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# Run 13 calibration updates

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## Run 13 Trigger Options

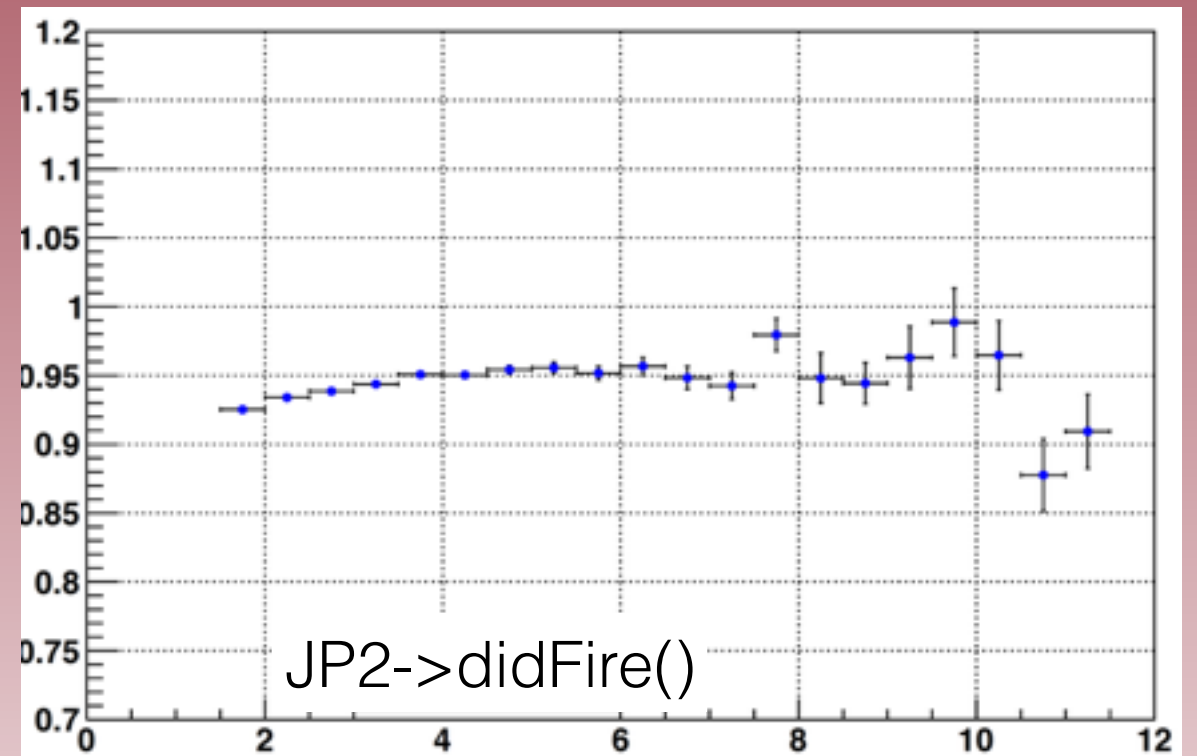
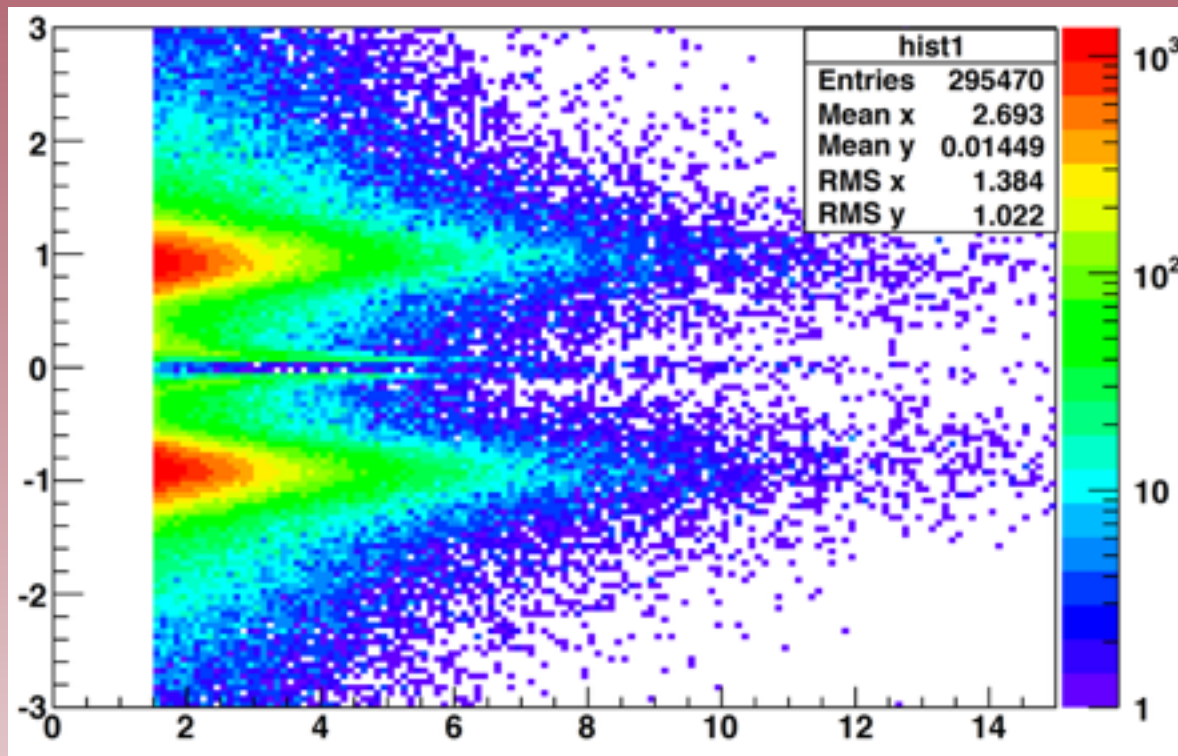
03-29-2016

# Run 13 TriggerOptions

- Trigger Info which are flagged in Run 13 Trees.

BHT Trigger Info	non BHT Trigger Info
BHT0, BHT1, BHT2, BHT3	JP2

- JP2->didFire()



- According to the study done by Kevin, accessing non-HT trigger info which were not flagged in the trees by using “NOT (!) of flagged HT” leads to randomly count fake non HT trigger events and also to reject some true non HT events.

[https://drupal.star.bnl.gov/STAR/system/files/TriggeringCondition\\_2012\\_pp200.pdf](https://drupal.star.bnl.gov/STAR/system/files/TriggeringCondition_2012_pp200.pdf)

# Unbiased Trigger Option

- Does JP2 alone is enough statistics (295 K) ?
- We can try to access other non HT events similar to run 12 method but with some modification in the command to avoid accepting fake non HT triggers.
- But then we may wont able to add JP2 alone with them since we might double count JP2 events.
- Lets have a look how much true non HT events we can access .

# Accessing non HT events

## Accessing Other non HT Triggers

- Run 12 Trigger Option

**Condition 1**

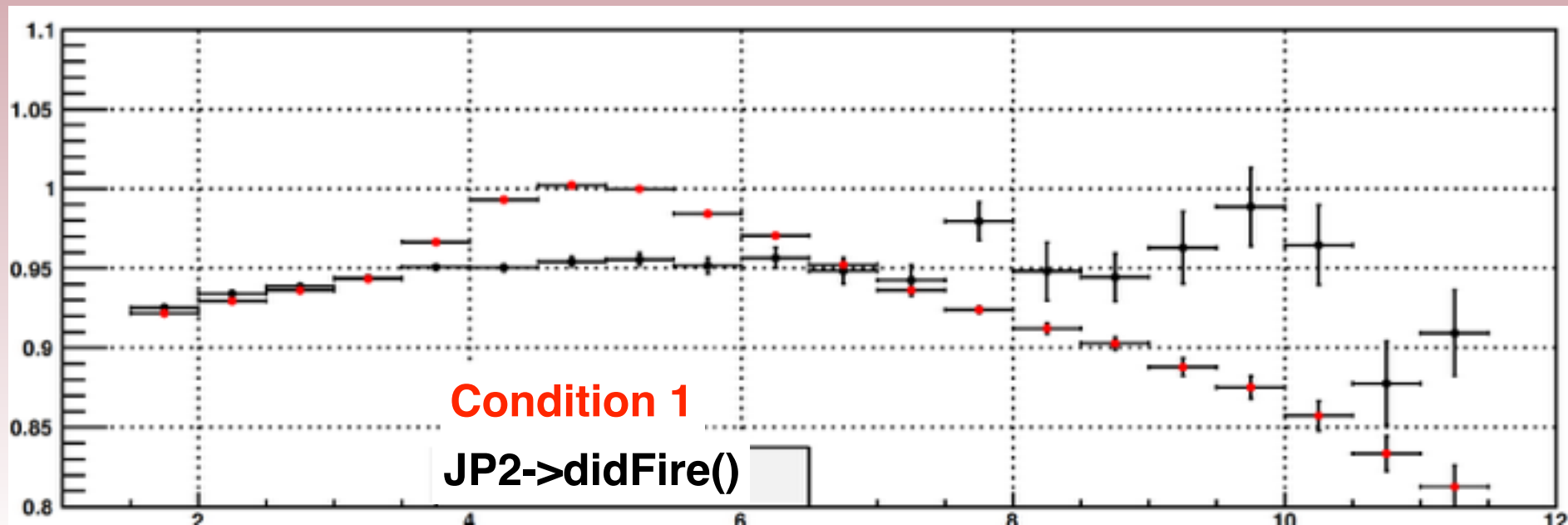
```
if ( ( !mBHT0 && !mBHT1 && !mBHT2 && !mBHT3 ) ||
```

```
(mBHT0 && !mBHT0->didFire() ||  
(mBHT1 && !mBHT1->didFire() ||  
(mBHT2 && !mBHT2->didFire() ||  
(mBHT3 && !mBHT3->didFire() ) )
```

A Pointer does not exist for any of the BHT triggers, events must have fired something else such as JP or FMS.

A Pointer to a BHT trigger does exist but the didFire condition fails, meaning HT Trigger only fired in the software and some other trigger must have fired.

Due to different HT trigger Pre-scales having " || " condition would accept a HT trigger as a non HT trigger.



