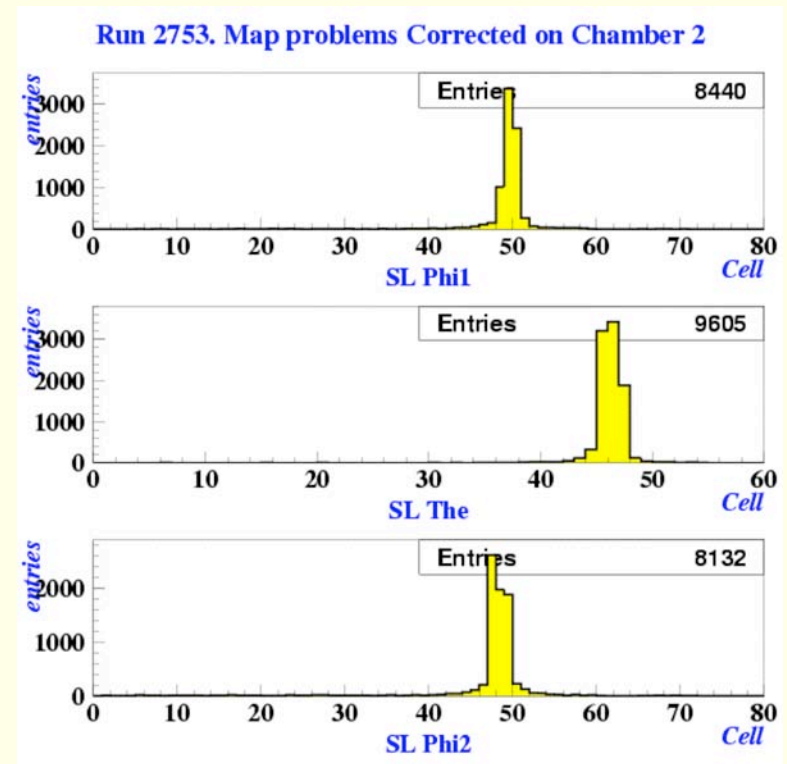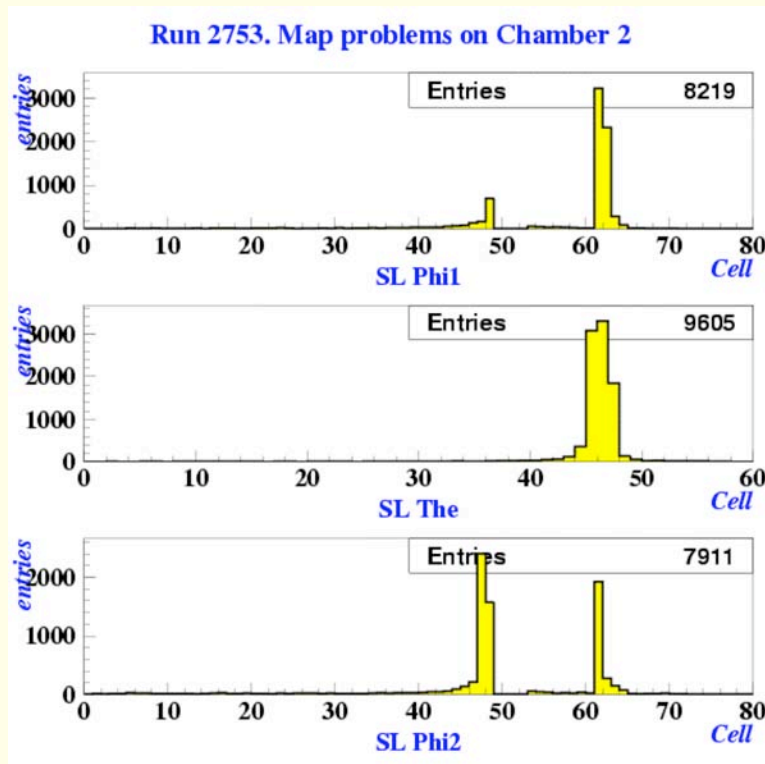# Test beam 2004

ROB Problems

Errors on cabling SL-ROB?

