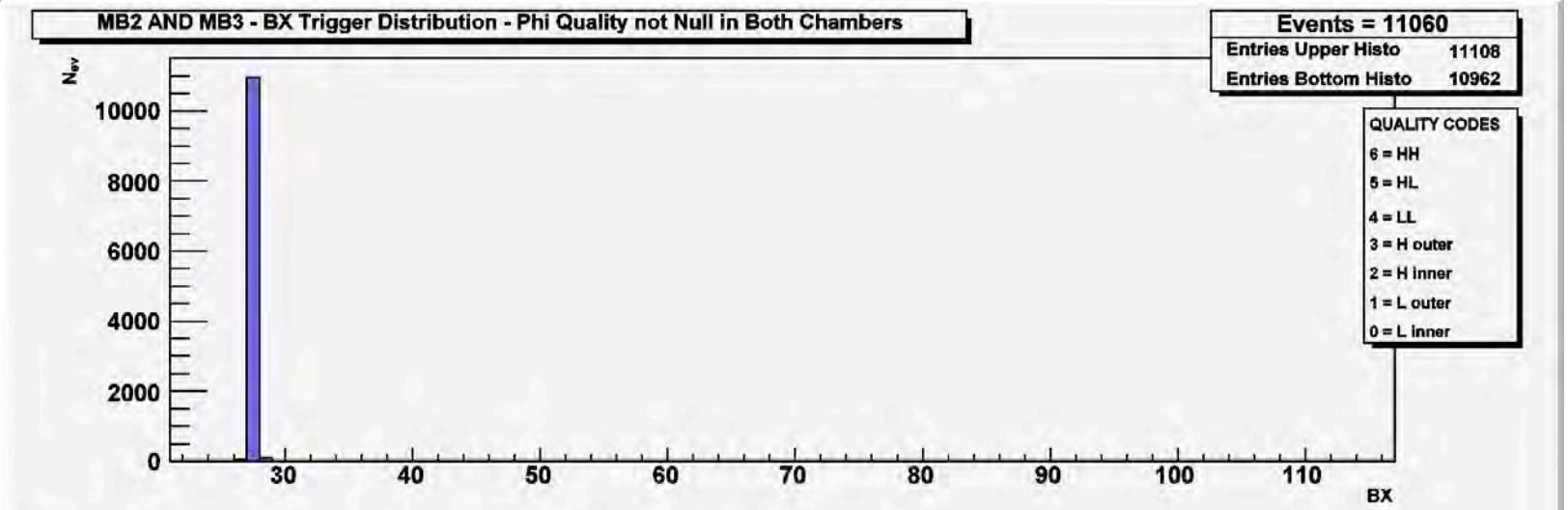
MB1 AND MB2

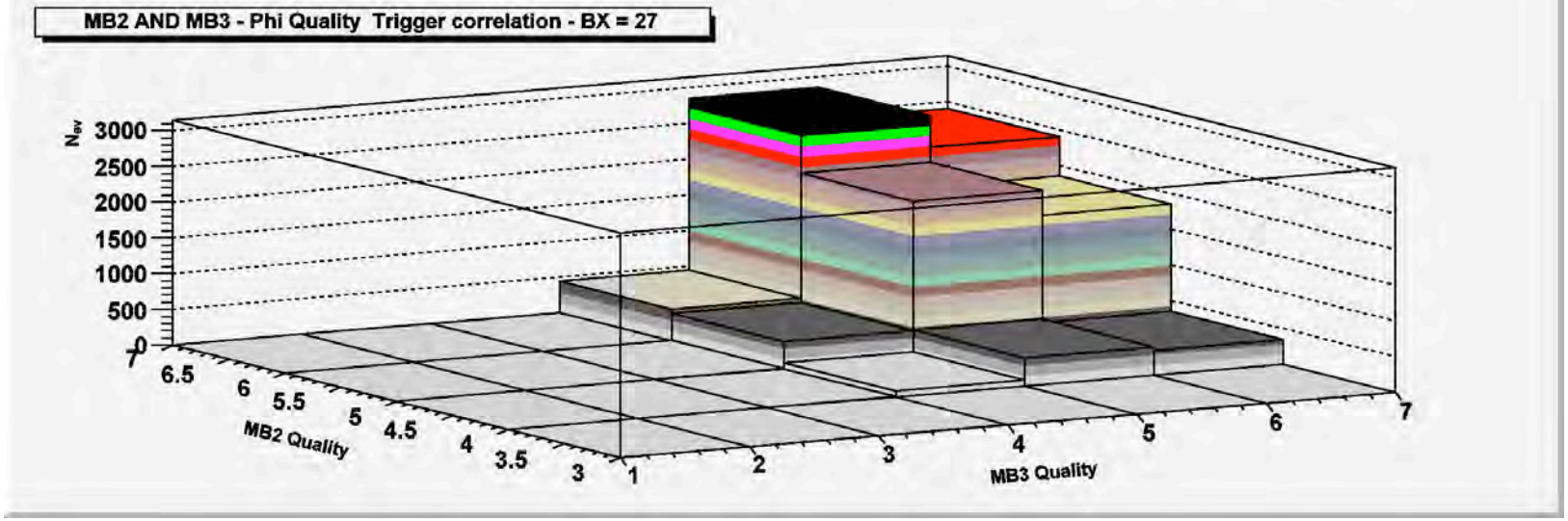

MB1 AND MB2 - BX Trigger Distribution - Phi Quality not Null in Both Chambers
Events = 11060
Entries Upper Histo 11091
Entries Bottom Histo 10994
QUALITY CODES
6 = HH
5 = HL
4 = LL
3 = H outer
2 = H inner
1 = L outer
0 = L inner
N_ev
10000
8000
6000
4000
2000
0
30
40
50
60
70
80
90
BX
MB1 AND MB2 - Phi Quality Trigger correlation - BX = 27
HH (mb1) – HH (mb2)
N_ev
3500
3000
2500
2000
1500
1000
500
0
MB1 Quality
MB2 Quality