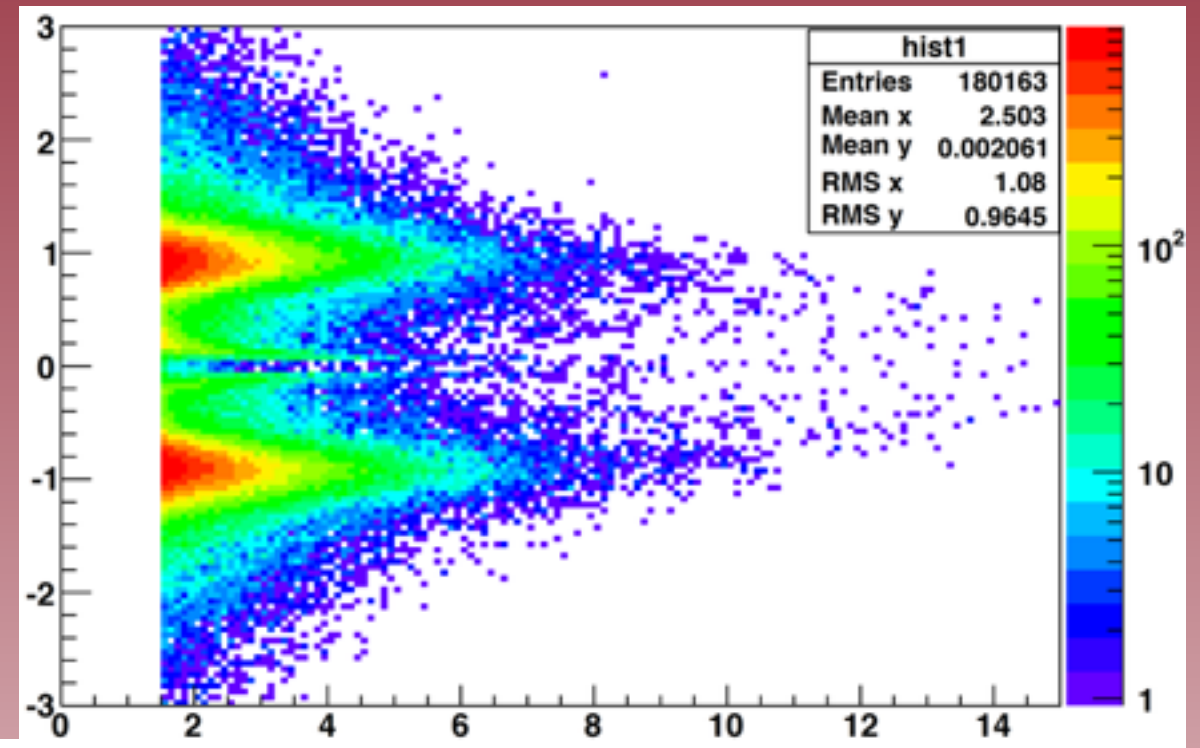
# Accessing non HT Events

Can avoid the former, using “&&” instead of “||”

## Condition 2

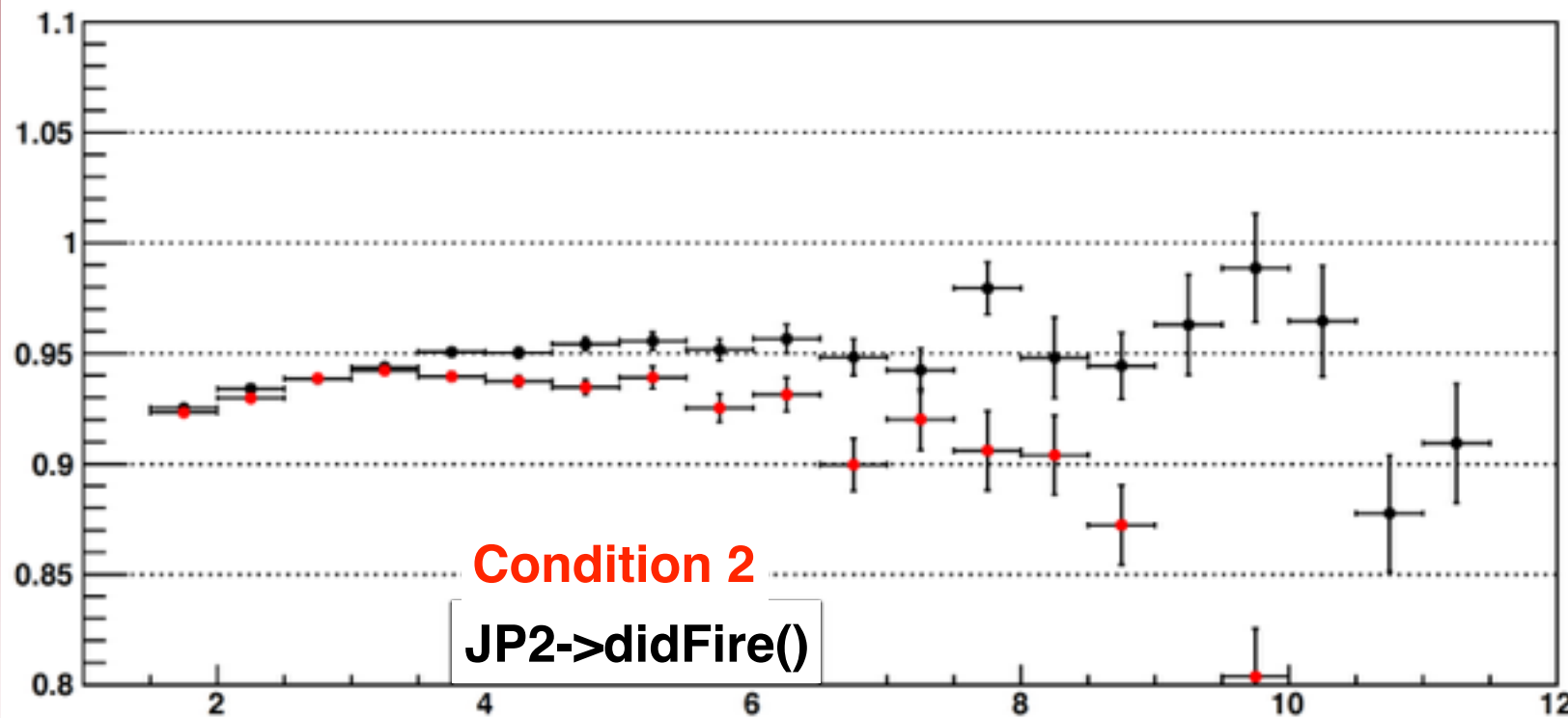
```
(mBHT0 && !mBHT0->didFire()) &&  
(mBHT1 && !mBHT1->didFire()) &&  
(mBHT2 && !mBHT2->didFire()) &&  
(mBHT3 && !mBHT3->didFire())
```

A Pointer to a BHT trigger does exist but the didFire condition fails, meaning HT Trigger only fired in the software and some other trigger must have fired.



statistics\_condition2 (180 K)

statistics\_JP2 (295 K)





# Unbiased Trigger Option

What if we enlarge our set using “!” to the pointer for HT trigger instead for didFire () condition

`!(mBHT3 && mBHT3->didFire())`

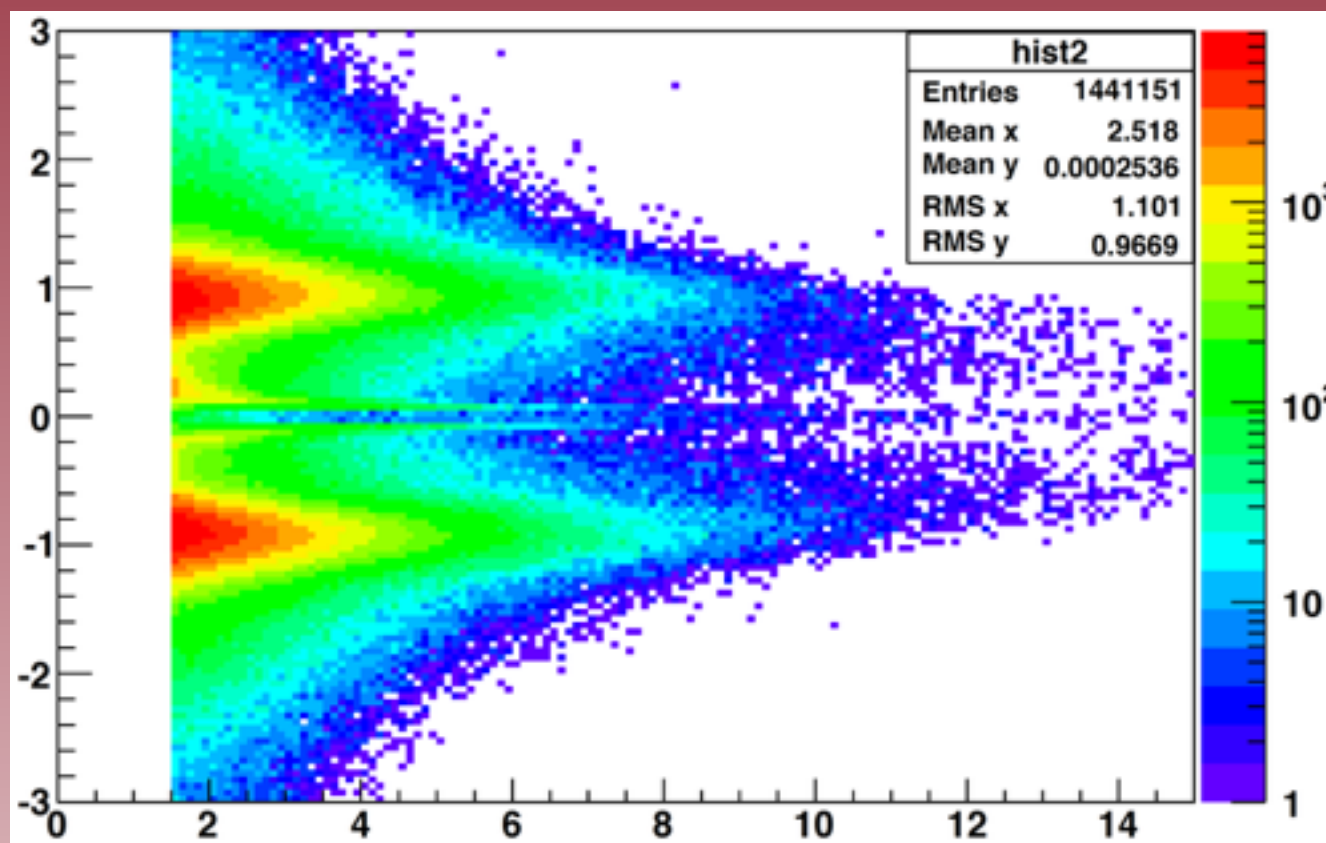
`(mBHT3 && !mBHT3->didFire())` ?

## Condition 3

```
!(mBHT0 && mBHT0->didFire()) &&
!(mBHT1 && mBHT1->didFire()) &&
!(mBHT2 && mBHT2->didFire()) &&
!(mBHT3 && mBHT3->didFire())
```

Having pointer to a BHT trigger && having true did Fire () condition, Fails.