- Tracks on Run>2739 shows problems on the channel map of Phi Sls of chamber 2

- It seems that ROB#3 TDC0 interchanged with TDC3.
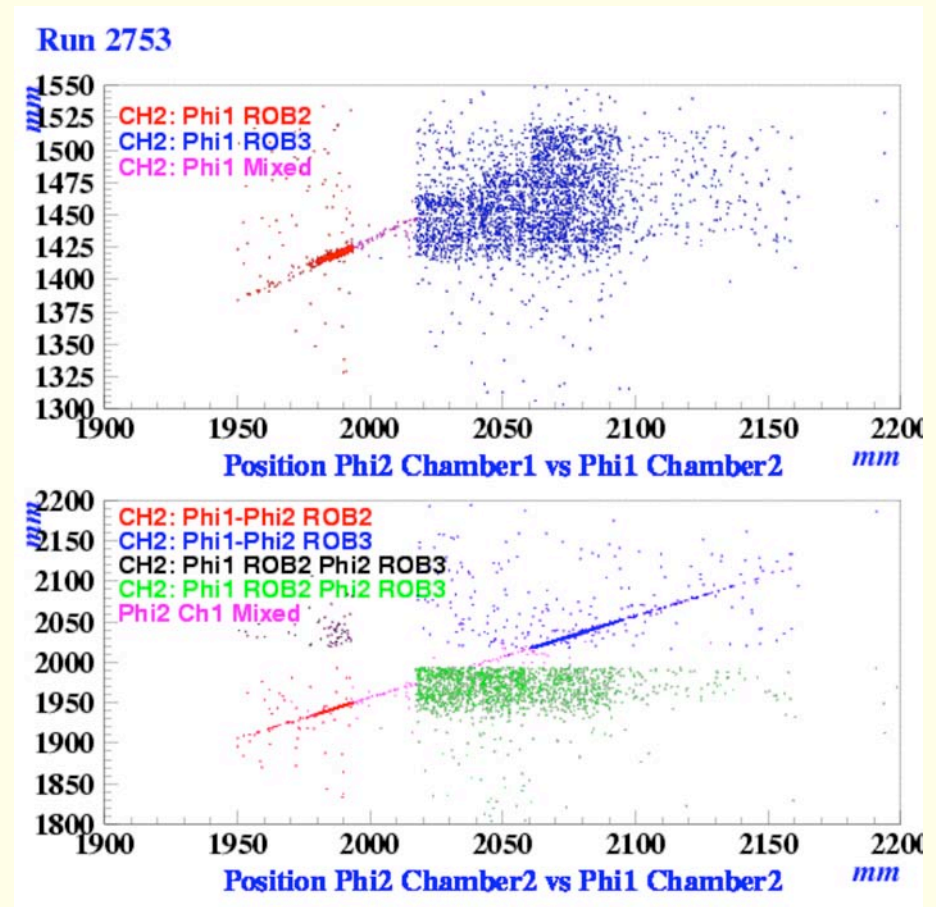- On addition TDC0 has not hits

Problems on correlating tracks

■ There are problems for correlating tracks between chambers when Cell>48 on chamber 2

■ The same kind of problems observed when correlating tracks on both phi SL's of chamber 2 in the region of cells 48-49

➡ It seems that muons on ROB3 of chamber 2 are not the triggered ones !!

Synchronization errors????

Problems on correlating tracks (II)

When comparing the information of TRACO's of both chambers

TRACO: Phi chamber2 vs Phi Chamber 1 (HH vs HH)
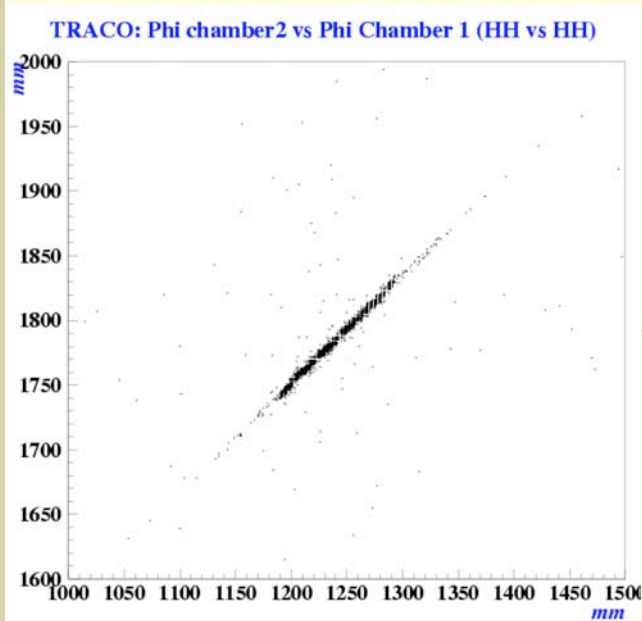
Information from both TRACOs match well

