Summary Data_Qual checking for E08014 : D2

There are 3 Kinematic setting

Kin	Po	Angle	Run#	type
Kin3.1	2.905	21	3681, 3682, 3683	Production
Kin5.1	2.795	25	3642, 3643, 3644 3645, 3646, 3648	Production
Kin5.0				Boiling target

What will be check for Data_qual?

1. SPE location for each run
2. E/P main peak for each run
3. Tracking efficiency for each run
4. Time Live for each run

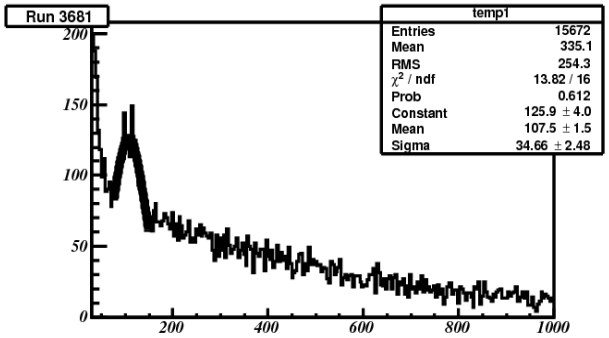
This just first check to make sure nothing go wrong in data. But later when we go to extract physics we will have more test for Yield and Cross section

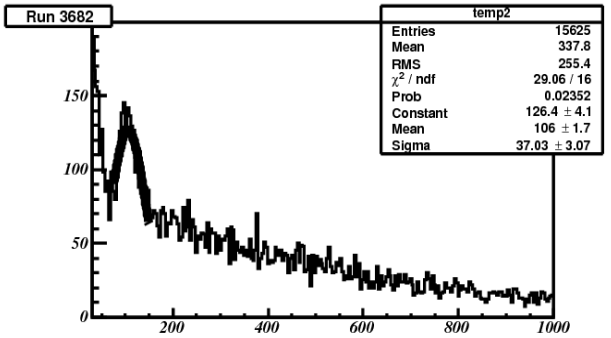
First Check: SPE location for Cer for Production run.

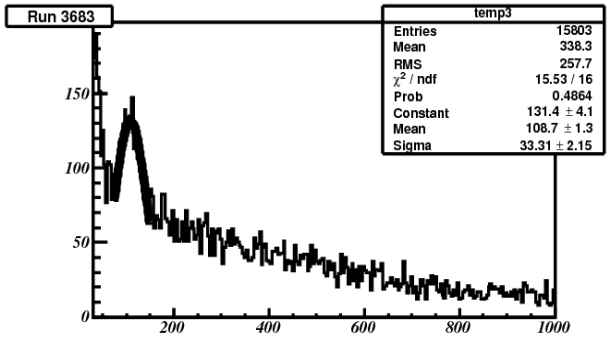
For Cer Calibration we want to adjust the SPE at channel 100

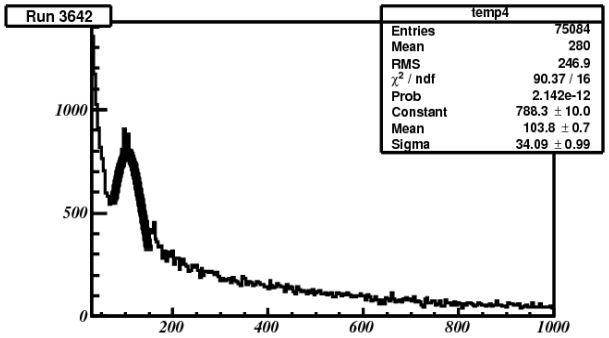
-Take the existing calibrated rootfiles for D2 production and do plot the L.cer.sum for every run and see the SPE location

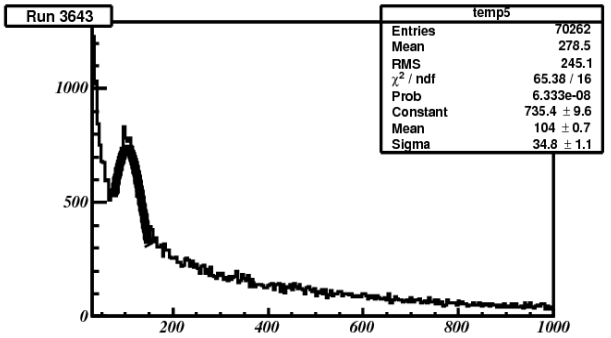
- Using cuts: Trigger4 not Trigger 3 only