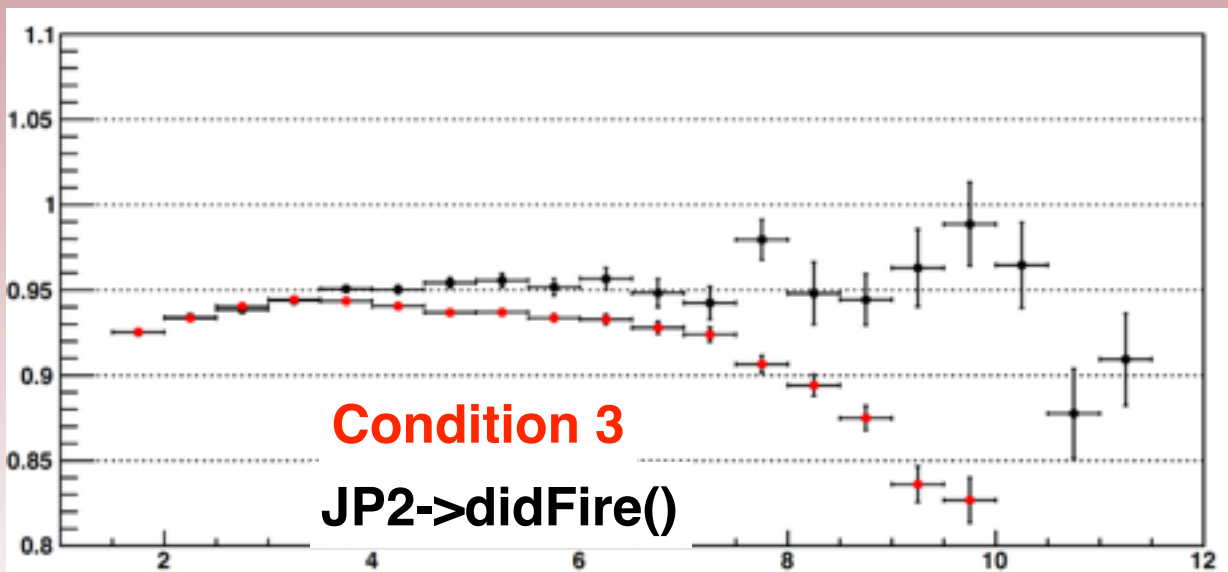
This access the previous set and also everything else with no HT info at all.



statistics\_condition3 (1441 K)

- Order of magnitude of statistics
- Stable E / p similar to JP2,  $P < 7$  GeV

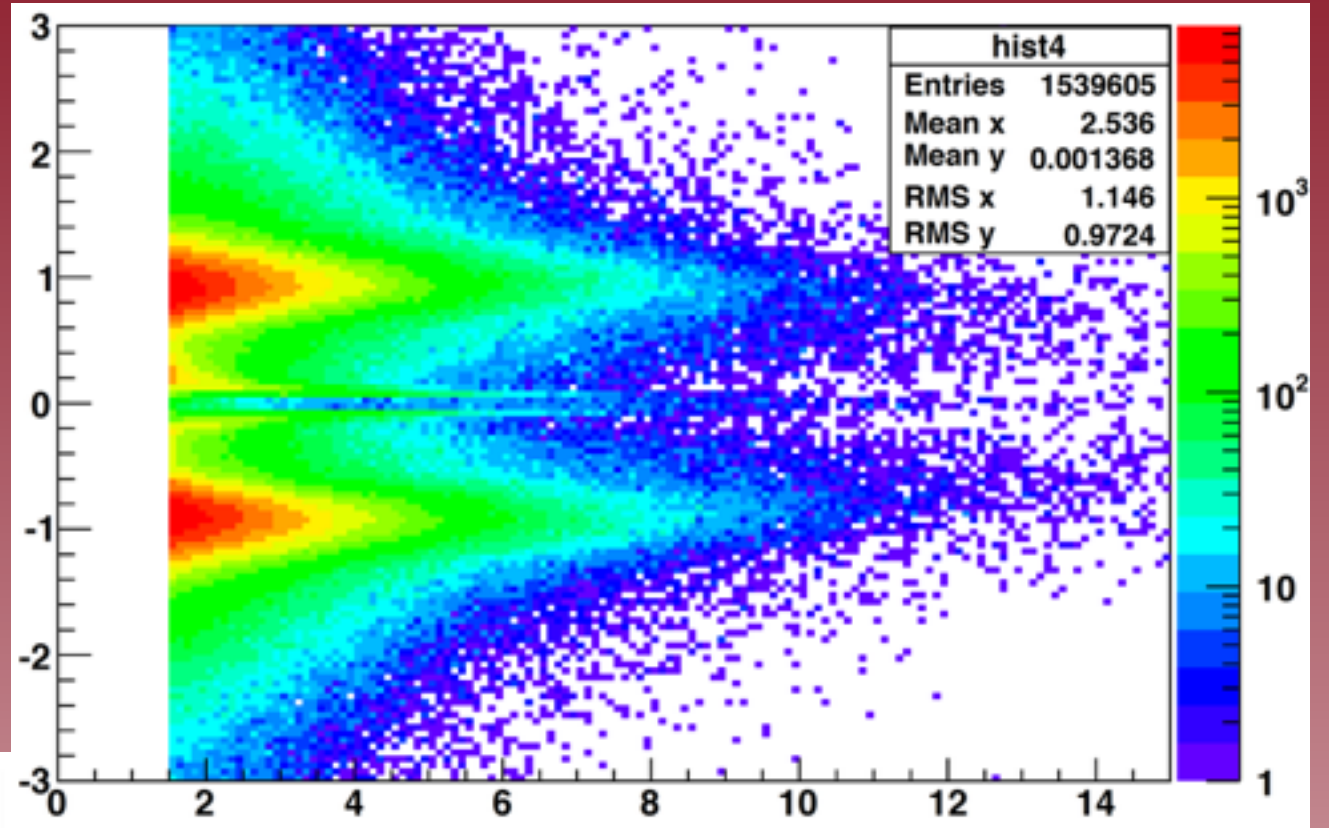
• Now let's add JP2->didFire ()



# Now add JP2 trigger - Unbiased Trigger Option

## Condition 4

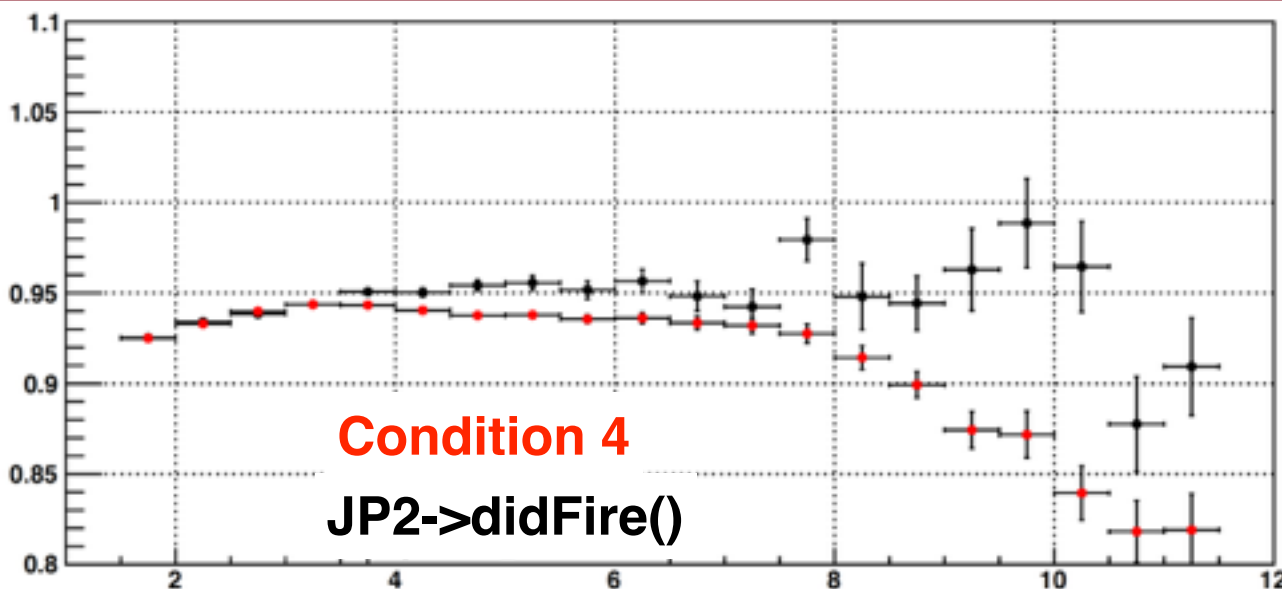
```
(mJP2 && mJP2->didFire()) ||  
!(mBHT0 && mBHT0->didFire()) &&  
!(mBHT1 && mBHT1->didFire()) &&  
!(mBHT2 && mBHT2->didFire()) &&  
!(mBHT3 && mBHT3->didFire())
```



statistics\_condition4 (1540 K)

JP2 -> statistics(295 K)