Position Phi TRACO vs Phi1 for Chamber2
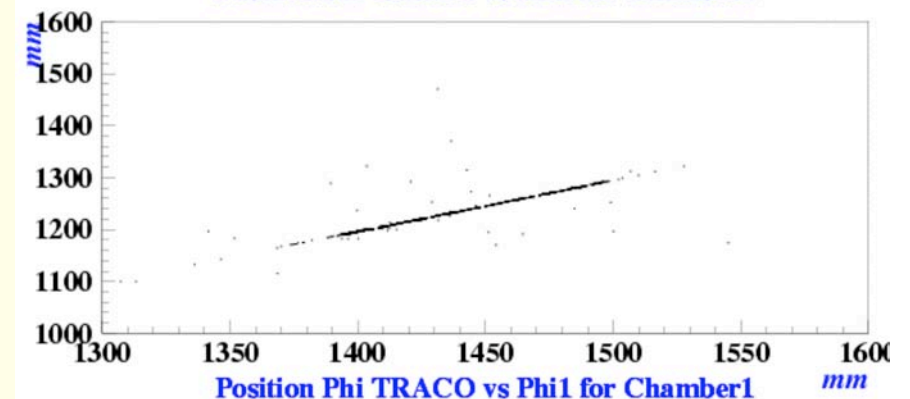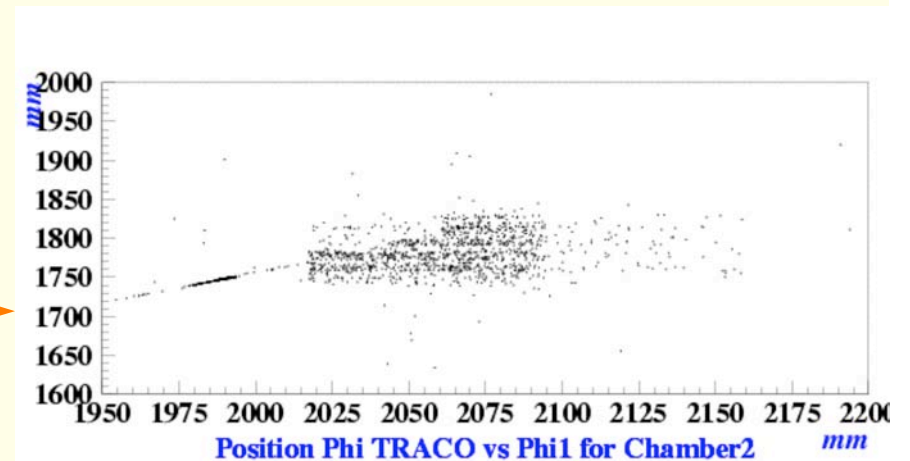
➢ TRACO position for chamber 2 is not correlated with chamber information when hits are on ROB-3

➢ Chamber 1 → O.K

Position Phi TRACO vs Phi1 for Chamber1

Problems on correlating tracks (III)

Could be a shift on the event number in between both ROBs ?