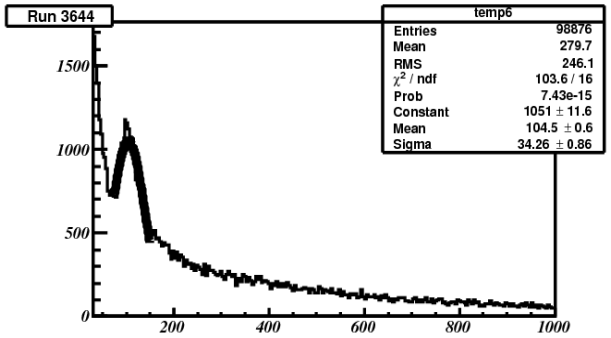


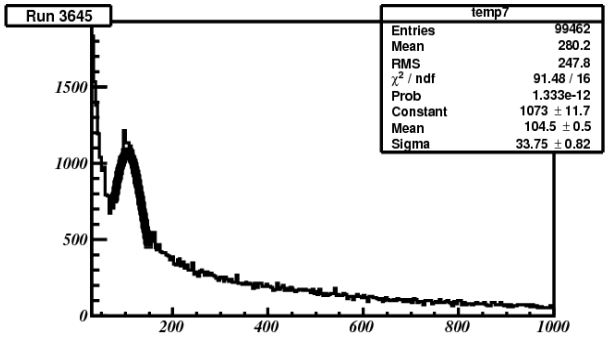


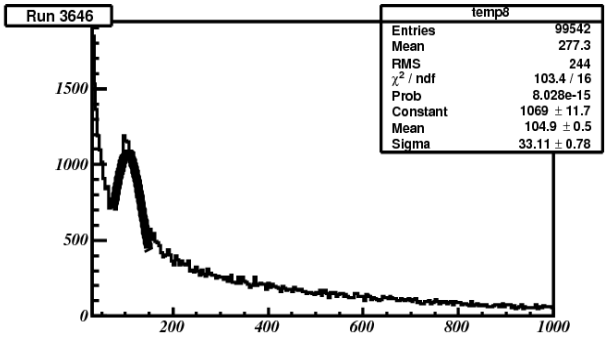


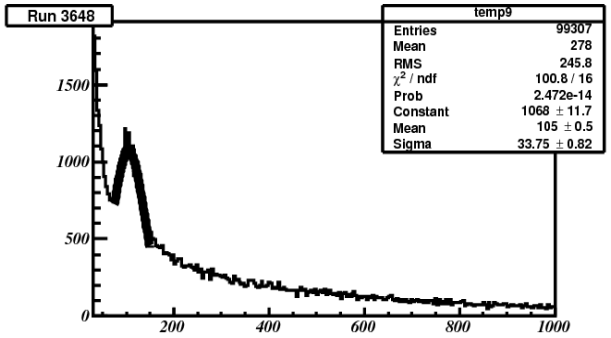




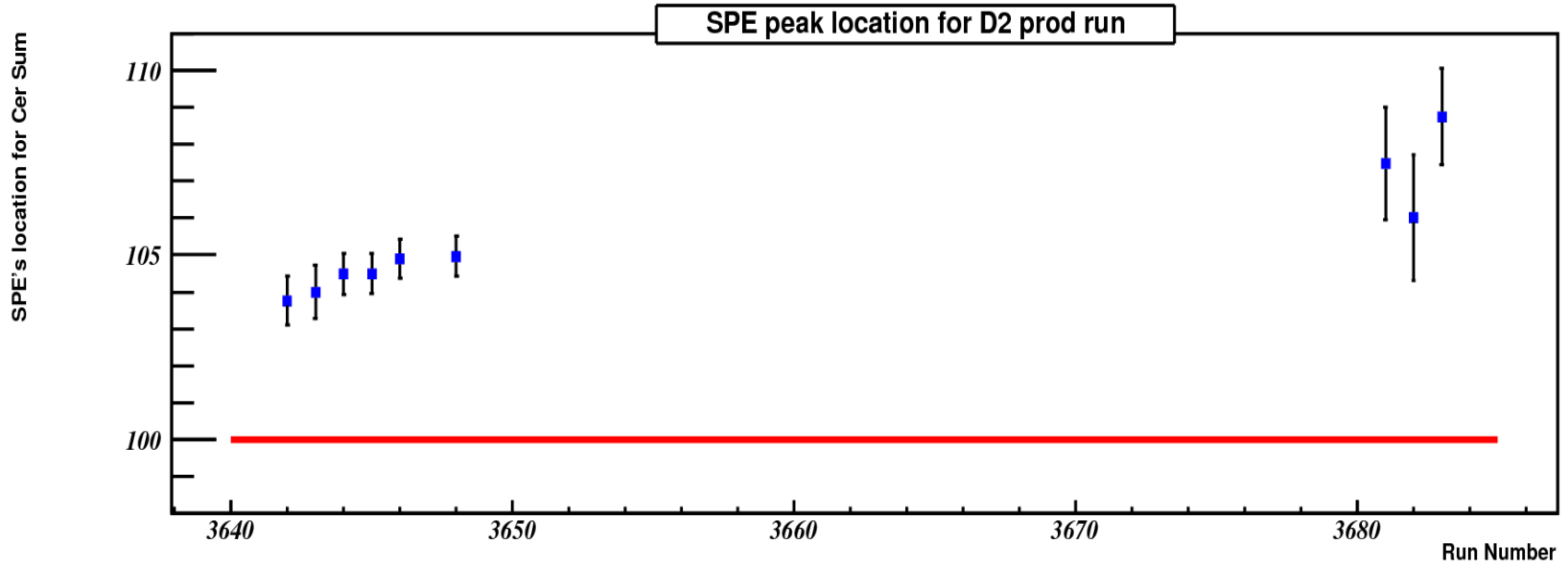


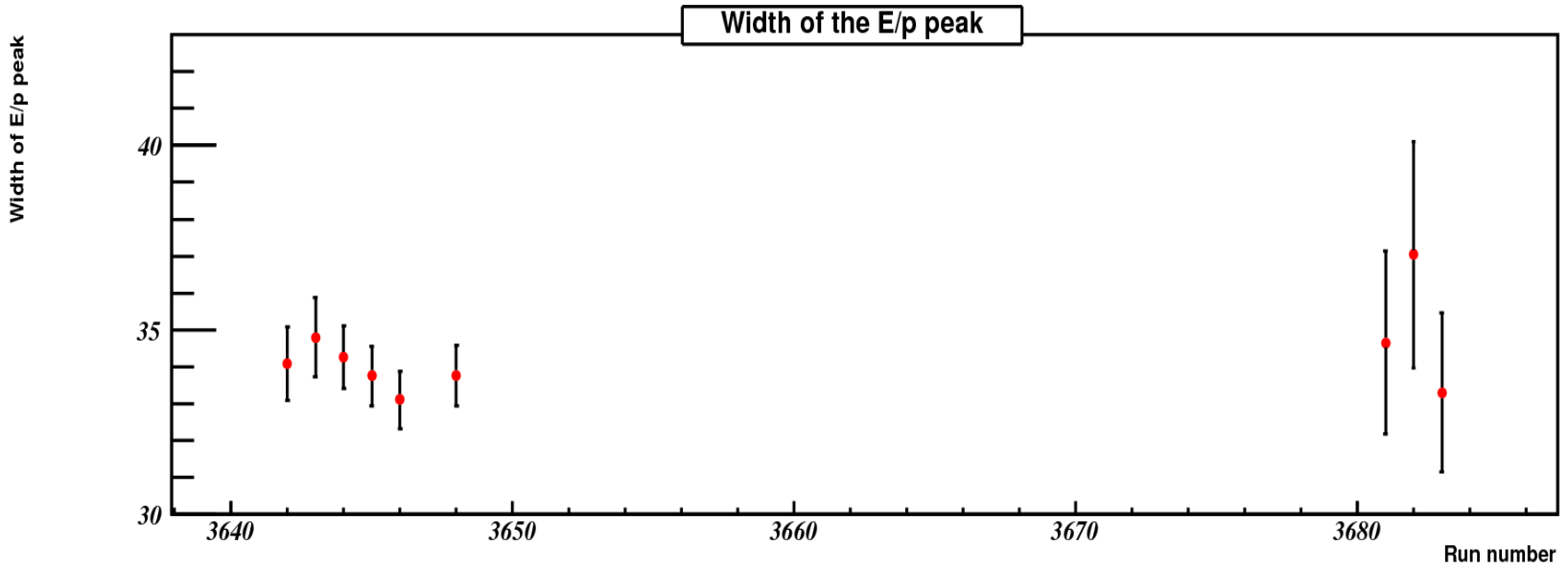






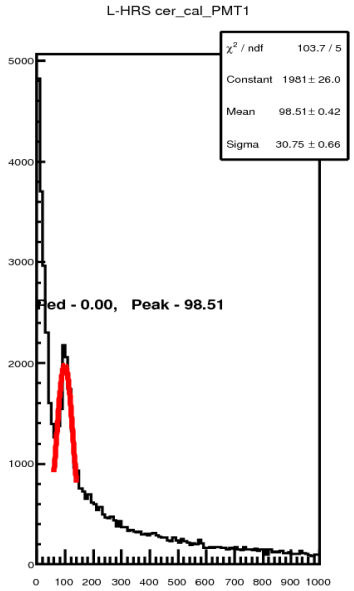
For Cer Sum. Location of SPE

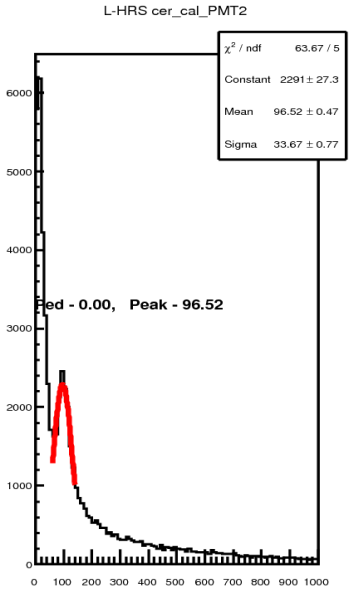


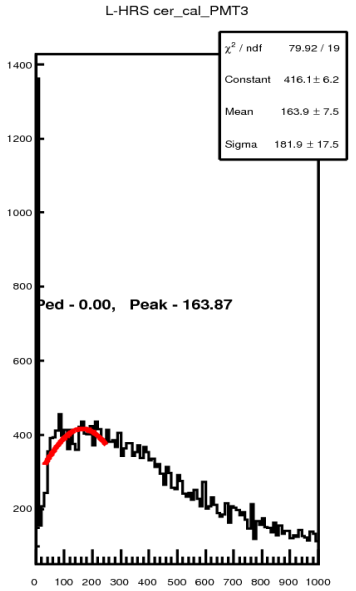


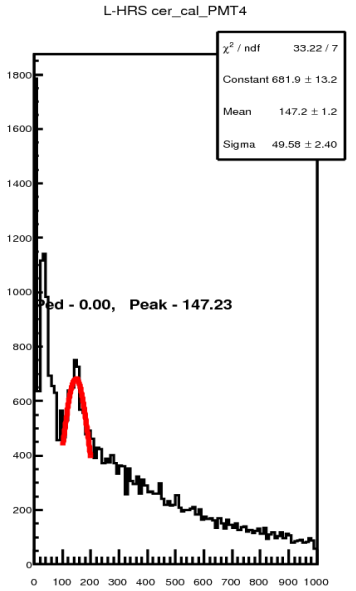
This is SPE from cer_sum so it is reasonale to have shift from channel 100. But to make sure how much they really shift and what we see is reasonale we need to see the SPE for each PMTs on Cer.

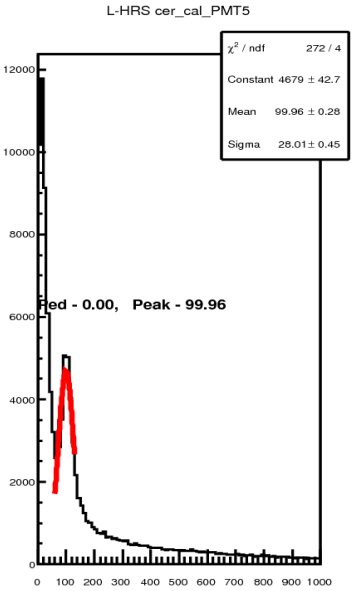
Kin5.1 have more pion so it is easier to see SPE in each PMT. So use this existing data to check SPE for each PMTs. Add old rootfile for this kin and use the same cuts