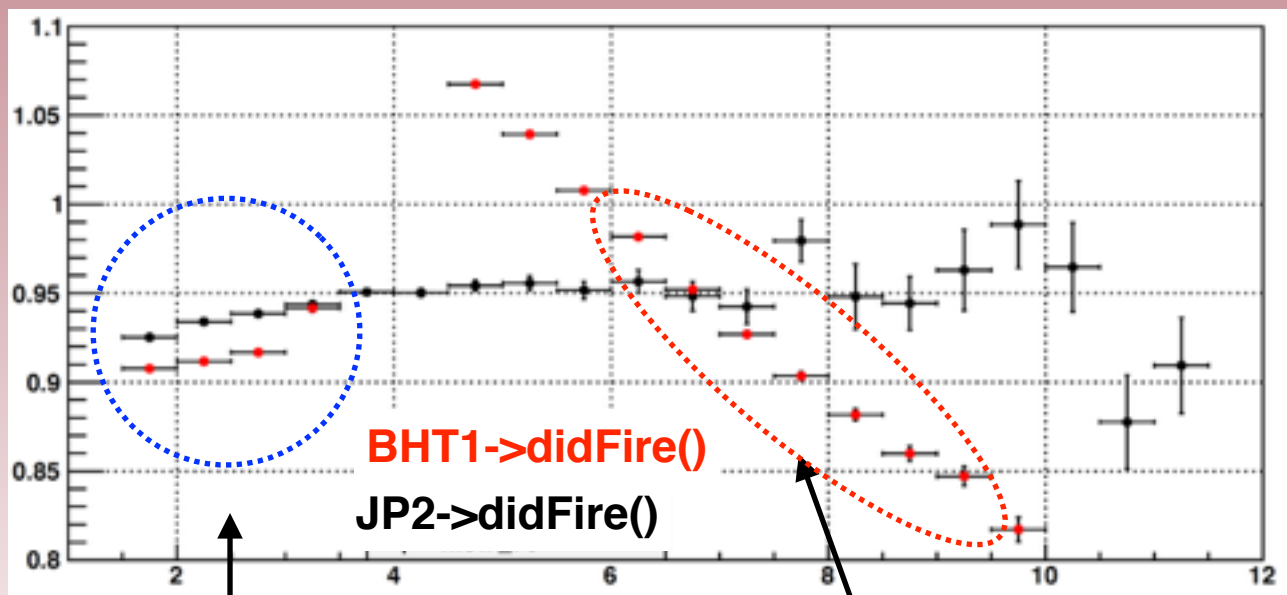
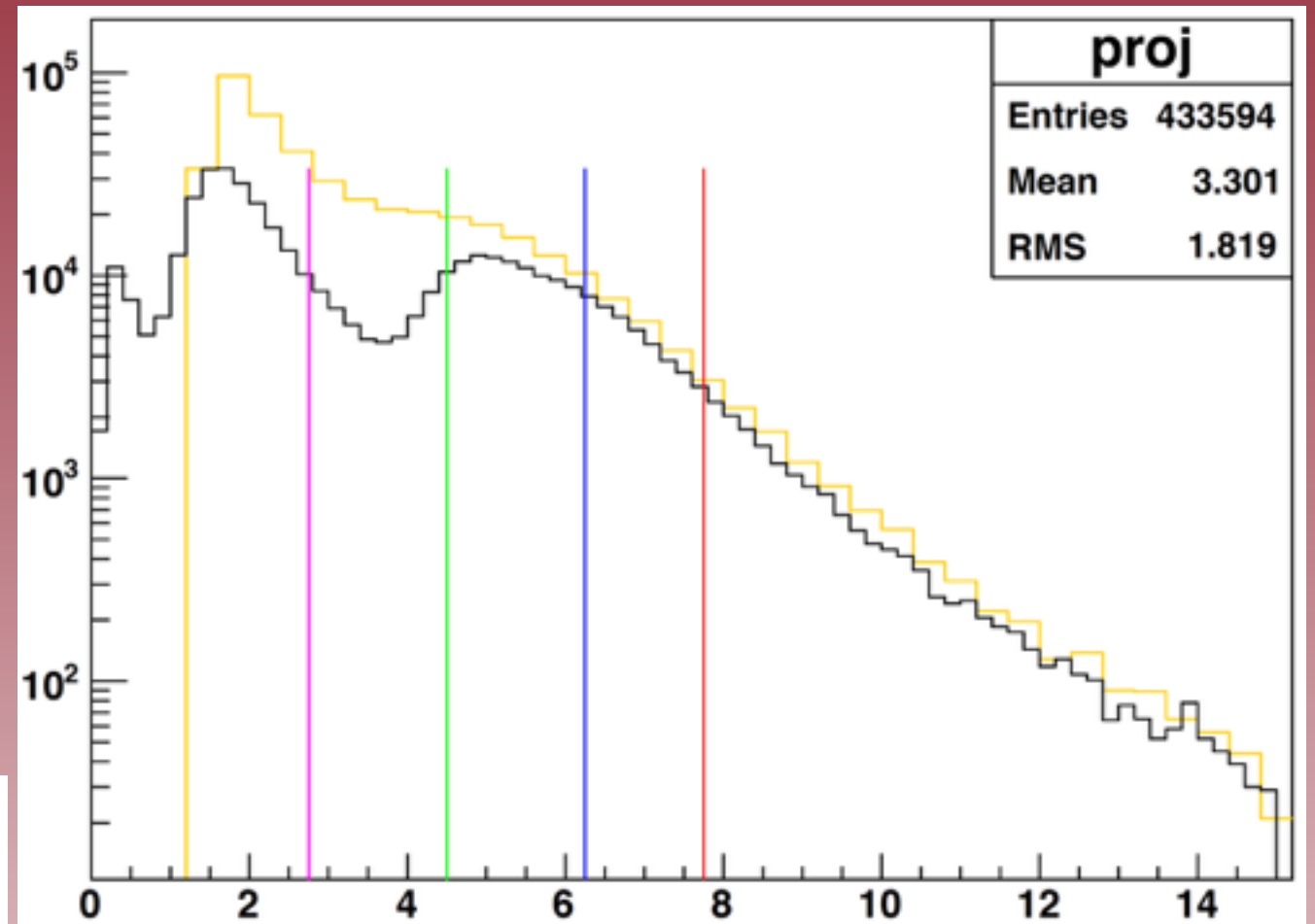
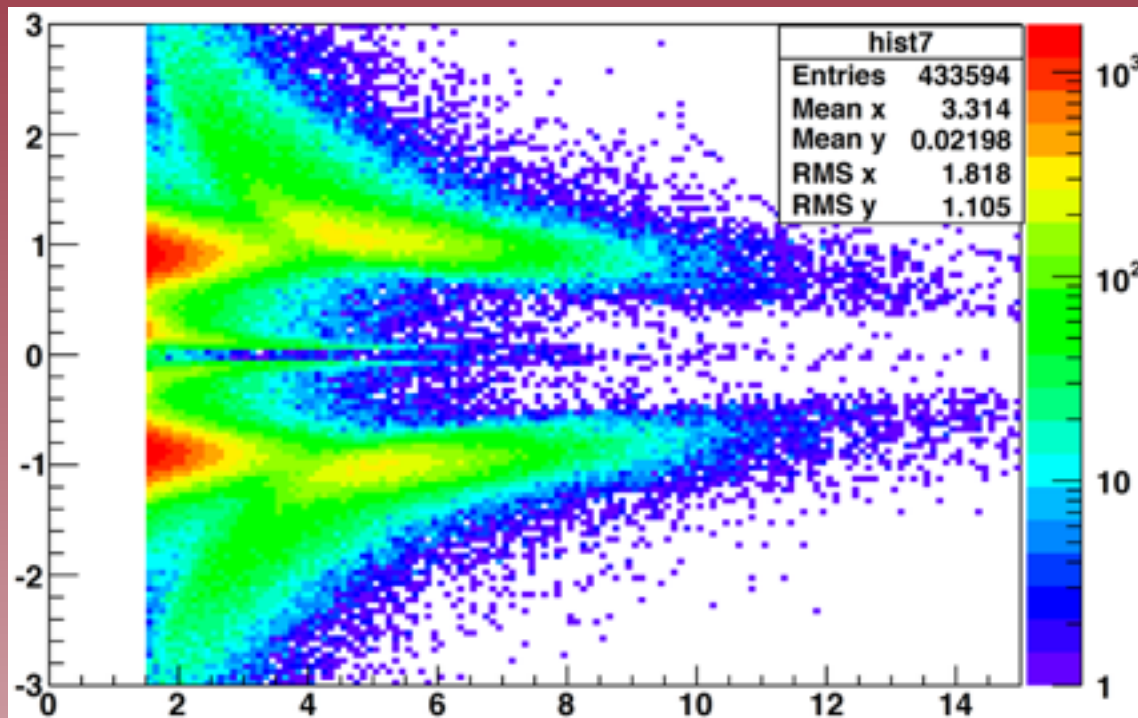
condition 3->statistics(1441 K)



It seems  $\sim 1/3$  of the JP2 events overlap with condition 3.

# HT Triggers - BHT1

- BHT1->didFire()



Below the threshold

Above the threshold

Systematically low  $E/p$   
than non HT

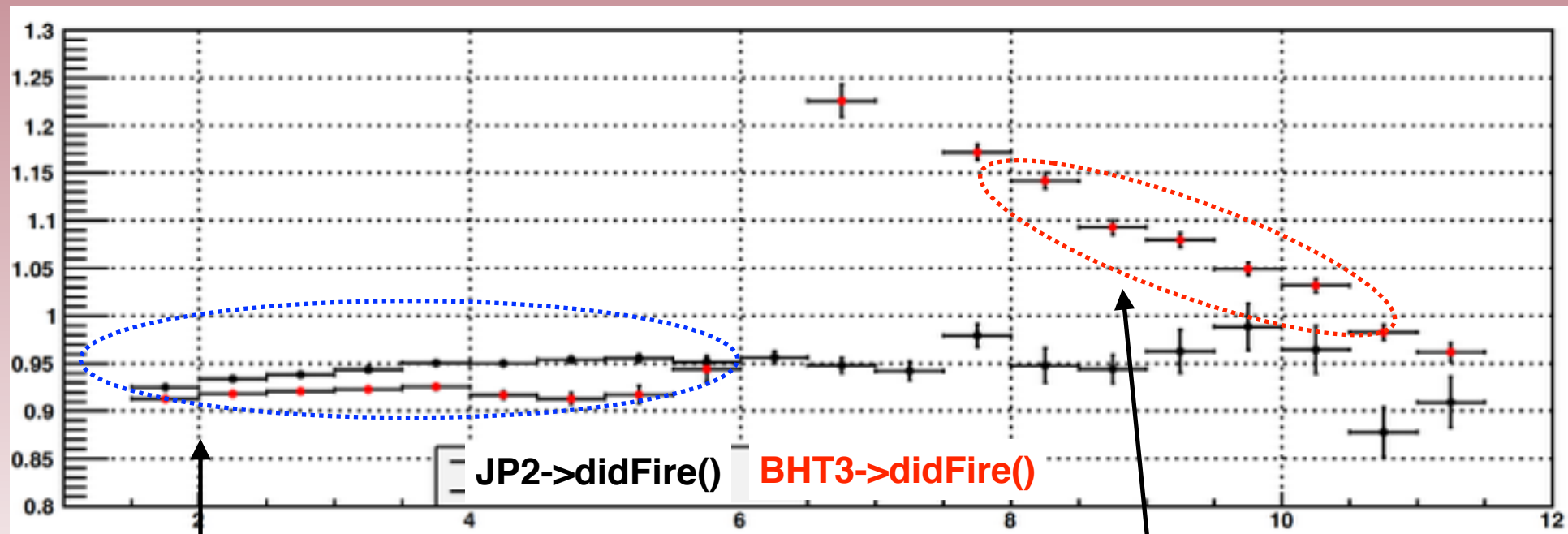
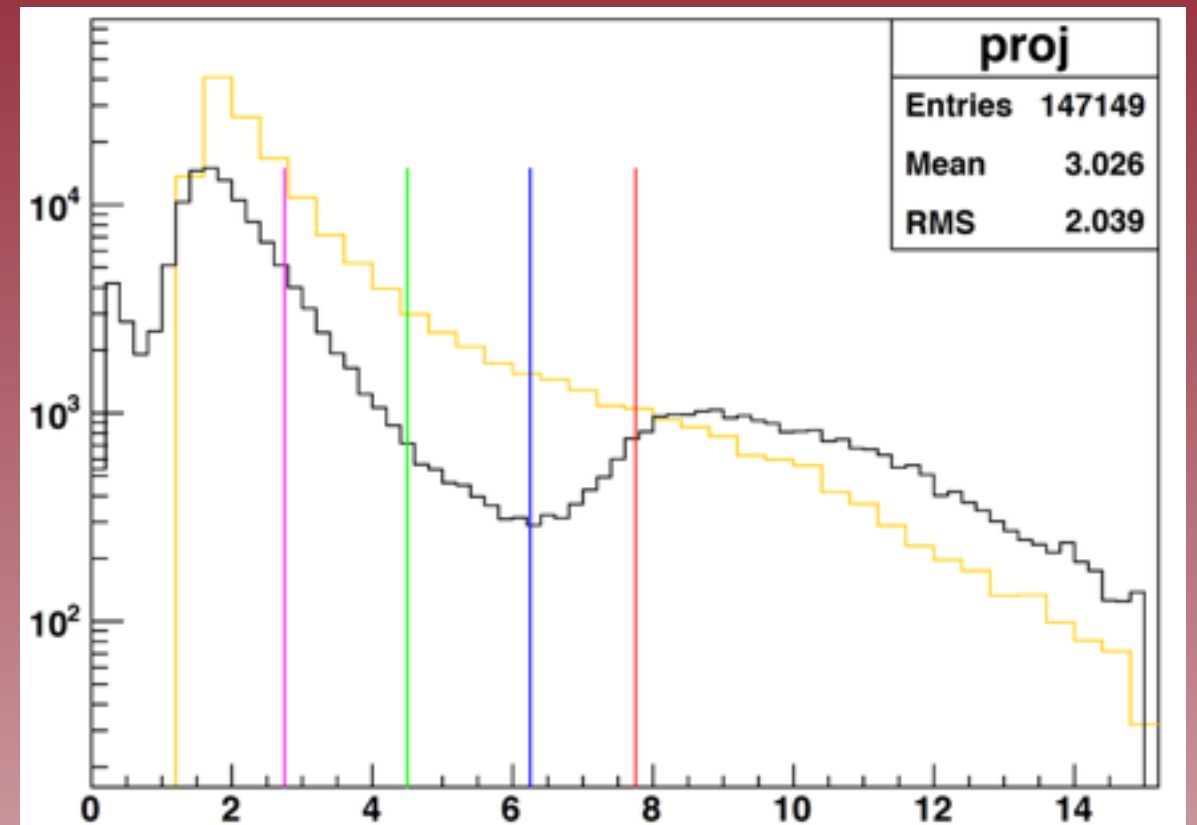
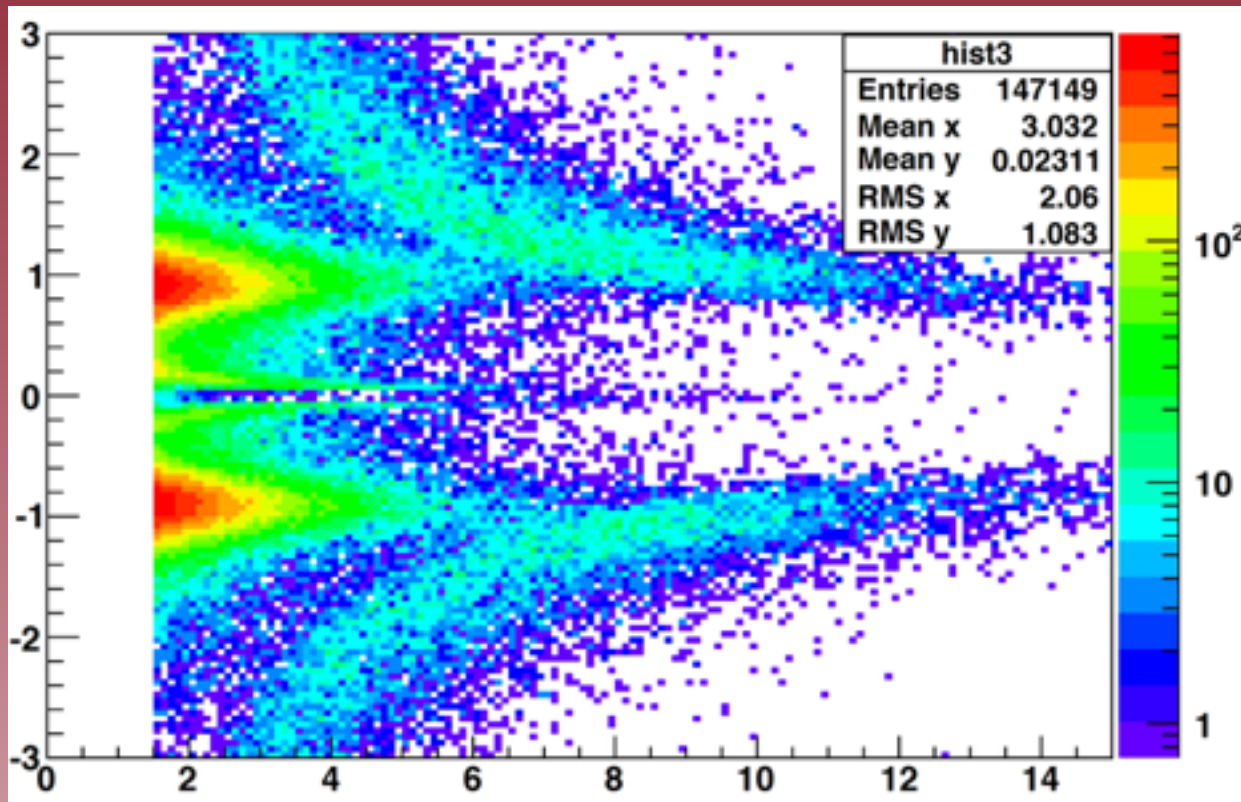
Unresolved  $E/p$  drop