Data of chamber 2 from ROB2 is not correlated with the SAME event of chamber 1

BUT

Data of chamber 2 from ROB3 is correlated with the PREVIOUS event of chamber 1
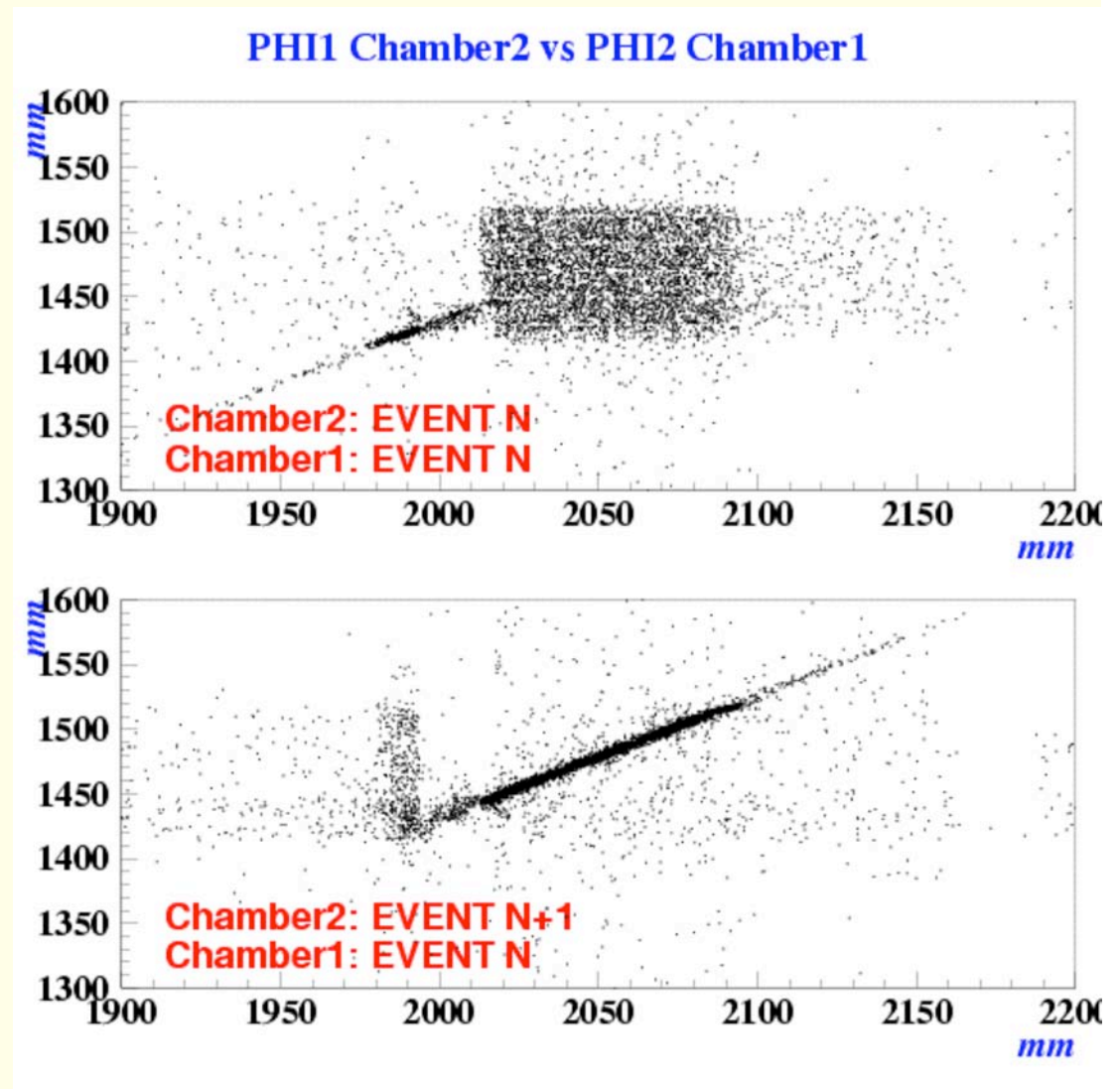
What is happening?

- There are cabling errors SL - ROBs?

  BUT, this is not observed by the TRACO

- The muons found by ROB-3 on chamber 2 are not correlated with the muons on chamber 1 and on TRACO.

- The muons from ROB-3 on chamber 2 corresponds to the previous event of chamber 1