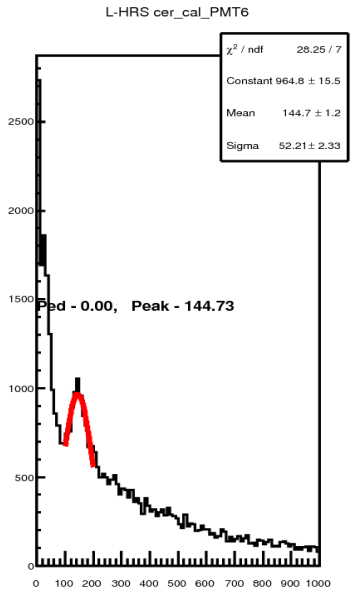


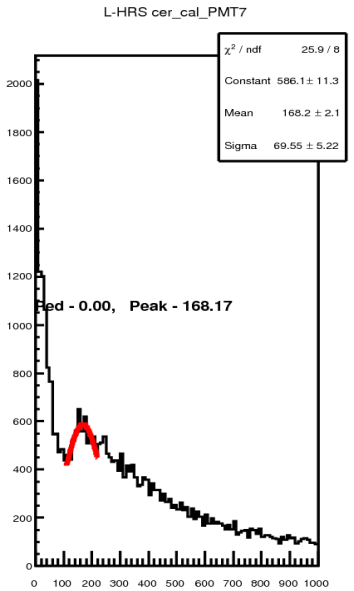


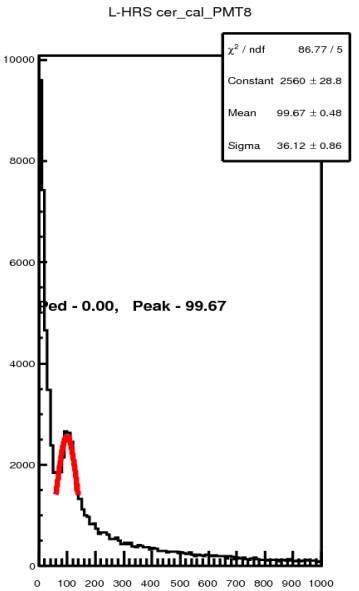


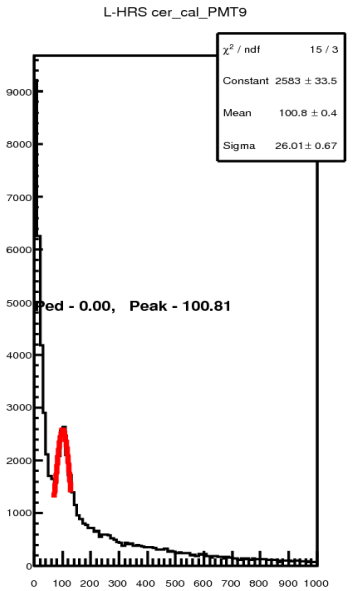


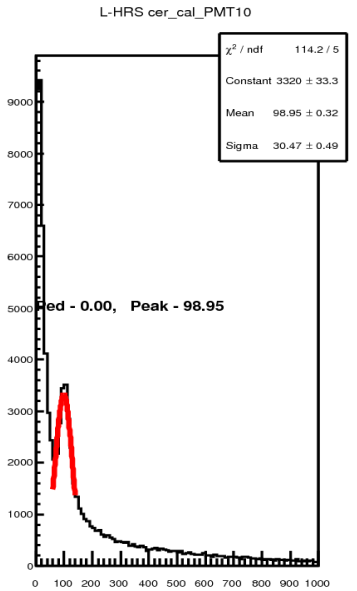




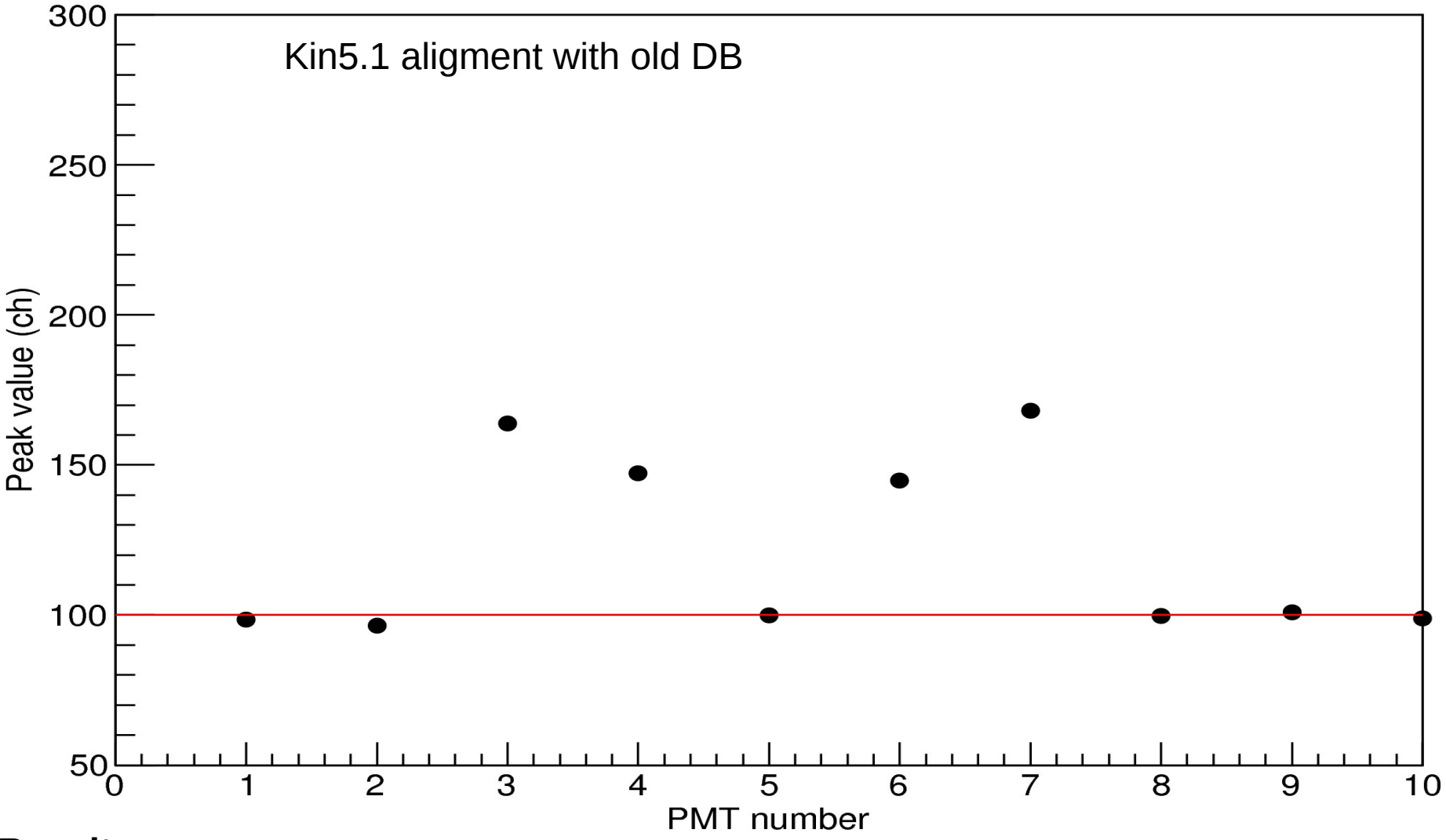








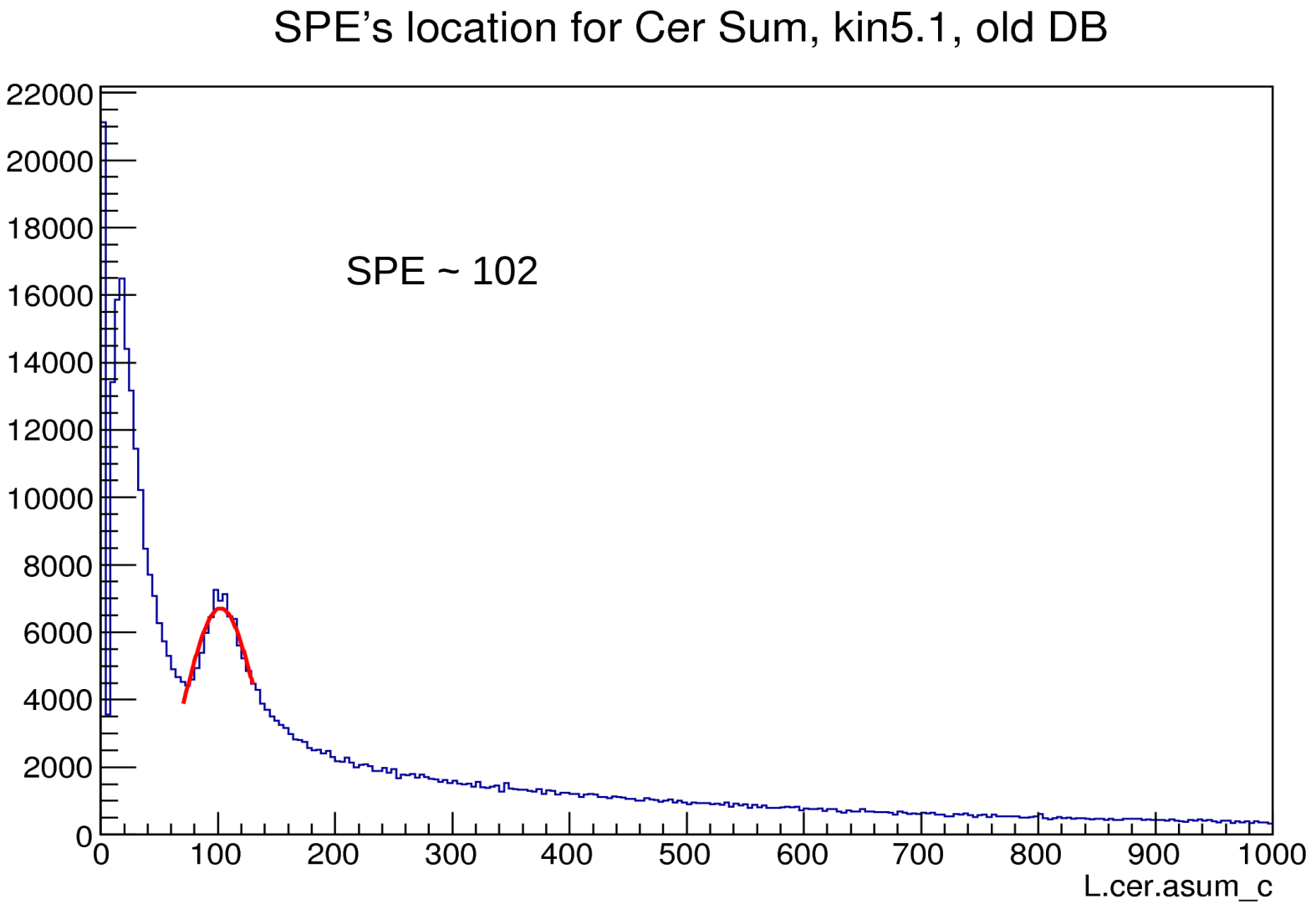
Do plot for SPE's location Vs number of PMT