MB1 AND MB3

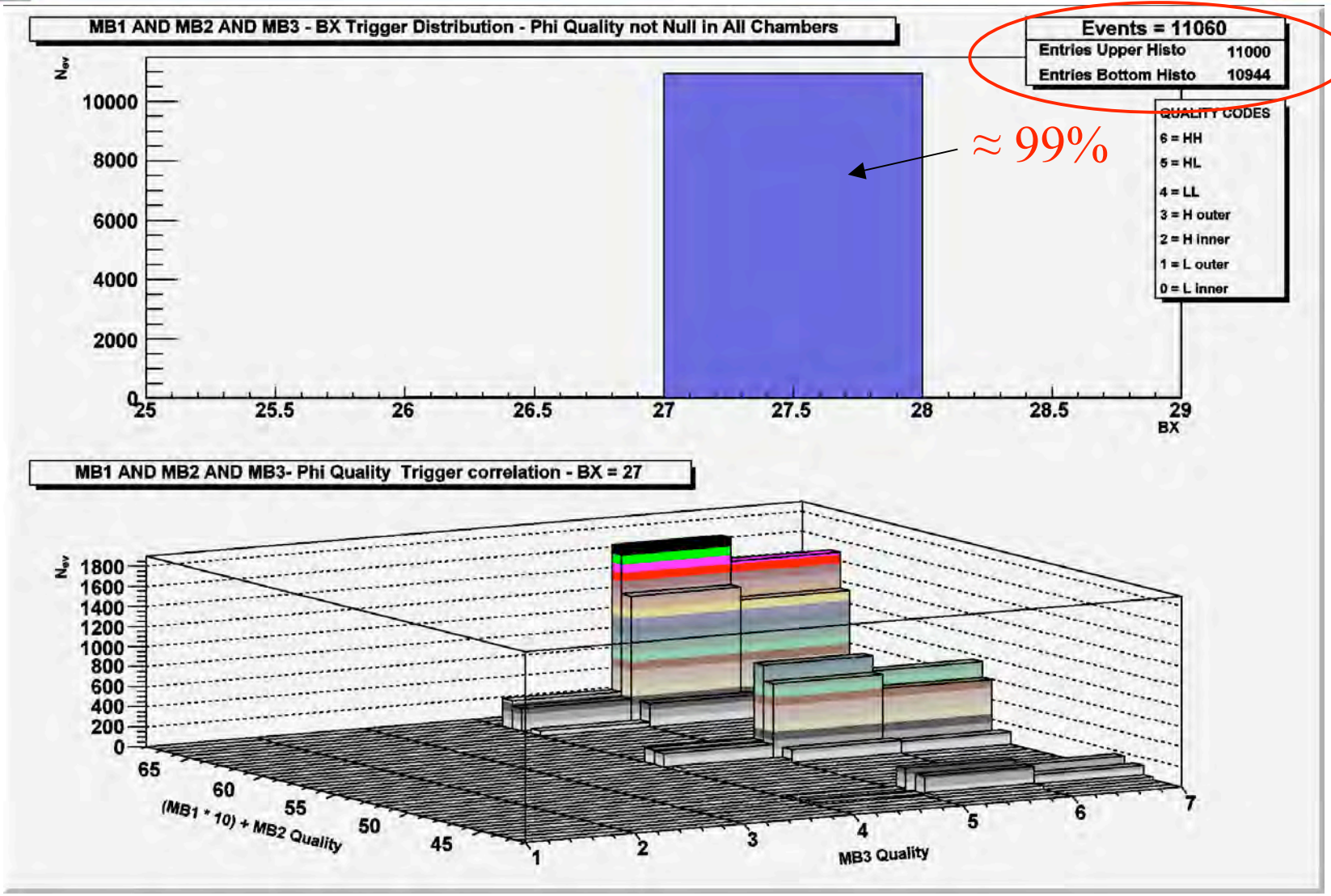

MB1 AND MB3 - BX Trigger Distribution - Phi Quality not Null in Both Chambers
Events = 11060
Entries Upper Histo 11058
Entries Bottom Histo 10944
QUALITY CODES
6 = HH
5 = HL
4 = LL
3 = H outer
2 = H inner
1 = L outer
0 = L inner
N_ev
10000
8000
6000
4000
2000
0
25
25.5
26
26.5
27
27.5
28
28.5
29
BX
MB1 AND MB3 - Phi Quality Trigger correlation - BX = 27
N_ev
3500
3000
2500
2000
1500
1000
500
0
7
6.5
6
5.5
5
4.5
4
3.5
3
MB1 Quality
1
2
3
4
5
6
7
MB3 Quality

MB2 AND MB3


MB2 AND MB3 - BX Trigger Distribution - Phi Quality not Null in Both Chambers
Events = 11060
Entries Upper Histo 11108
Entries Bottom Histo 10962
QUALITY CODES
6 = HH
5 = HL
4 = LL
3 = H outer
2 = H inner
1 = L outer
0 = L inner
N_ev
BX


MB2 AND MB3 - Phi Quality Trigger correlation - BX = 27
N_ev
MB2 Quality
MB3 Quality

MB1 AND MB2 AND MB3



Summary

- First successful test of the trigger electronics from Minicrates (3 chambers) to the Barrel Sorter with muons
- A DT Trigger was generated and injected to the LTC, ready for MTCC

First look at the trigger data (spied at the SC level)

- Powerful tool to measure latency (from SC to L1A went back to the detector) (f.i. with this setup was 100 BX)
- SC synchronization of different Minicrates perform well!
- High quality cuts and PHTF "2 out of 3" provide very clean muon events,crossing all 3 stations (1,2,3) at the 99%, with a safe acquisition rate (10 Hz)