Looking to Raw data

In order to understand the problems
we plunged into the raw data

Some problems found

Processing ROB raw data

```
************************************************************
****        PROCESING EVENT >>>>    5
************************************************************
       TYPE:14 ... cmap:  0,  lock: 0  bit 8
>>>> ROB:  0,  ROS: 1
       TYPE:0 ... Master TDC:  3,  EV: 5  ibwc 1908
       TYPE:1 ... Master TDC:  3,  EV: 5  ibwc 2
>>>> ROB:  1,  ROS: 1
       TYPE:0 ... Master TDC:  3,  EV: 5  ibwc 1908
       TYPE:1 ... Master TDC:  3,  EV: 5  ibwc 2
>>>> ROB:  2,  ROS: 1
       TYPE:0 ... Master TDC:  3,  EV: 5  ibwc 1908
           ... TDC:  0,  chan: 14  time 3409
           ... TDC:  0,  chan: 18  time 3433
           ... TDC:  0,  chan: 15  time 3410
           ... TDC:  0,  chan: 19  time 3428
           ... TDC:  0,  chan: 15  time 3962
           ... TDC:  0,  chan: 16  time 3816
           ... TDC:  0,  chan: 17  time 3825
           ... TDC:  1,  chan: 0  time 3842
           ... TDC:  1,  chan: 1  time 3846
       TYPE:1 ... Master TDC:  3,  EV: 5  ibwc 11
>>>> ROB:  3,  ROS: 1
>>>> ROB:  4,  ROS: 1
       TYPE:0 ... Master TDC:  0,  EV: 5  ibwc 1908
       TYPE:1 ... Master TDC:  0,  EV: 5  ibwc 2
>>>> ROB:  5,  ROS: 1
       TYPE:0 ... Master TDC:  3,  EV: 5  ibwc 1908
       TYPE:1 ... Master TDC:  3,  EV: 5  ibwc 2
>>>> ROB:  6,  ROS: 1
       TYPE:0 ... Master TDC:  3,  EV: 5  ibwc 1908
           ... TDC:  3,  chan: 22  time 3570
           ... TDC:  3,  chan: 24  time 3680
           ... TDC:  3,  chan: 23  time 3565
           ... TDC:  3,  chan: 25  time 3681
           ... TDC:  3,  chan: 22  time 3823
       TYPE:1 ... Master TDC:  3,  EV: 5  ibwc 7
>>>> ROB:  7,  ROS: 1
```

```
>>>> ROB:  0,  ROS: 2
       TYPE:0 ... Master TDC:  3,  EV: 5  ibwc 1908
           ... TDC:  0,  chan: 31  time 3834
           ... TDC:  2,  chan: 5  time 4231
           ... TDC:  2,  chan: 22  time 4129
           ... TDC:  2,  chan: 24  time 4130
           ... TDC:  2,  chan: 2  time 4341
           ... TDC:  2,  chan: 23  time 4252
           ... TDC:  2,  chan: 24  time 4369
           ... TDC:  2,  chan: 4  time 4357
           ... TDC:  2,  chan: 25  time 4457
           ... TDC:  2,  chan: 3  time 4459
           ... TDC:  2,  chan: 4  time 4477
       TYPE:1 ... Master TDC:  3,  EV: 5  ibwc 13
>>>> ROB:  1,  ROS: 2
       TYPE:0 ... Master TDC:  3,  EV: 5  ibwc 1908
       TYPE:1 ... Master TDC:  3,  EV: 5  ibwc 2
>>>> ROB:  2,  ROS: 2
       TYPE:0 ... Master TDC:  3,  EV: 5  ibwc 1908
           ... TDC:  3,  chan: 14  time 3848
       TYPE:1 ... Master TDC:  3,  EV: 5  ibwc 3
>>>> ROB:  3,  ROS: 2
       TYPE:0 ... Master TDC:  3,  EV: 5  ibwc 1908
           ... TDC:  3,  chan: 31  time 3491
           ... TDC:  3,  chan: 28  time 3596
           ... TDC:  3,  chan: 30  time 3613
           ... TDC:  3,  chan: 29  time 3710
           ... TDC:  3,  chan: 30  time 3777
       TYPE:1 ... Master TDC:  3,  EV: 4  ibwc 9
       TYPE:0 ... Master TDC:  3,  EV: 5  ibwc 1908
       TYPE:1 ... Master TDC:  3,  EV: 5  ibwc 9
>>>> ROB:  4,  ROS: 2
       TYPE:0 ... Master TDC:  3,  EV: 5  ibwc 1908
       TYPE:1 ... Master TDC:  3,  EV: 5  ibwc 2
>>>> ROB:  5,  ROS: 2
       TYPE:0 ... Master TDC:  3,  EV: 5  ibwc 1908
           ... TDC:  0,  chan: 10  time 4204
           ... TDC:  0,  chan: 11  time 4193
           ... TDC:  0,  chan: 10  time 4444
           ... TDC:  0,  chan: 8  time 4502
           ... TDC:  0,  chan: 9  time 4500
       TYPE:1 ... Master TDC:  3,  EV: 5  ibwc 7
>>>> ROB:  6,  ROS: 2
       TYPE:0 ... Master TDC:  3,  EV: 5  ibwc 1908
           ... TDC:  3,  chan: 22  time 3465
           ... TDC:  3,  chan: 23  time 3470
           ... TDC:  3,  chan: 23  time 3705
           ... TDC:  3,  chan: 20  time 3792
           ... TDC:  3,  chan: 21  time 3781
       TYPE:1 ... Master TDC:  3,  EV: 5  ibwc 7
>>>> ROB:  7,  ROS: 2
```