Results:

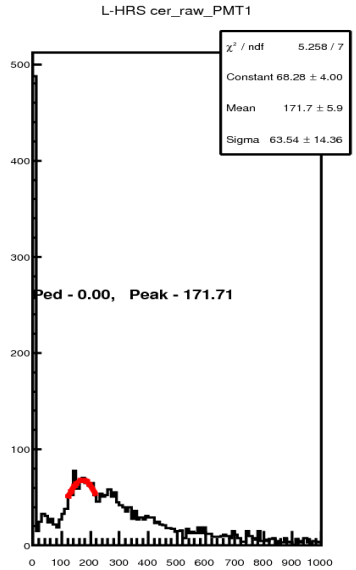
- only 6 in 10 PMTs got align
- PMT3: seem have very wide peak. Hard to say it is SPE or not?
- PMT4, PMT6, PMT7: SPE is not as clear as other

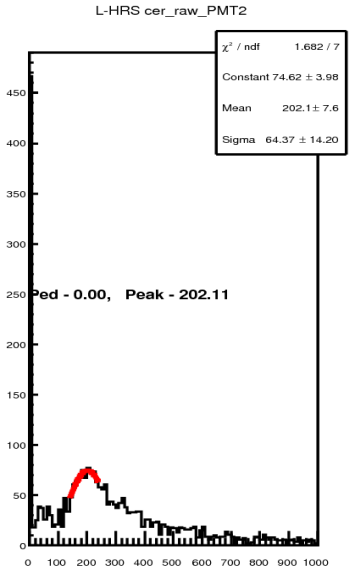
Want to see with this alignment where SPE of cer sum

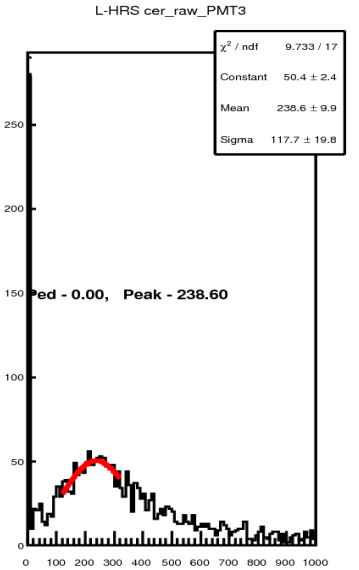


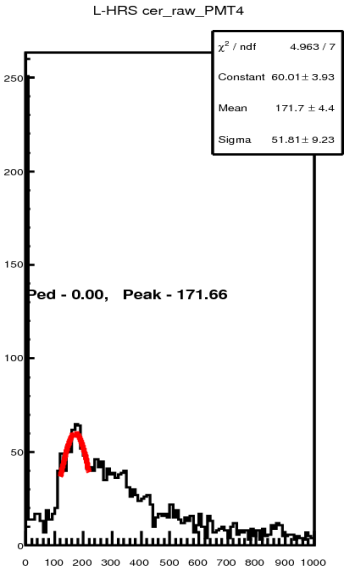
Try Cosmic runs to see SPE better to do alignment again and see if we can improve this alignment.

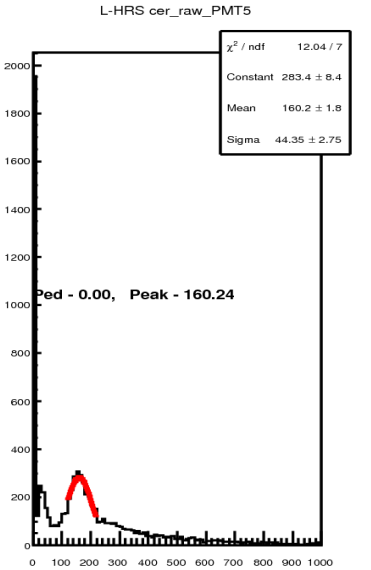
Cosmic Run: 3657, 3658, 3659,3690 with Existing Data Base.