- Considerably good statistics.
- Systematically low  $E/p$  below the threshold.
- Above the threshold highly  $P$  dependance.
- Do not use!



# HT Triggers - BHT3

- BHT3->didFire()



Below the threshold  
Systematically low  $E/p$   
than non HT

Above the threshold

Unresolved  $E/p$  drop

- Less statistics
- Systematically low  $E/p$  below the threshold
- Above the threshold  $E/p$  drop [ignorable statistics anyway]
- Do not use!

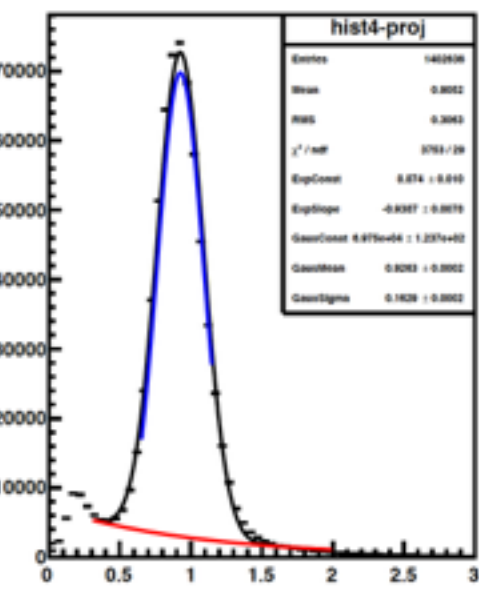
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# Unbiased Trigger Option

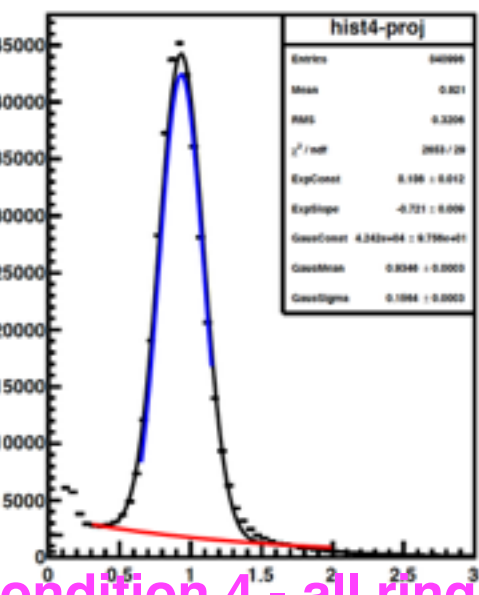
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- It is pretty clear that run 13 BHT trigger cannot be used for the calibration due to various reasons.
- Condition 4 gives the maximum statistics for non HT trigger option. [ Unbiased].
- If we all agree on using condition 4 then we can check the momentum dependence of condition 4 in different eta rings and specify momentum cuts in order to use stable E / p regions.

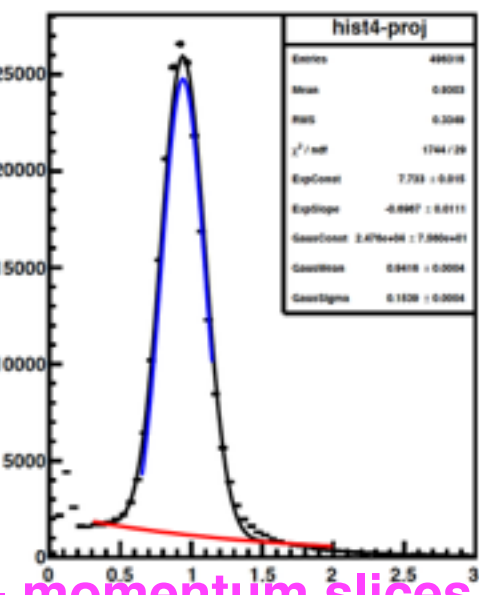
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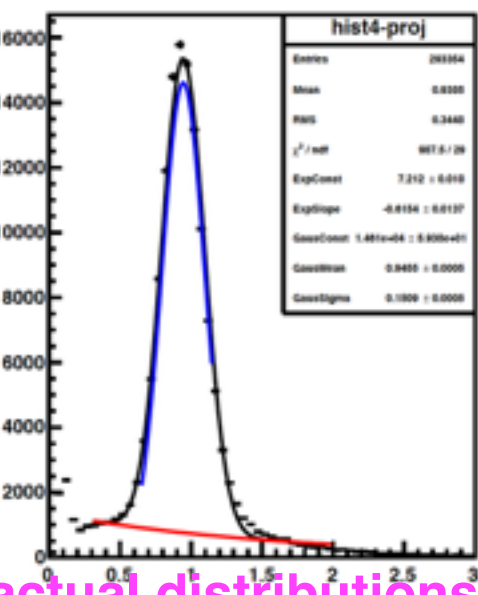
mom-slice-2.0<P<2.5