ROB data problems

GOOD

```
>>>> ROB:  0,  ROS: 2
     TYPE:0 ... Master TDC:  3,  EV: 5  ibwc 1908
         ... TDC:  0,  chan: 31  time 3834
         ... TDC:  2,  chan: 5  time 4231
         ... TDC:  2,  chan: 22  time 4129
         ... TDC:  2,  chan: 24  time 4130
         ... TDC:  2,  chan: 2  time 4341
         ... TDC:  2,  chan: 23  time 4252
         ... TDC:  2,  chan: 24  time 4369
         ... TDC:  2,  chan: 4  time 4357
         ... TDC:  2,  chan: 25  time 4457
         ... TDC:  2,  chan: 3  time 4459
         ... TDC:  2,  chan: 4  time 4477
     TYPE:1 ... Master TDC:  3,  EV: 5  ibwc 13
```

BAD

Event number mismatch between header and tail

Extra header

```
>>>> ROB:  3,  ROS: 2
     TYPE:0 ... Master TDC:  3,  EV: 5  ibwc 1908
         ... TDC:  3,  chan: 31  time 3491
         ... TDC:  3,  chan: 28  time 3596
         ... TDC:  3,  chan: 30  time 3613
         ... TDC:  3,  chan: 29  time 3710
         ... TDC:  3,  chan: 30  time 377
     TYPE:1 ... Master TDC:  3,  EV: 4  ibwc 9
     TYPE:0 ... Master TDC:  3,  EV: 5  ibwc 1908
     TYPE:1 ... Master TDC:  3,  EV: 5  ibwc 9
```

More "problems"

```
>>>> ROB:  3,  ROS: 2
      TYPE:0 ... Master TDC:  0,    EV: 5  ibwc 423
          ... TDC:  1,  chan: 12  time 3448
          ... TDC:  1,  chan: 11  time 3565
          ... TDC:  1,  chan: 12  time 3454
          ... TDC:  1,  chan: 10  time 3724
          ... TDC:  1,  chan: 13  time 3712
      TYPE:1 ... Master TDC:  3    EV: 4  ibwc 9
      TYPE:0 ... Master TDC:  3    EV: 5  ibwc 423
          ... TDC:  0,  chan: 0  time 3753
          ... TDC:  0,  chan: 28  time 3458
          ... TDC:  0,  chan: 1  time 3732
          ... TDC:  0,  chan: 29  time 3837
      TYPE:1 ... Master TDC:  0    EV: 5  ibwc 13
```

DifferentTDC master

```
      input file rawdata_b/run_2686
******************************************
****       PROCESING EVENT >>>>    1
******************************************

>>>> ROB:  0,   ROS: 1
>>>> ROB:  1,   ROS: 1
>>>> ROB:  2,   ROS: 1
>>>> ROB:  3,   ROS: 1
>>>> ROB:  4,   ROS: 1
>>>> ROB:  5,   ROS: 1
>>>> ROB:  6,   ROS: 1
>>>> ROB:  7,   ROS: 1
>>>> ROB:  0,   ROS: 2
      TYPE:0 ... Master TDC:  3,  EV: 0  ibwc 294
      TYPE:1 ... Master TDC:  3,  EV: 0  ibwc 2
>>>> ROB:  1,   ROS: 2
      TYPE:0 ... Master TDC:  3,  EV: 0  ibwc 294
      TYPE:1 ... Master TDC:  3,  EV: 0  ibwc 2
>>>> ROB:  2,   ROS: 2
      TYPE:0 ... Master TDC:  3,  EV: 0  ibwc 294
      TYPE:1 ... Master TDC:  3,  EV: 0  ibwc 2
      ........................................

      input file rawdata/run_2774
******************************************
****       PROCESING EVENT >>>>    1
******************************************

>>>> ROB:  0,   ROS: 1
>>>> ROB:  1,   ROS: 1
      TYPE:0 ... Master TDC:  3,  EV: 0  ibwc 268
      TYPE:1 ... Master TDC:  3,  EV: 0  ibwc 2
>>>> ROB:  2,   ROS: 1
      TYPE:0 ... Master TDC:  3,  EV: 0  ibwc 268
      TYPE:1 ... Master TDC:  3,  EV: 0  ibwc 2
      ........................................
```