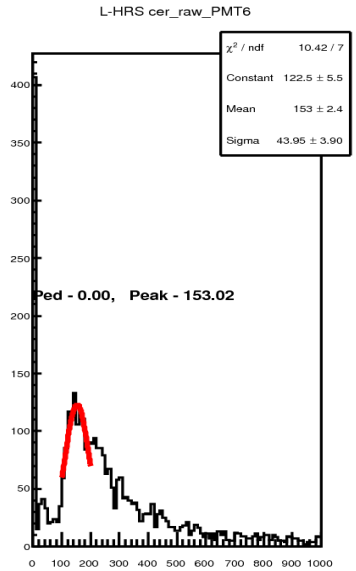


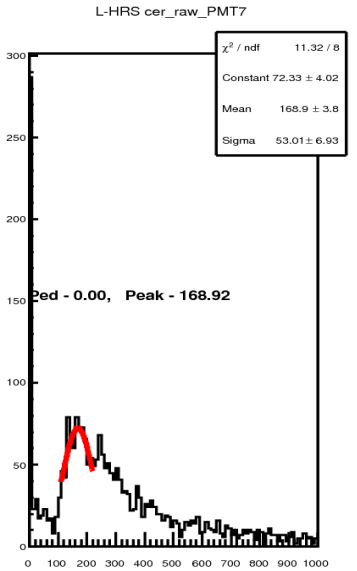


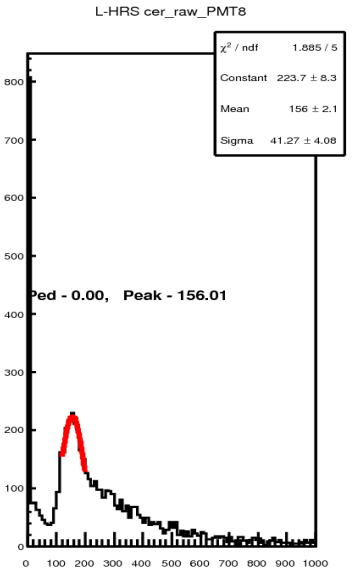


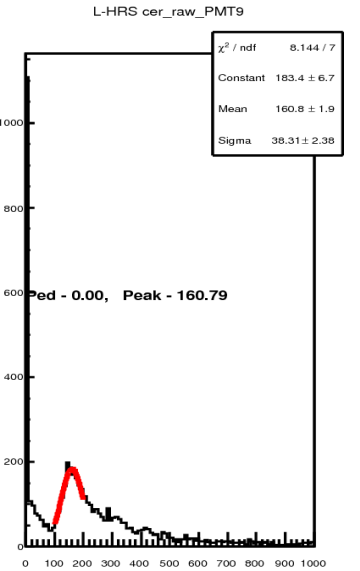


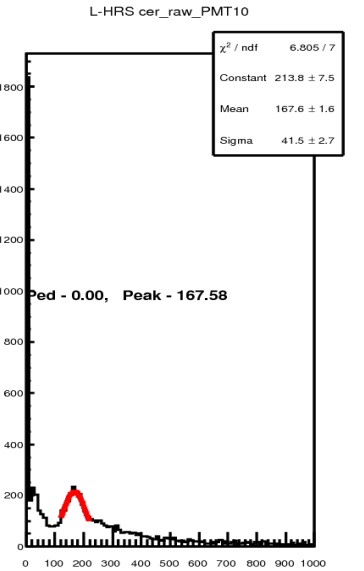




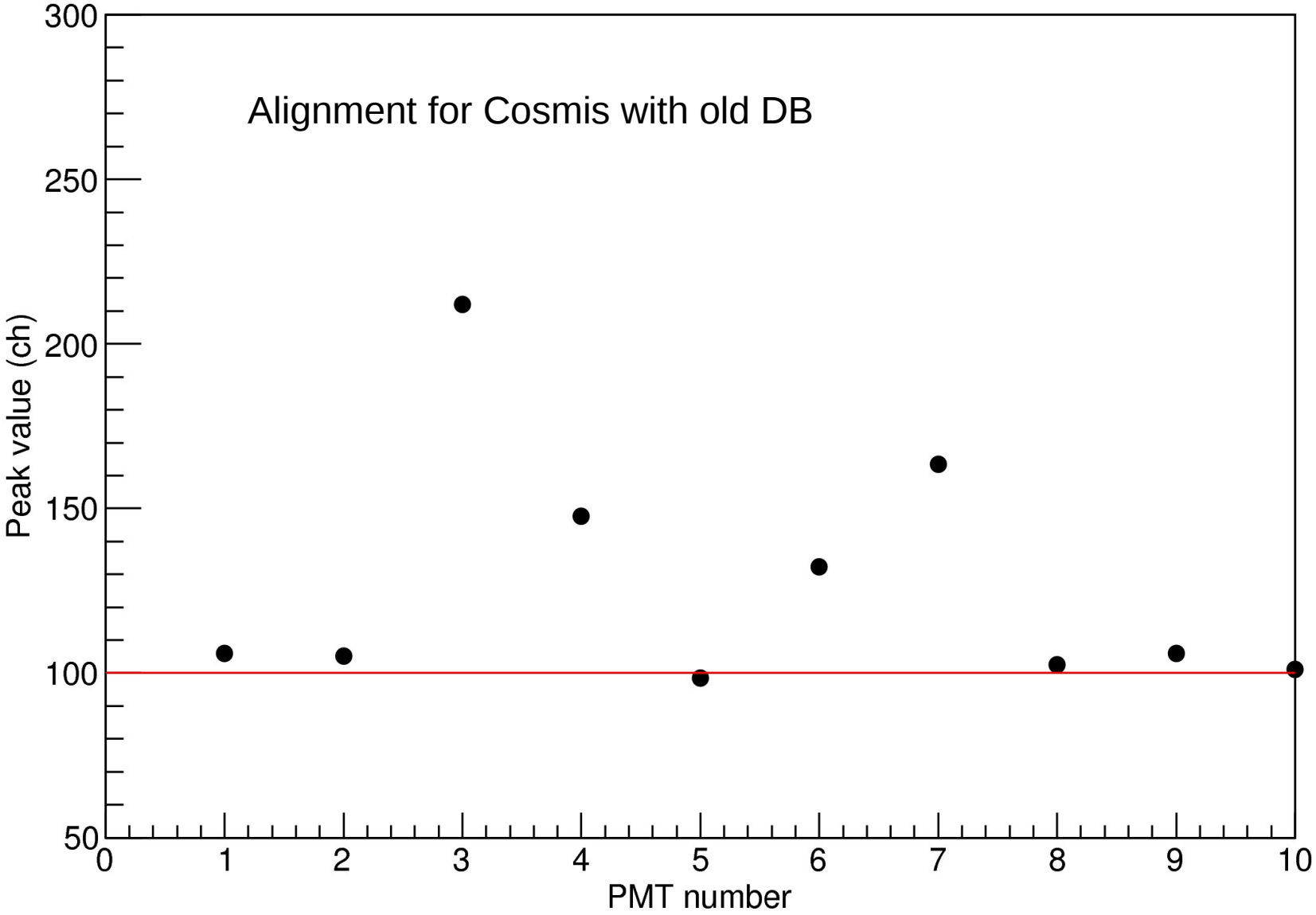






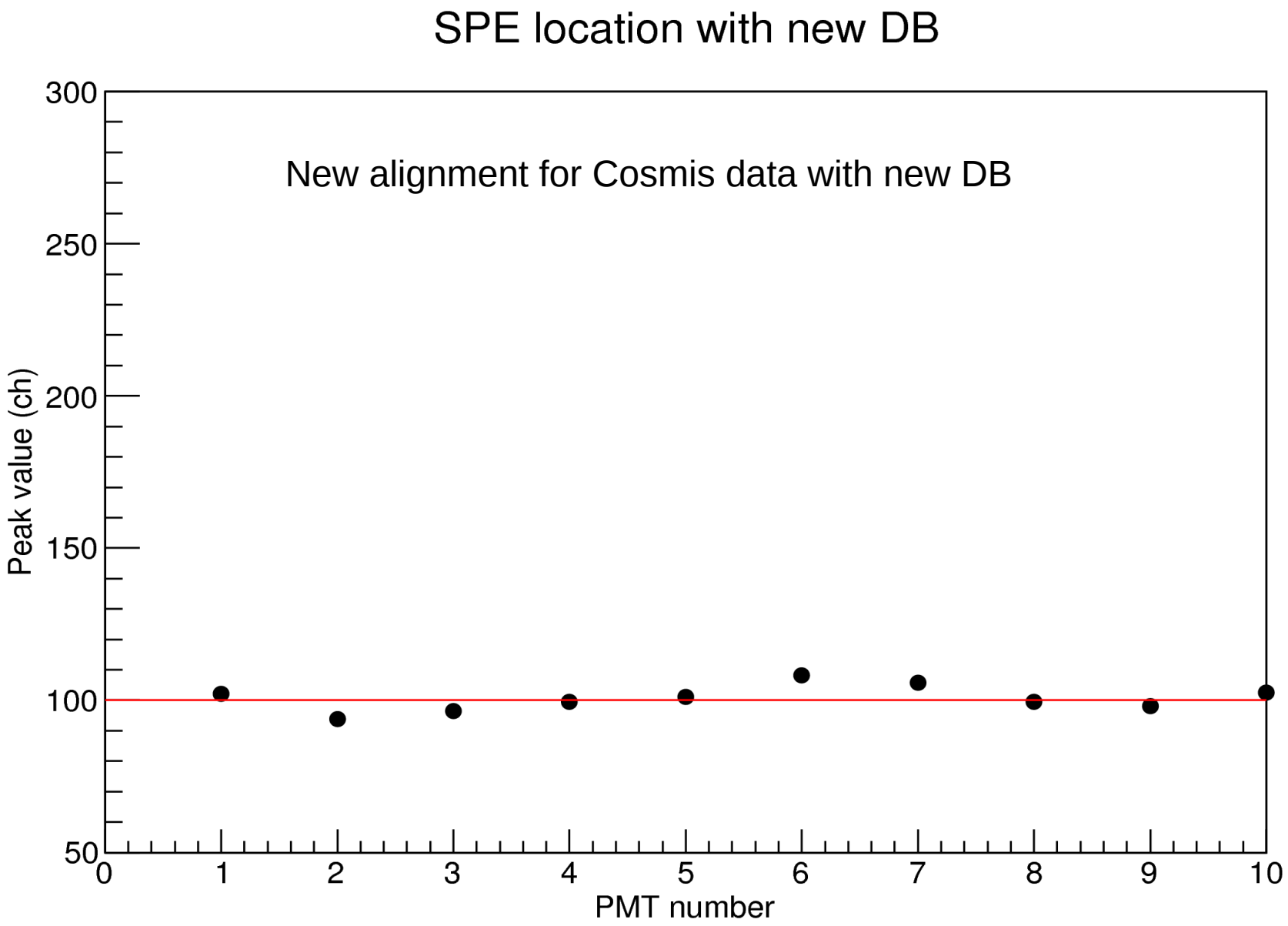


With that existing Data Base : this is how Cosmic data alignment have the same problem with production run with existing DB



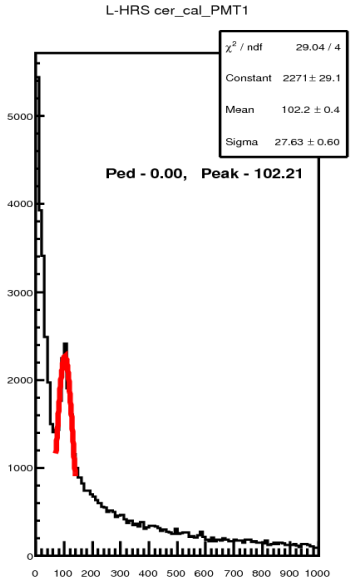
Want to do the alignment again and update DB to see any improvement

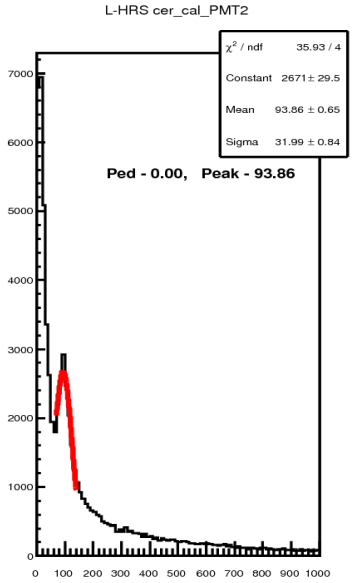
Old DB:	0.57	0.51	0.89	0.86	0.62	0.86	0.95	0.64	0.63	0.59
New DB	0.58	0.49	0.42	0.58	0.62	0.65	0.59	0.64	0.62	0.60