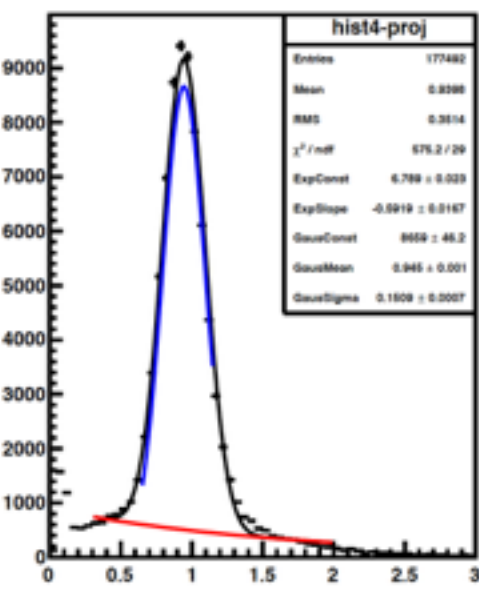
mom-slice-2.5<P<3.0



mom-slice-3.0<P<3.5

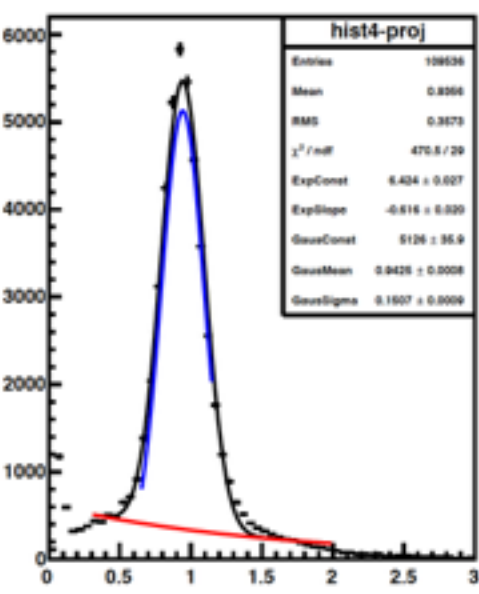


mom-slice-3.5<P<4.0

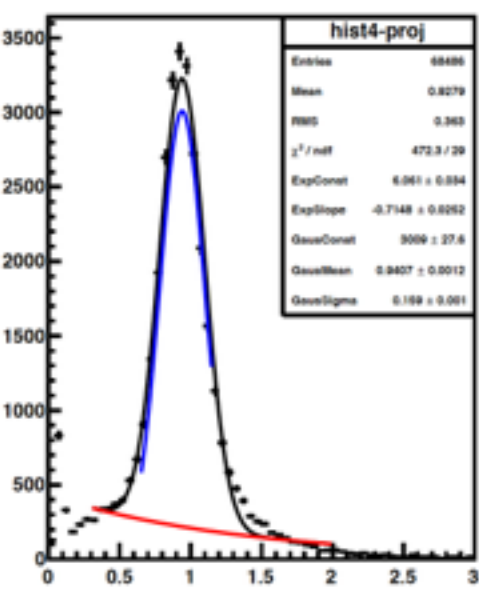


Condition 4 - all rings - momentum slices - actual distributions

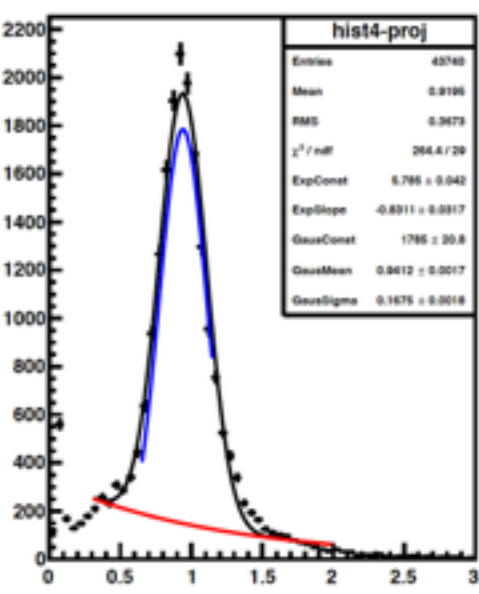
mom-slice-4.0<P<4.5



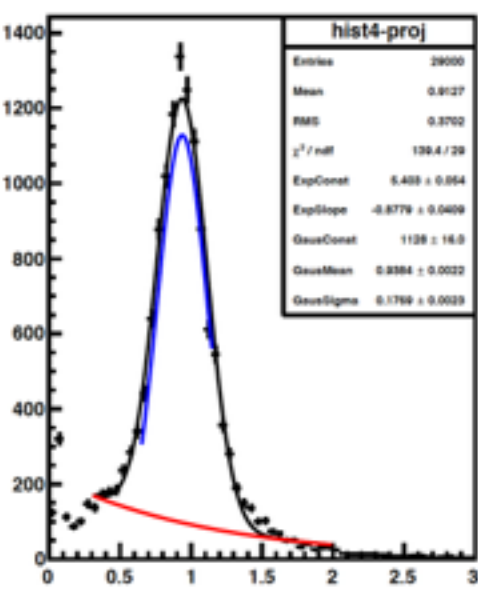
mom-slice-4.5<P<5.0



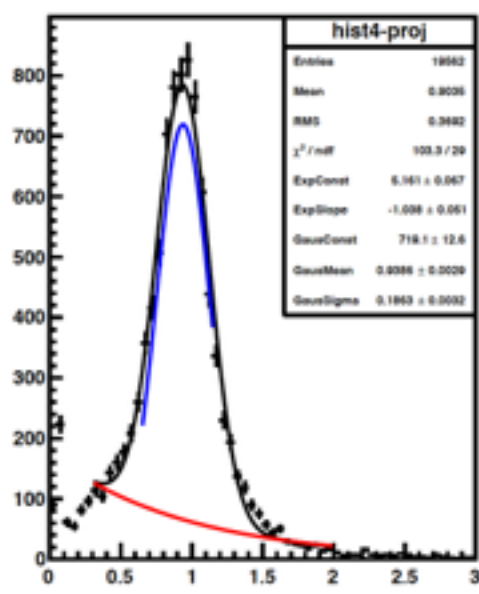
mom-slice-5.0<P<5.5



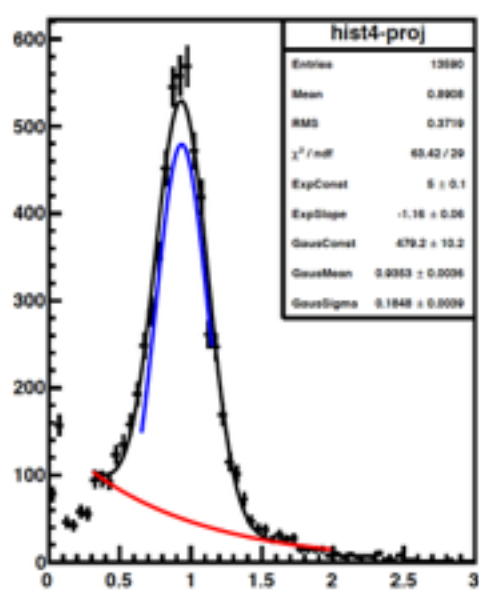