ROB "empty"

Two ROB events for one DAQ event

```
      TYPE:0 ... Master TDC:   3,   EV: 3  ibwc 2387
      TYPE:1 ... Master TDC:   3,   EV: 3  ibwc 2
      TYPE:0 ... Master TDC:   3,   EV: 4  ibwc 3148
      TYPE:1 ... Master TDC:   3,   EV: 4  ibwc 2
>> ROB:  1,   ROS: 1
      TYPE:0 ... Master TDC:   3,   EV: 3  ibwc 2387
      TYPE:1 ... Master TDC:   3,   EV: 3  ibwc 2
      TYPE:0 ... Master TDC:   3.   EV: 4  ibwc 3148
          ... TDC:  0,  chan: 22  time 3448
          ... TDC:  0,  chan: 21  time 3574
          ... TDC:  0,  chan: 22  time 3742
          ... TDC:  0,  chan: 23  time 3765
          ... TDC:  0,  chan: 20  time 3841
      TYPE:1 ... Master TDC:   3,   EV: 4  ibwc 7
>> ROB:  2.   ROS: 1
      TYPE:0 ... Master TDC:   3,   EV: 3  ibwc 2387
          ... TDC:  0,  chan: 14  time 3551
          ... TDC:  0,  chan: 21  time 3402
          ... TDC:  0,  chan: 15  time 3556
          ... TDC:  0,  chan: 18  time 3540
          ... TDC:  0,  chan: 12  time 3682
          ... TDC:  0,  chan: 19  time 3549
          ... TDC:  0,  chan: 13  time 3677
          ... TDC:  0,  chan: 20  time 3695
          ... TDC:  0,  chan: 14  time 4402
      TYPE:1 ... Master TDC:   3,   EV: 3  ibwc 11
      TYPE:0 ... Master TDC:   3,   EV: 4  ibwc 3148
          ... TDC:  0,  chan: 14  time 3478
          ... TDC:  0,  chan: 18  time 3488
          ... TDC:  0,  chan: 15  time 3486
          ... TDC:  0,  chan: 19  time 3490
          ... TDC:  0,  chan: 12  time 3763
          ... TDC:  0,  chan: 20  time 3753
          ... TDC:  0,  chan: 13  time 3771
          ... TDC:  0,  chan: 21  time 3753
          ... TDC:  0,  chan: 13  time 3901
          ... TDC:  0,  chan: 18  time 3846
          ... TDC:  0,  chan: 18  time 3990
      TYPE:1 ... Master TDC:   3,   EV: 4  ibwc 13
>> ROB:  3,   ROS: 1
```

```
Open input file rawdata/run_2552
******************************************
****       PROCESSING FIRST EVENT >>>>    33919
******************************************
>>>> ROB:  0,   ROS: 1
      TYPE:0 ... Master TDC:  3,  EV: 1150  ibwc 1448
      TYPE:1 ... Master TDC:  3,  EV: 1150  ibwc 2
>>>> ROB:  1,   ROS: 1
      TYPE:0 ... Master TDC:  3,  EV: 1150  ibwc 1448
      TYPE:1 ... Master TDC:  3,  EV: 1150  ibwc 2
>>>> ROB:  2,   ROS: 1
      TYPE:0 ... Master TDC:  3,  EV: 1150  ibwc 1448
          ... TDC:  0,  chan: 14  time 3537
          ... TDC:  0,  chan: 18  time 3529
          ... TDC:  0,  chan: 15  time 3542
          ... TDC:  0,  chan: 19  time 3528
          ... TDC:  0,  chan: 12  time 3677
          ... TDC:  0,  chan: 20  time 3695
          ... TDC:  0,  chan: 13  time 3683
          ... TDC:  0,  chan: 21  time 3697
          ... TDC:  0,  chan: 20  time 4227
      TYPE:1 ... Master TDC:  3,  EV: 1150  ibwc 11
      ........................................
      ........................................

******************************************
****       PROCESSING SECOND EVENT >>>>    1
******************************************
      TYPE:14 ... cmap:  0,  lock: 0  bit 8
>>>> ROB:  0,   ROS: 1
      TYPE:0 ... Master TDC:  3,  EV: 0  ibwc 2565
      TYPE:1 ... Master TDC:  3,  EV: 0  ibwc 2
>>>> ROB:  1,   ROS: 1
      TYPE:0 ... Master TDC:  3,  EV: 0  ibwc 2565
      TYPE:1 ... Master TDC:  3,  EV: 0  ibwc 2
>>>> ROB:  2,   ROS: 1
      TYPE:0 ... Master TDC:  3,  EV: 0  ibwc 2565
          ... TDC:  0,  chan: 6  time 3679
          ... TDC:  0,  chan: 8  time 3528
      ........................................
```