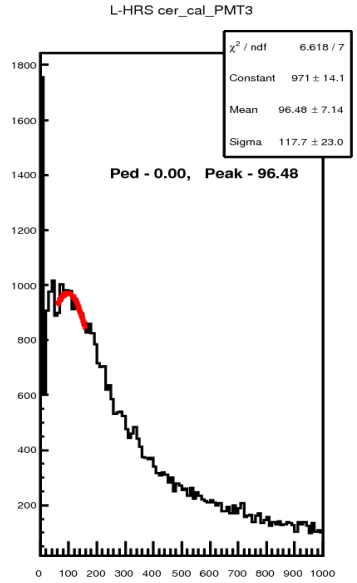


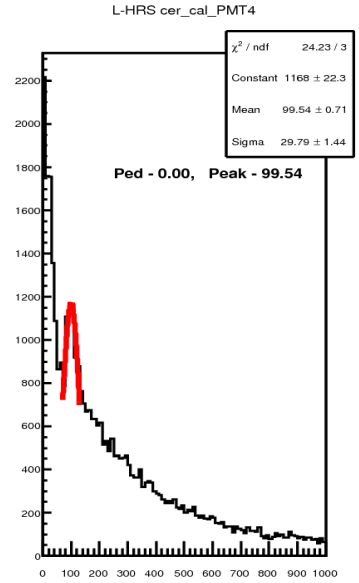
Now I use the new DB to replay again and check the alignment for production run

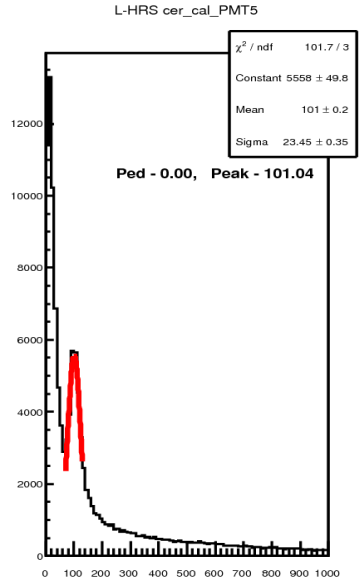
Kin5.1.