mom-slice-5.5<P<6.0



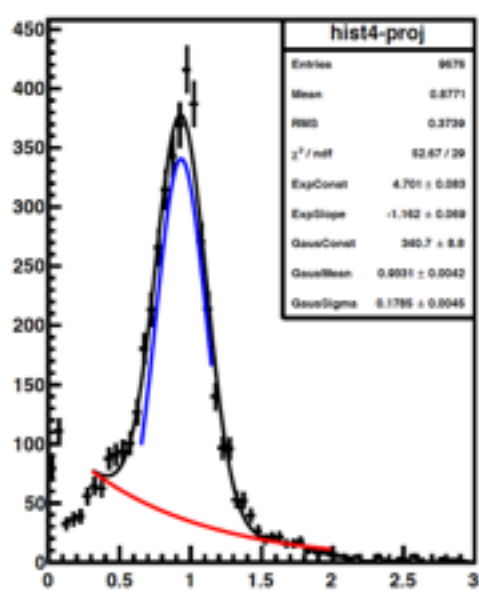
mom-slice-6.0<P<6.5



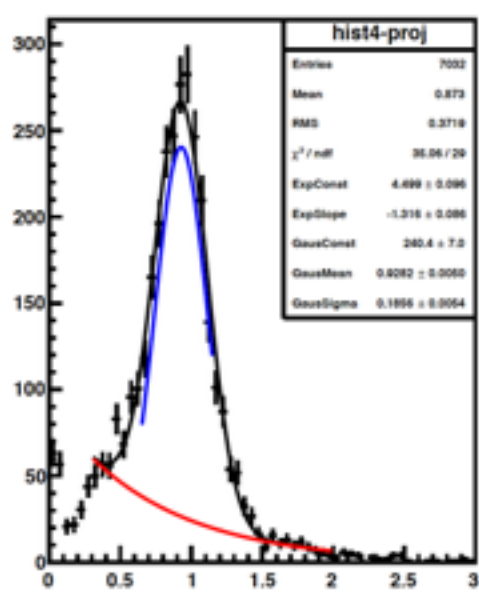
mom-slice-6.5<P<7.0



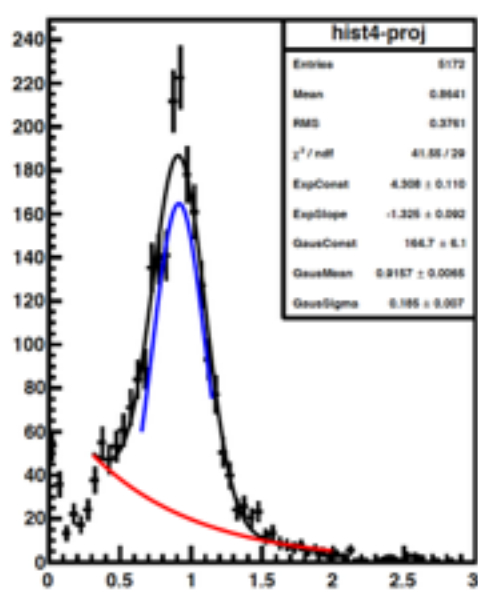
mom-slice-7.0<P<7.5



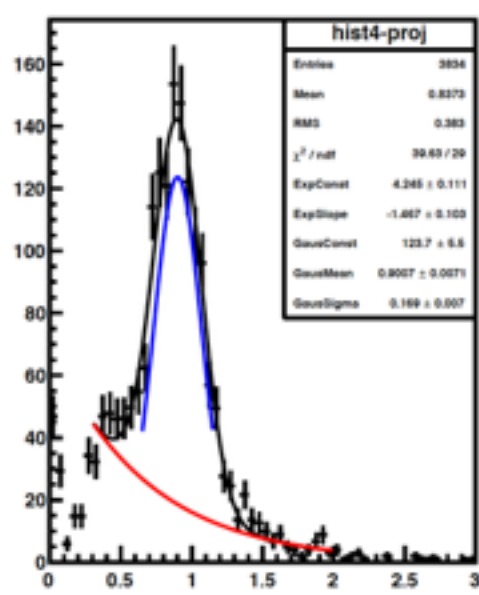
mom-slice-7.5<P<8.0



mom-slice-8.0<P<8.5

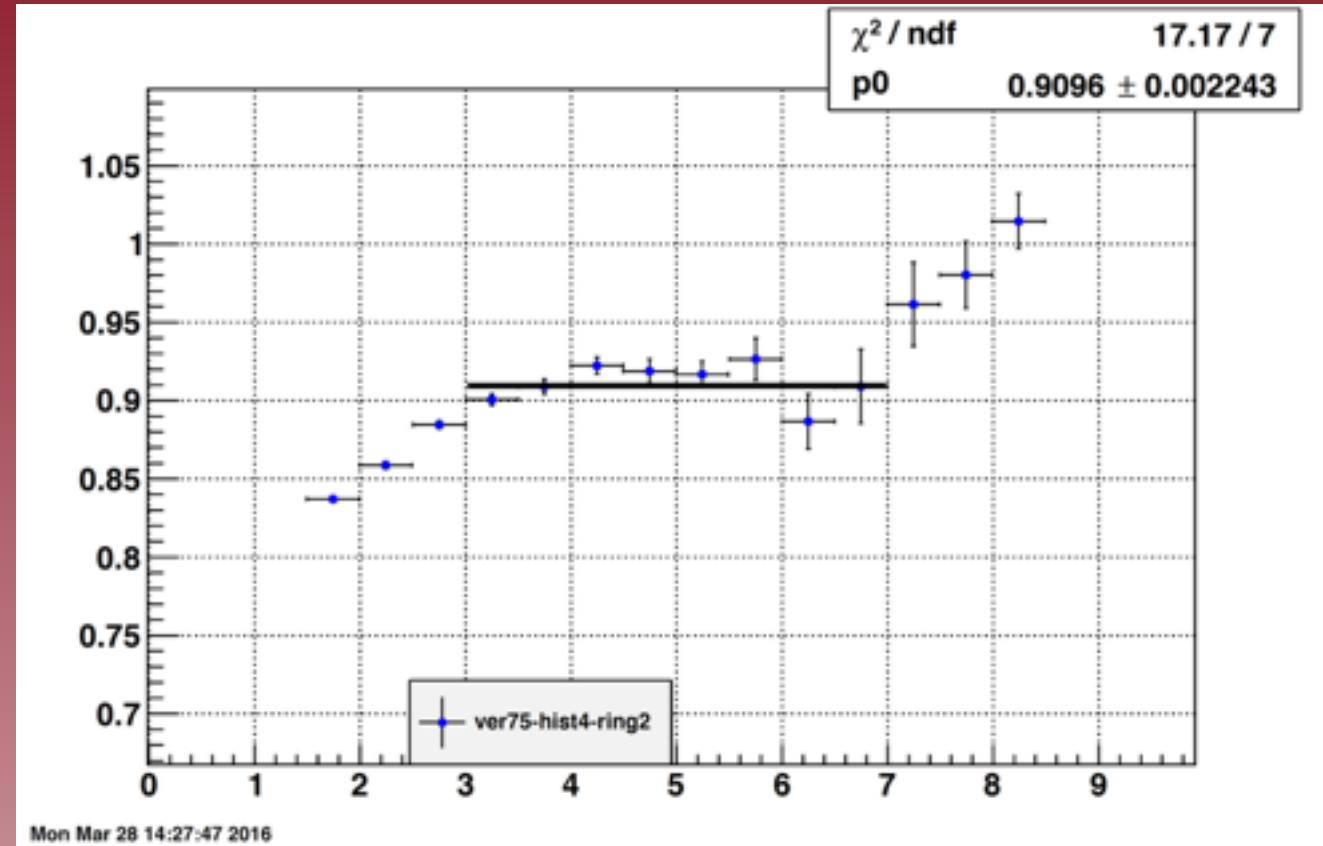
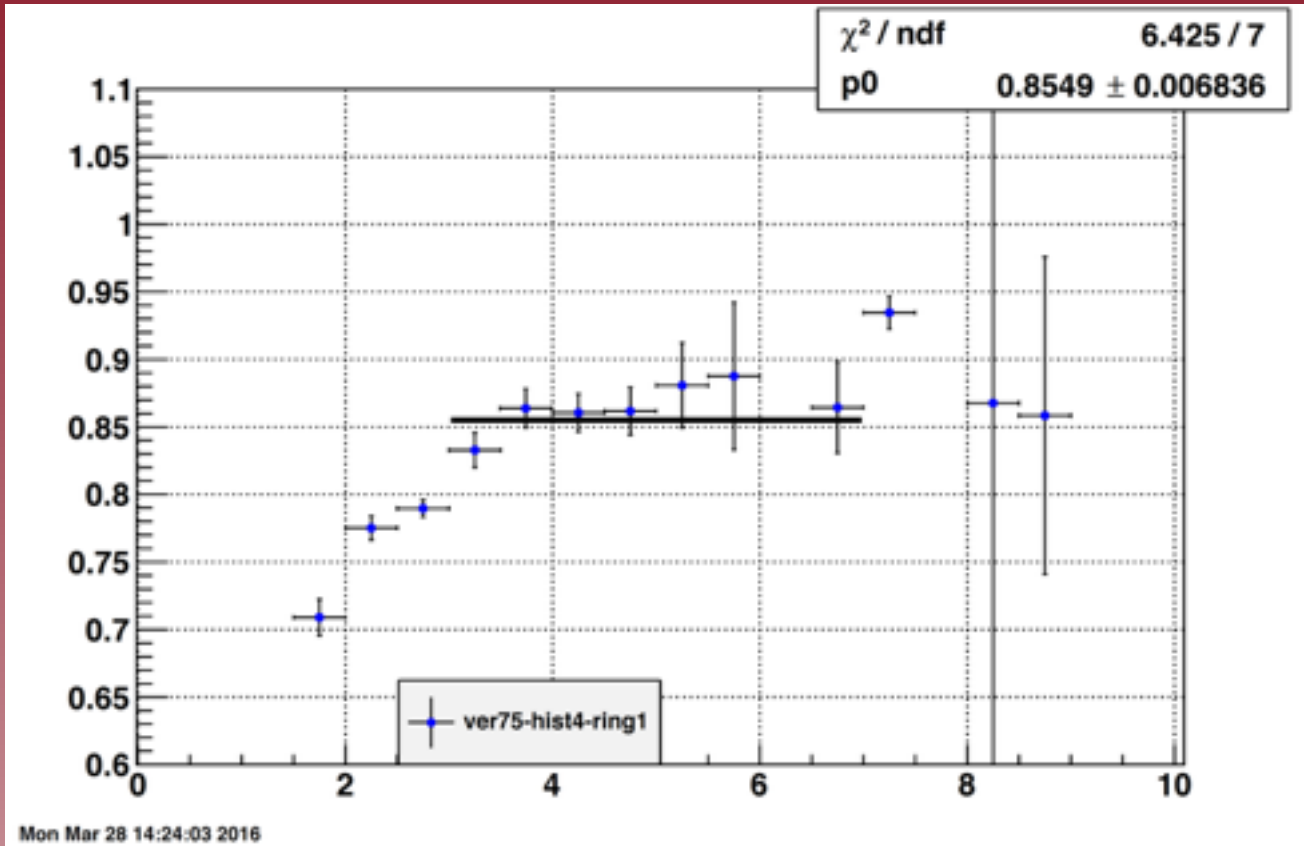


mom-slice-8.5<P<9.0

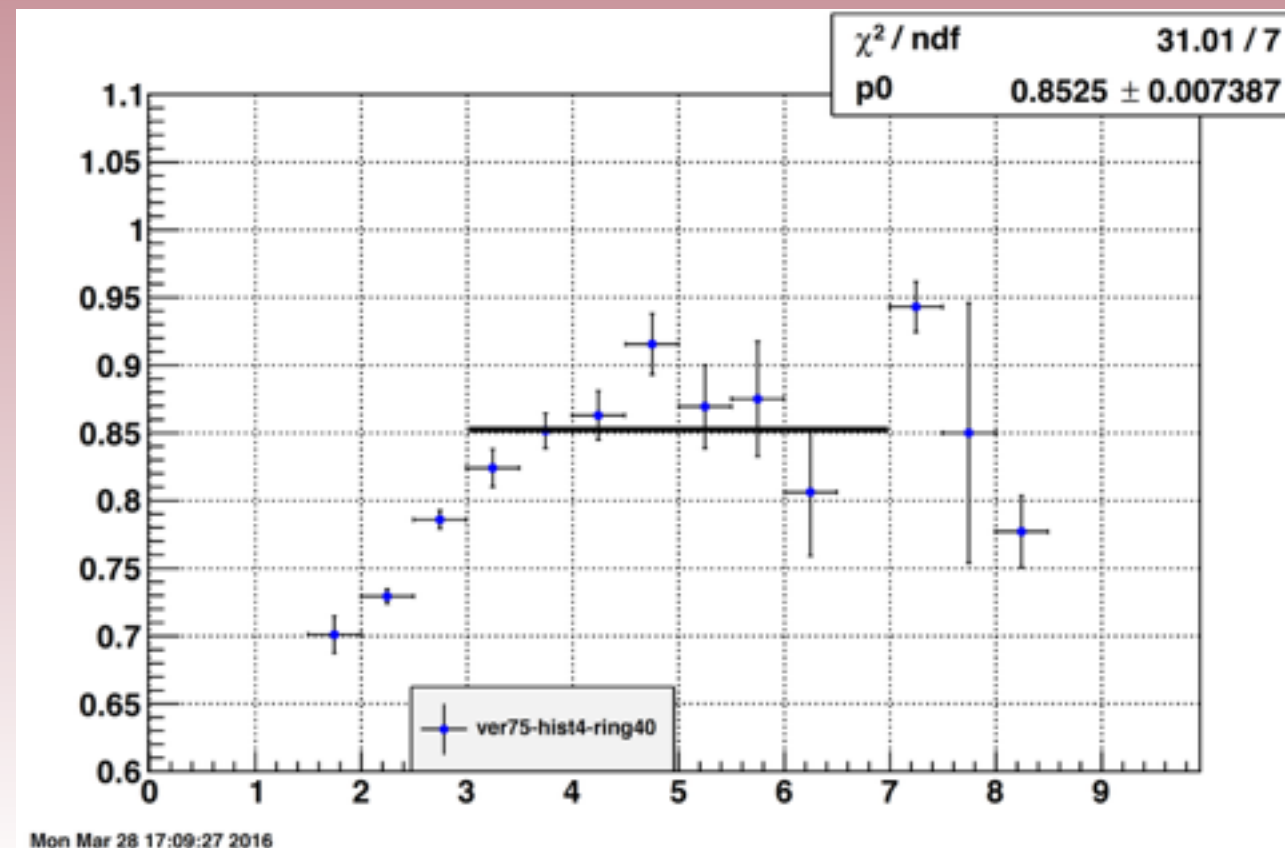
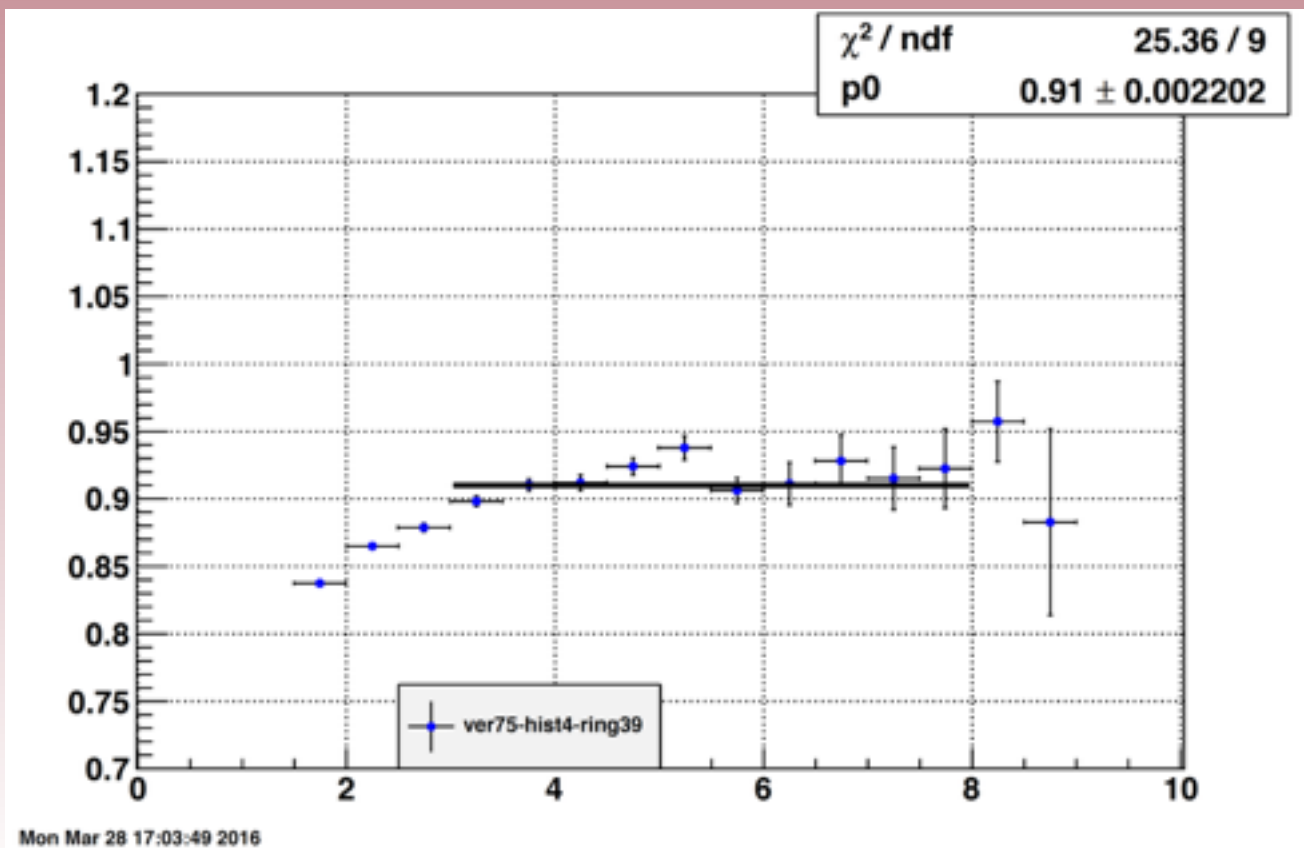