Strange first event number

BUT it corresponds to
Last_ev (previous run)+1

```
Open input file rawdata/run_2551

      ..............................................
      ..............................................
      ..............................................

*************************************************
****       LAST EVENT  >>>>    33918
*************************************************
```

Some Statistics

Data from Run 2165 were processed looking for errors

➔ More than 10million of events

Data were divided on 5 types: (NNNN=run number)

BT: for files   bt_default_sncro_NNNN

PUS: for files   pusync_NNNN

AUT: for files   auto_XX_delay_X_NNNN

RUN: for files   run_NNNN

SY: for files   syncro_bt_Xdeg_xx_X_run_NNN

Some Statistics

TYP	Nrun	Events	#Runs 1st ev ≠1	#Evs ROB empty	# Ev Bad TDCMaster	#Ev Multiev	#EV ROB3-ROS2 event match
BT	7	54974	1	0	0	4	54974
PUS	46	14987	27	0	0	48	14987
AUT	85	1691408	59	2	0	1	1691408
RUN	320	6625594	42	42	14	233	40943
SY	146	1735161	91	38	540392	52	591984

==== **Looking to type of errors RUN y SY can be divide in several consecutive run subgroups**

RU1: 2150-2162, 2512-2513   RU2: 2440-2443, 2480-2511, 2514-2802

SY1: 2229-2254, 2309-2313, 2408-2438   SY2: 2444-2478   SY3:2228,2256 2308,2314

RU1	9	40465	7	0	0	2	40465
RU2	312	6585129	35	42	14(14 run)	231	478 (29 runes)
SY1	58	591898	35	8	0	18	591984
SY2	33	602901	25	22	0	0	3 (1 runes)
SY3	55	540392	31	8	540392	34	83 (4 runes)

Bad ROB configuration

Looking for Minicrate configuration, we found, for example, in between run 2254 (good) and 2256 (bad)), the following configuration files on the LogBook

Logbook

Page 21

Bad ROB configuration

Looking the ROB configuration inside these files we found:

TB2004_mb1_41.cfg (mb1) → Configuration of ROB's of ROS1.   ALL O.K

TB2004_mb3_41.cfg (mb3) → Configuration of ROB's of ROS2.   ALL O.K

TB2004_mb3_phiON.cfg (mb3)

It re-configures ONLY TDC0 of ROB3 of ROS2

It define TDC0 as master

(BUT TDC3 was also configured as master previously → 2 masters)

It assigns to TDC0 number 3

(BUT TDC3 was also configured as 3 previously)

The hits on TDC0 channels and TDC3 channels are all of them associated to TDC3

A ROB was configured at lab with two TDC masters (as in previous files), looking to data event number mismatch between header and tail was also found

Conclusions

- ☹ Problems on some data, associate to ROB3-ROS2, were found

- ☹ They were due to a bad configuration of this ROB.

- ☹ For these problematic runs, data from this ROB should be through away.