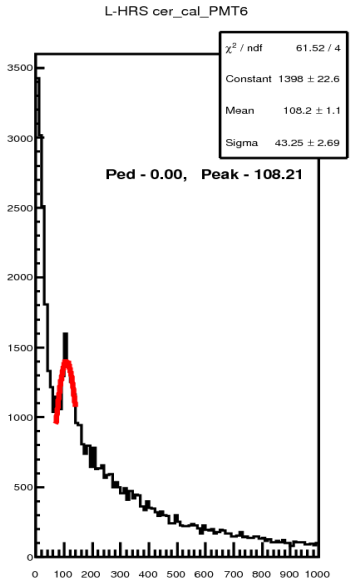


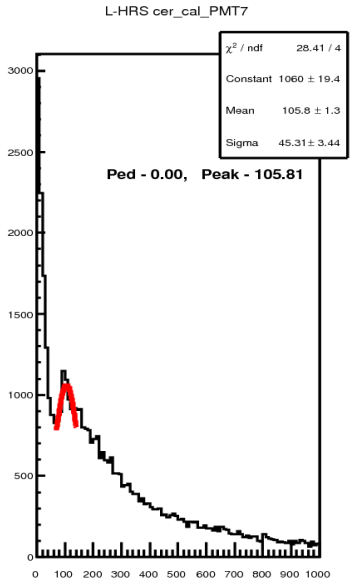


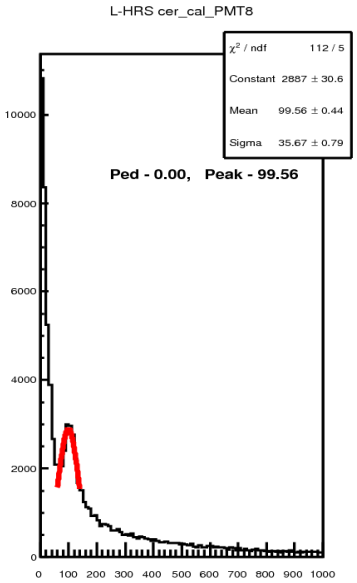


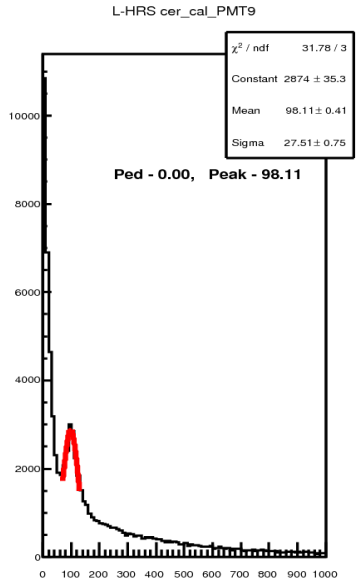


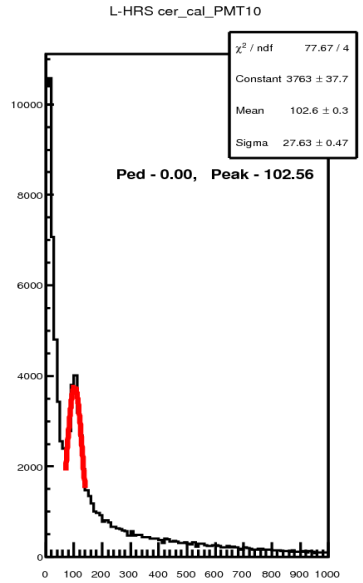


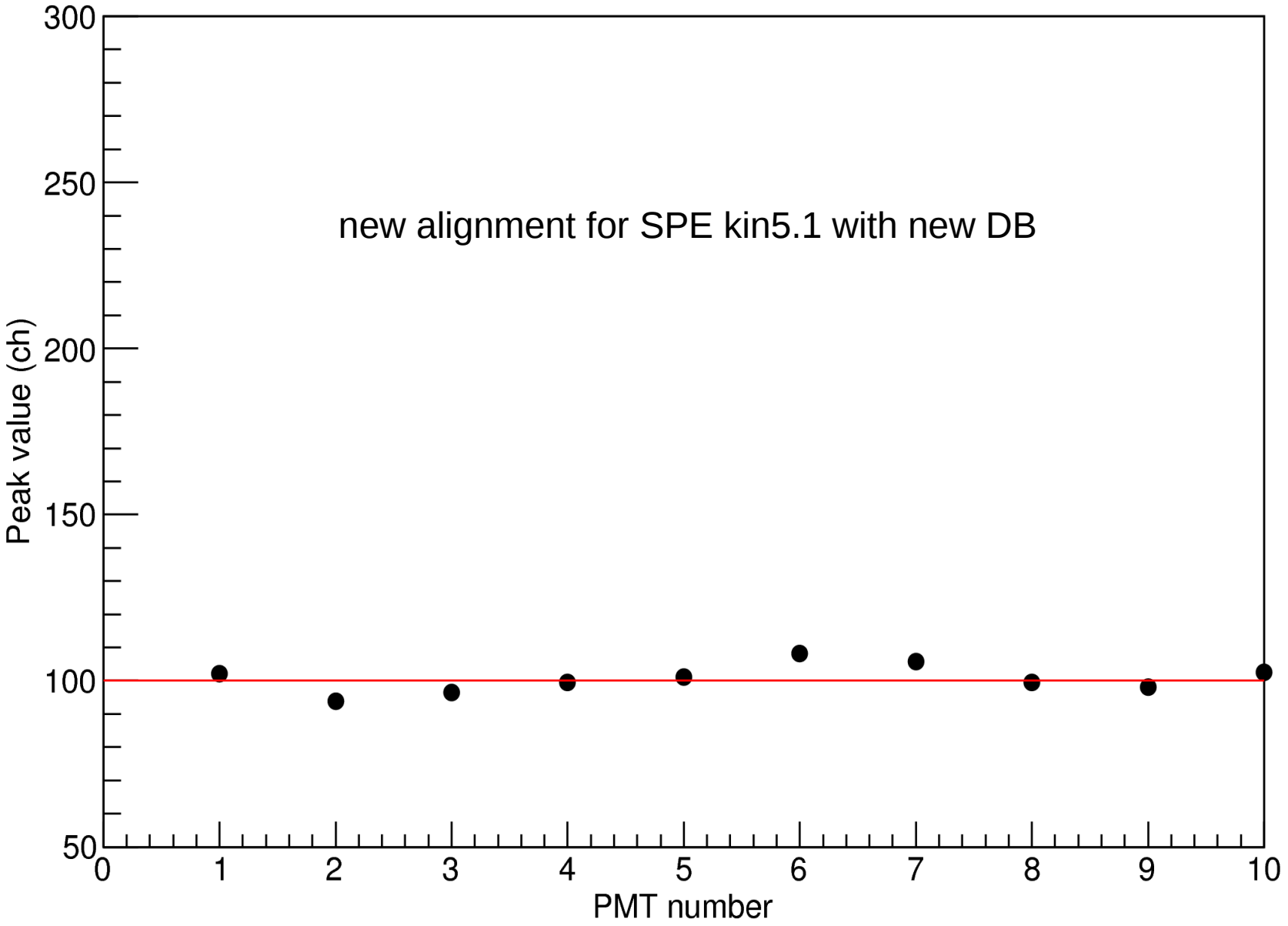




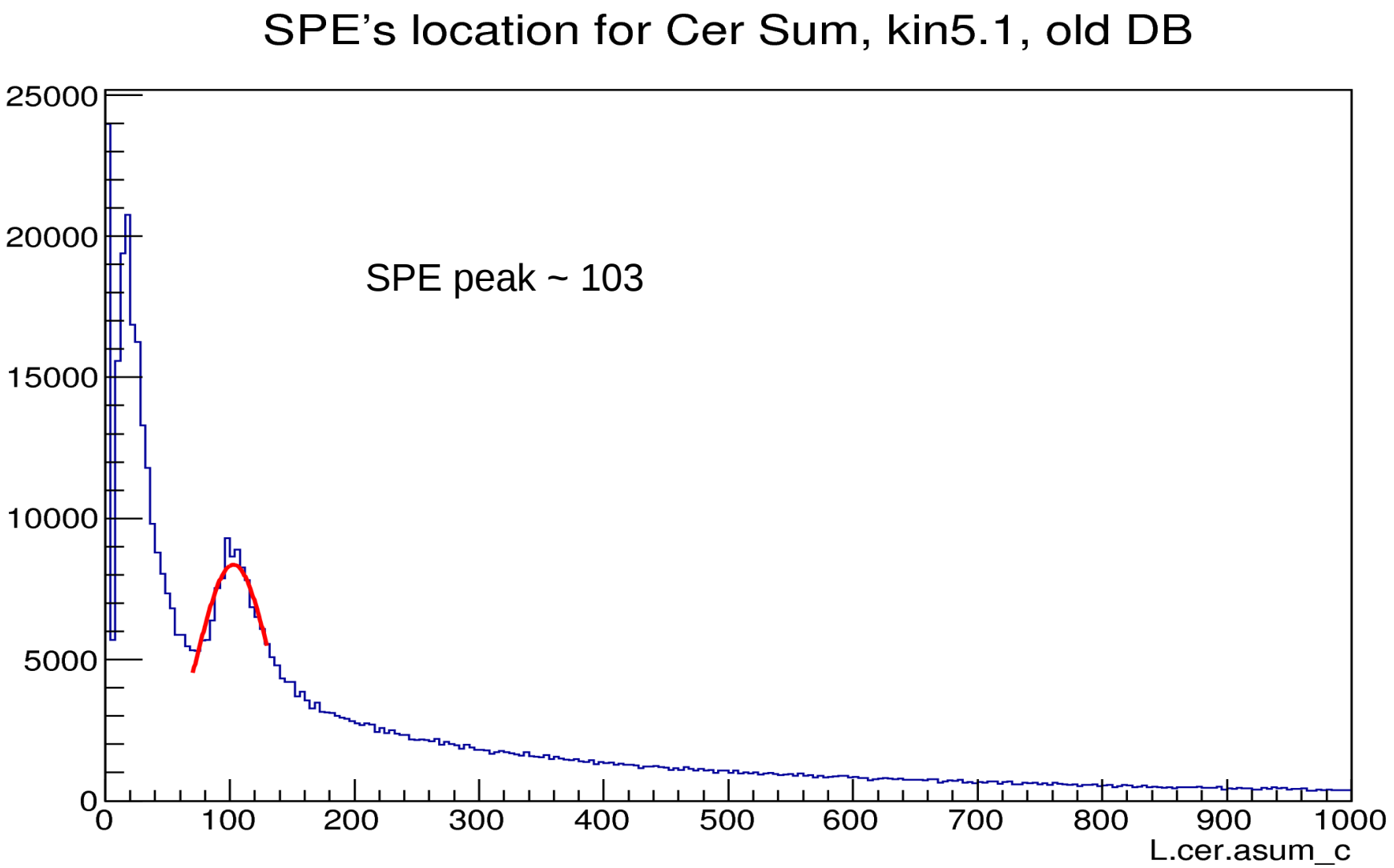







SPE location with new DB
new alignment for SPE kin5.1 with new DB
Peak value (ch)
PMT number
300
250
200
150
100
50
0
1
2
3
4
5
6
7
8
9
10

How about the SPE for Cer Sum with new Alignment

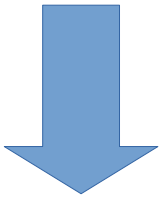


Conclusion :

- New Aligment seems to have better alignment for every single PMT SPE's peak

- But Not improve the SPE's for Cer Sum.

- When we do the PID the variable need to use is the Cer Sum. So the old alignment seem is okay for this espect.



Continue other check use the calibrated rootfiles

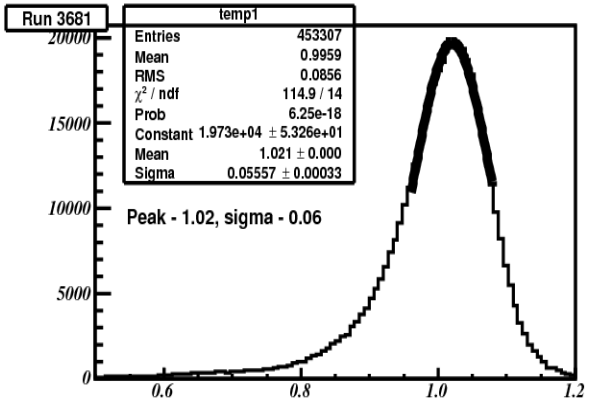
Second check: E/p peak location

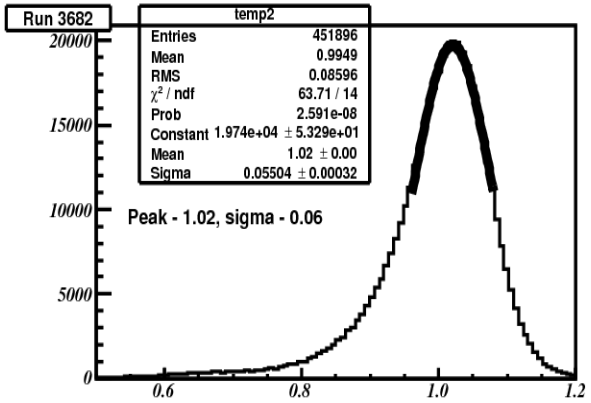
To do this study we use the cuts:

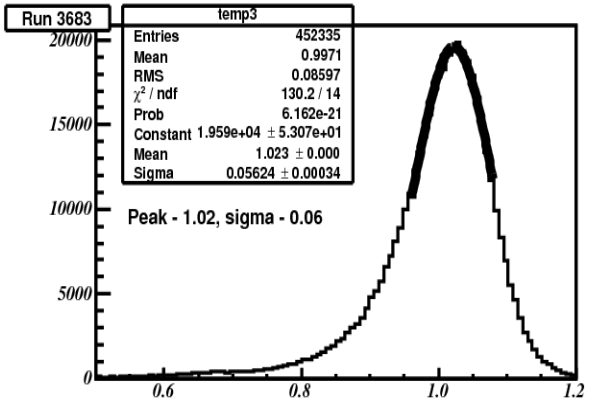
- Loose acceptance cuts: on momentum and solid angle

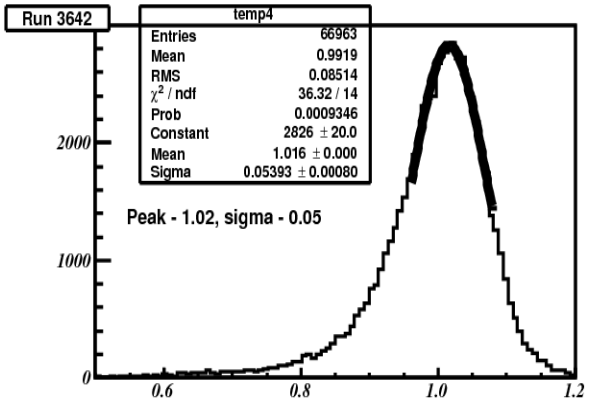
- PID cut using Cer_sum>100

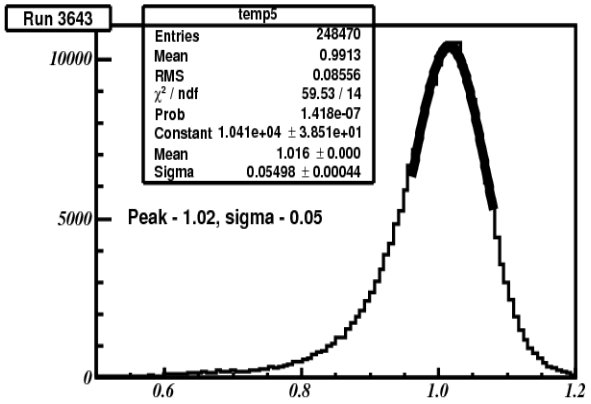
Plot E/p : here E = total energy deposist on Pre and Shower, P is setup momentum

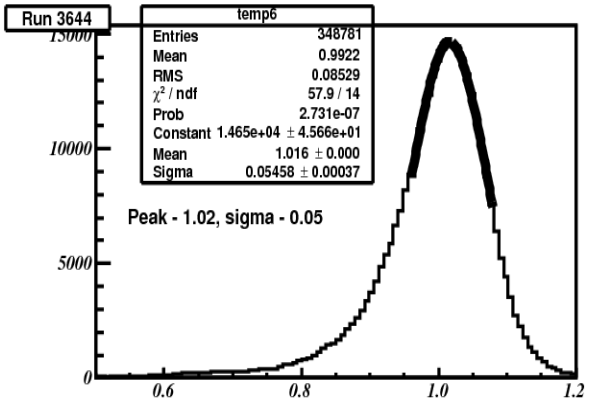


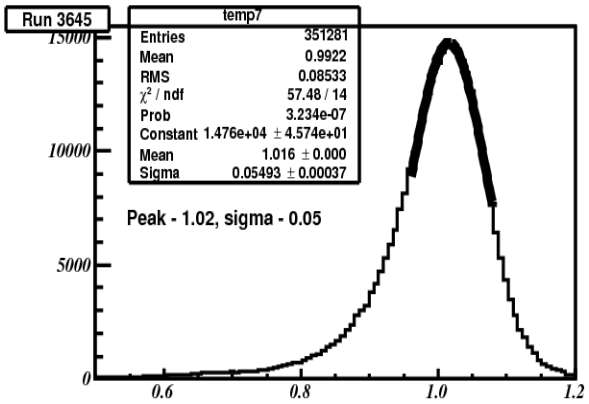


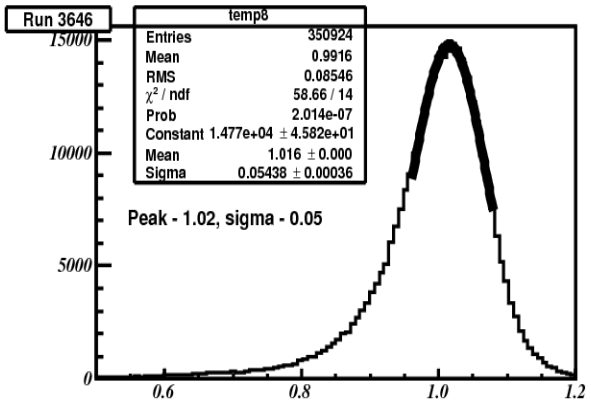


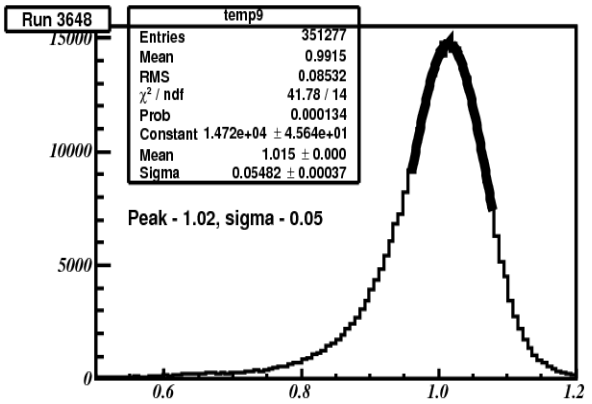




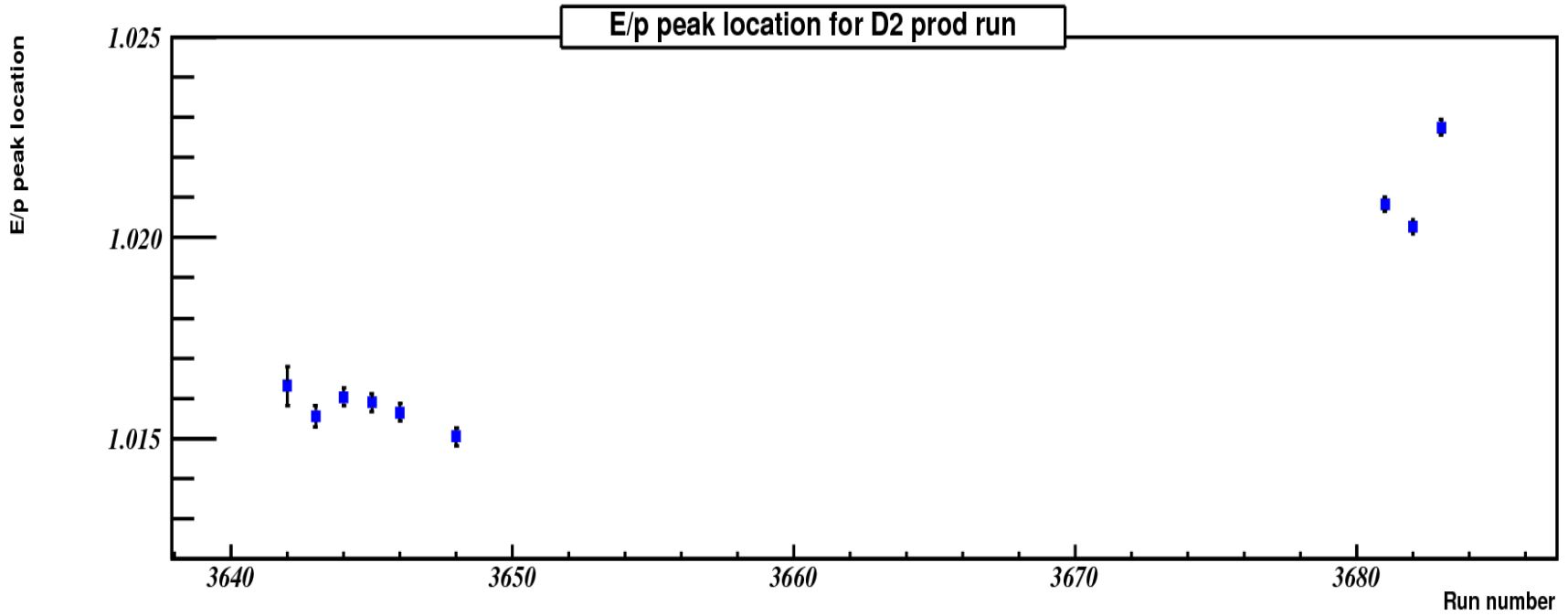


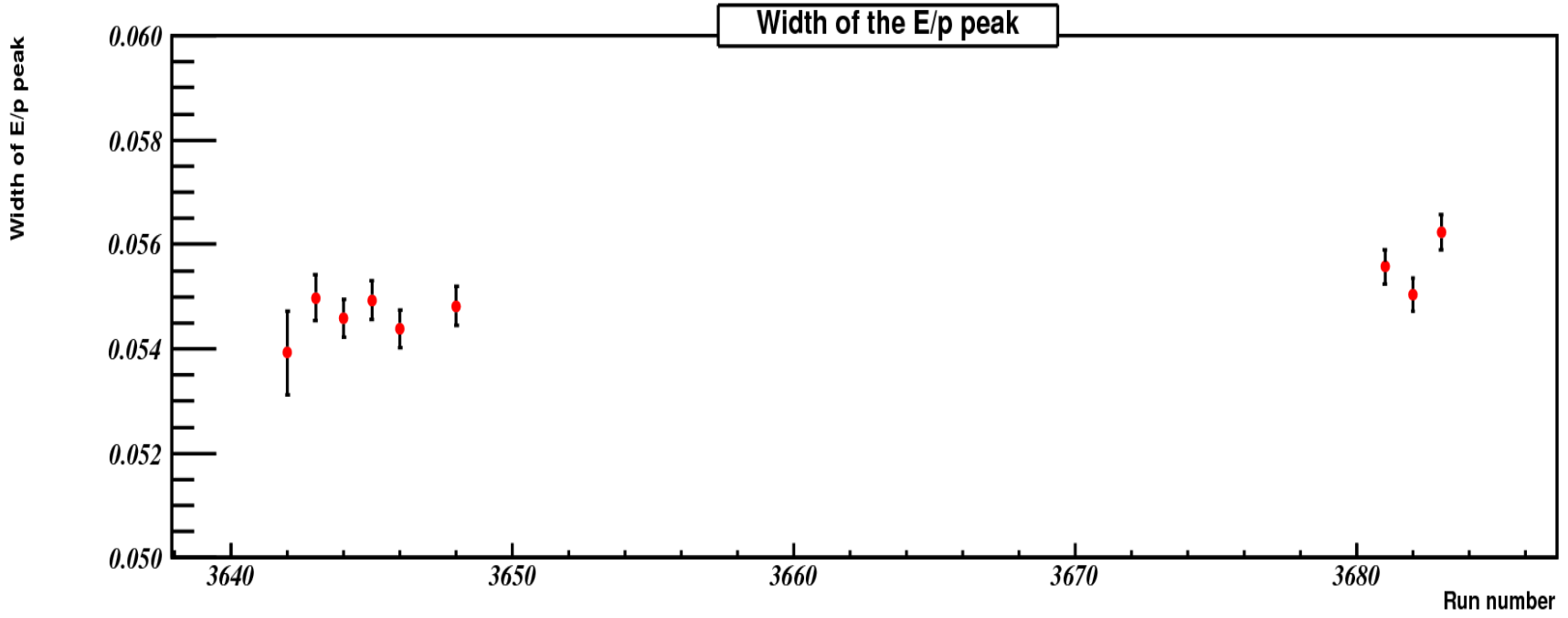






Results of E/p fitting:





Third check: Tracking efficiency for every run D2_data