# Outermost 2 -Rings



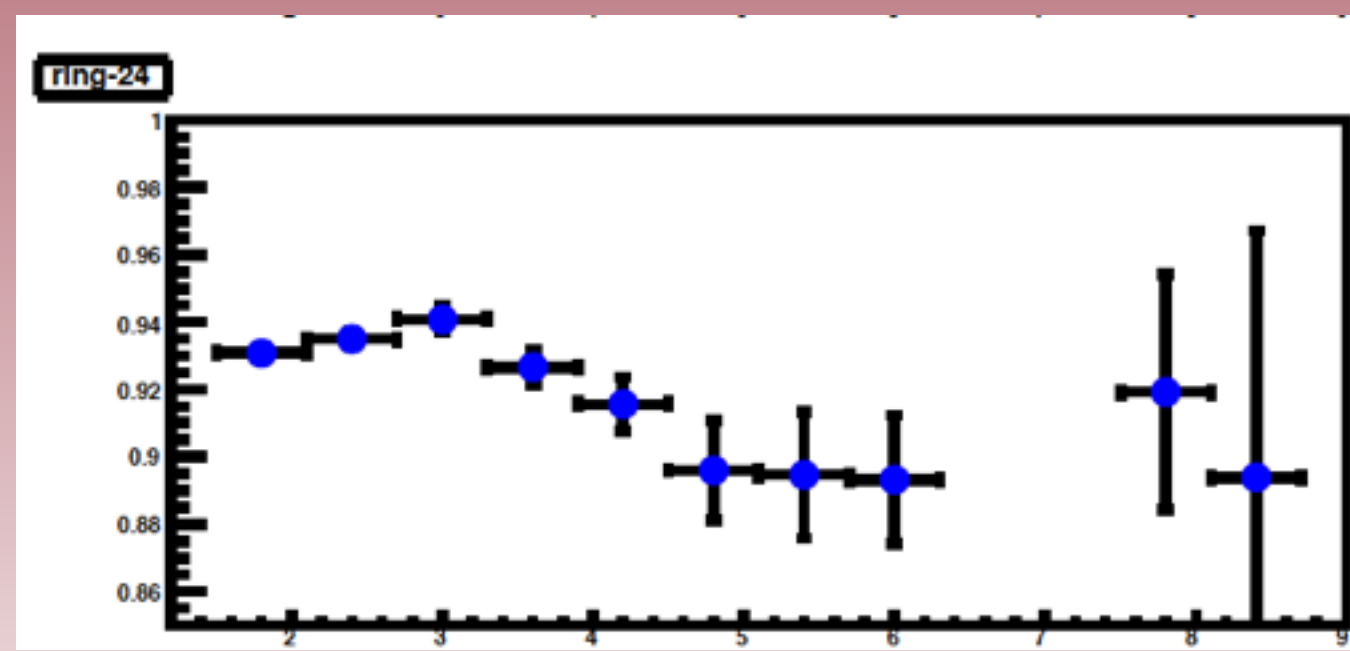
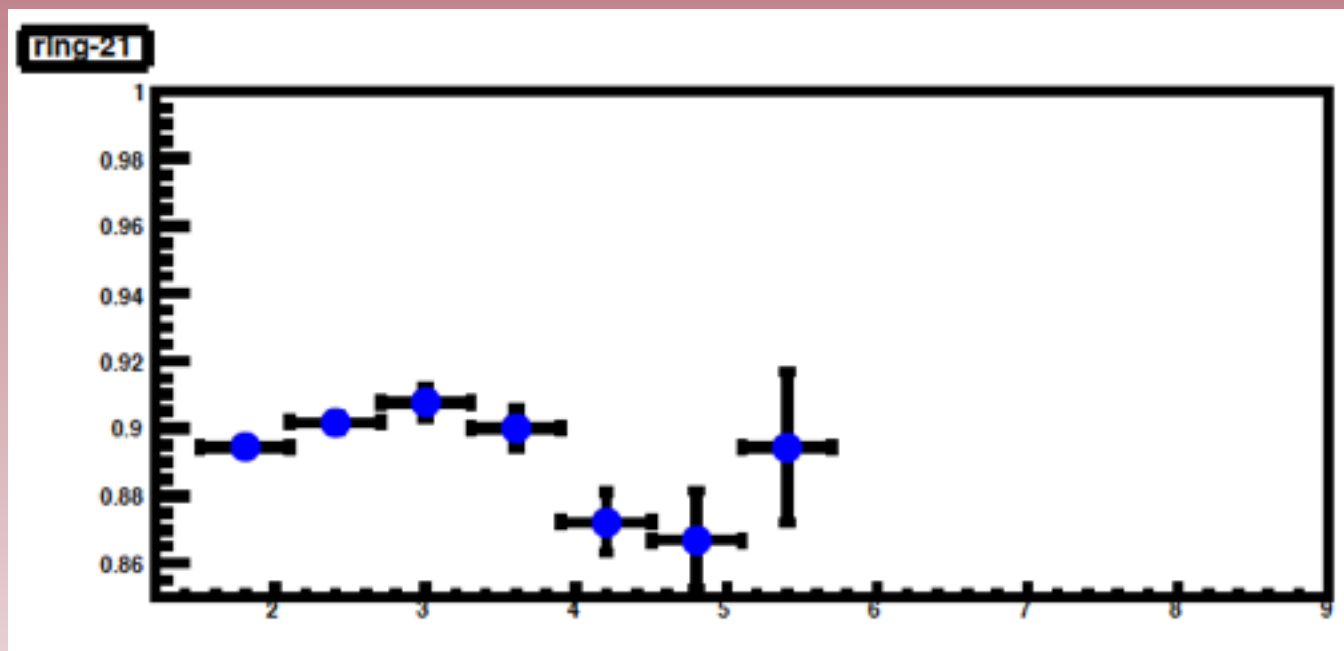
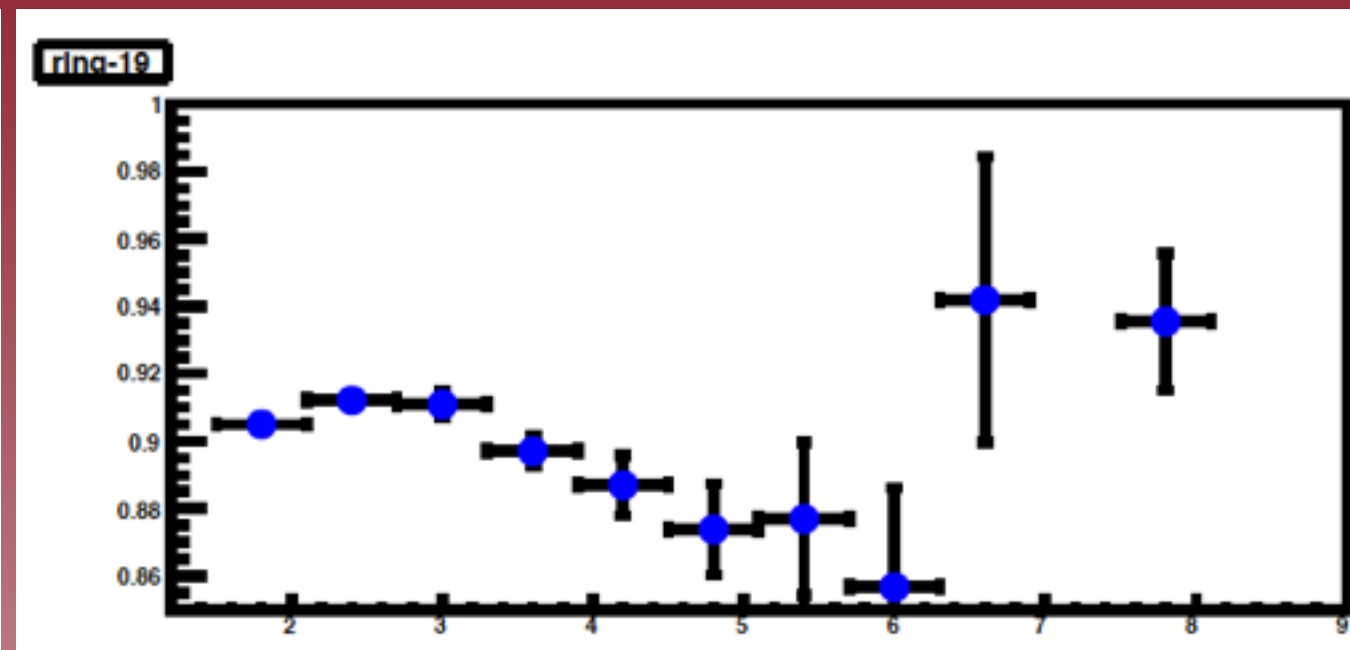
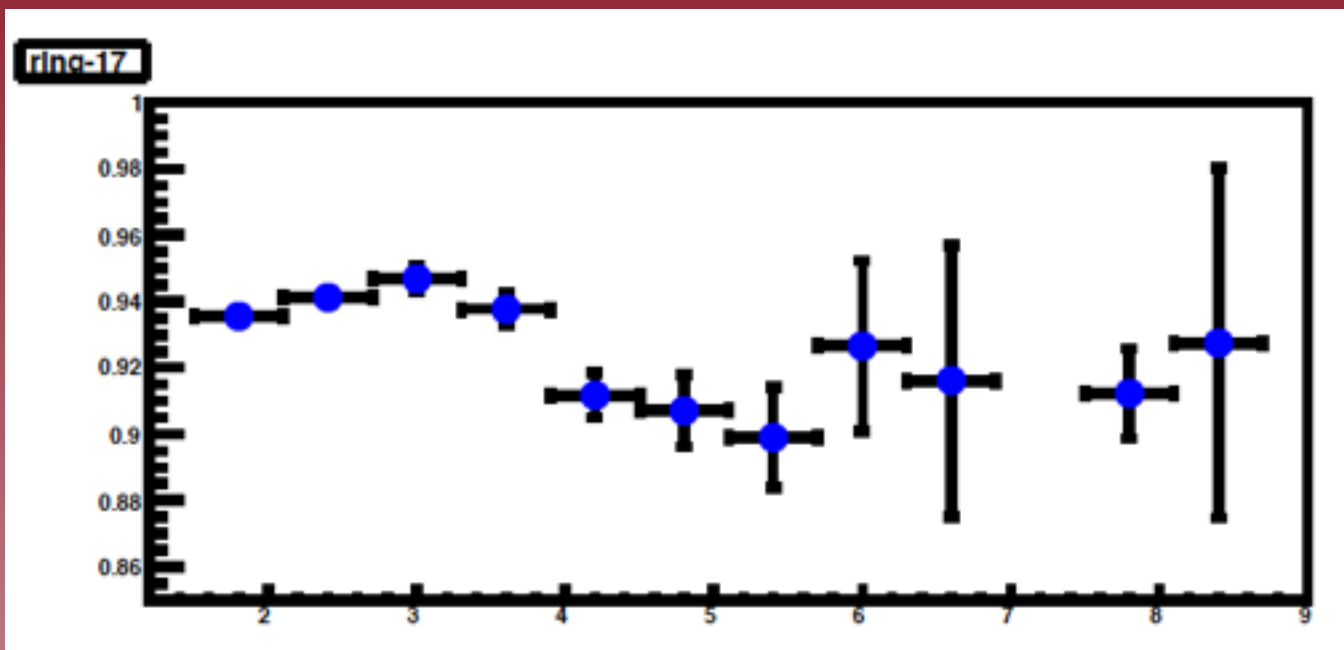
Low P cut == 3.0 GeV ?





# Inner most Rings

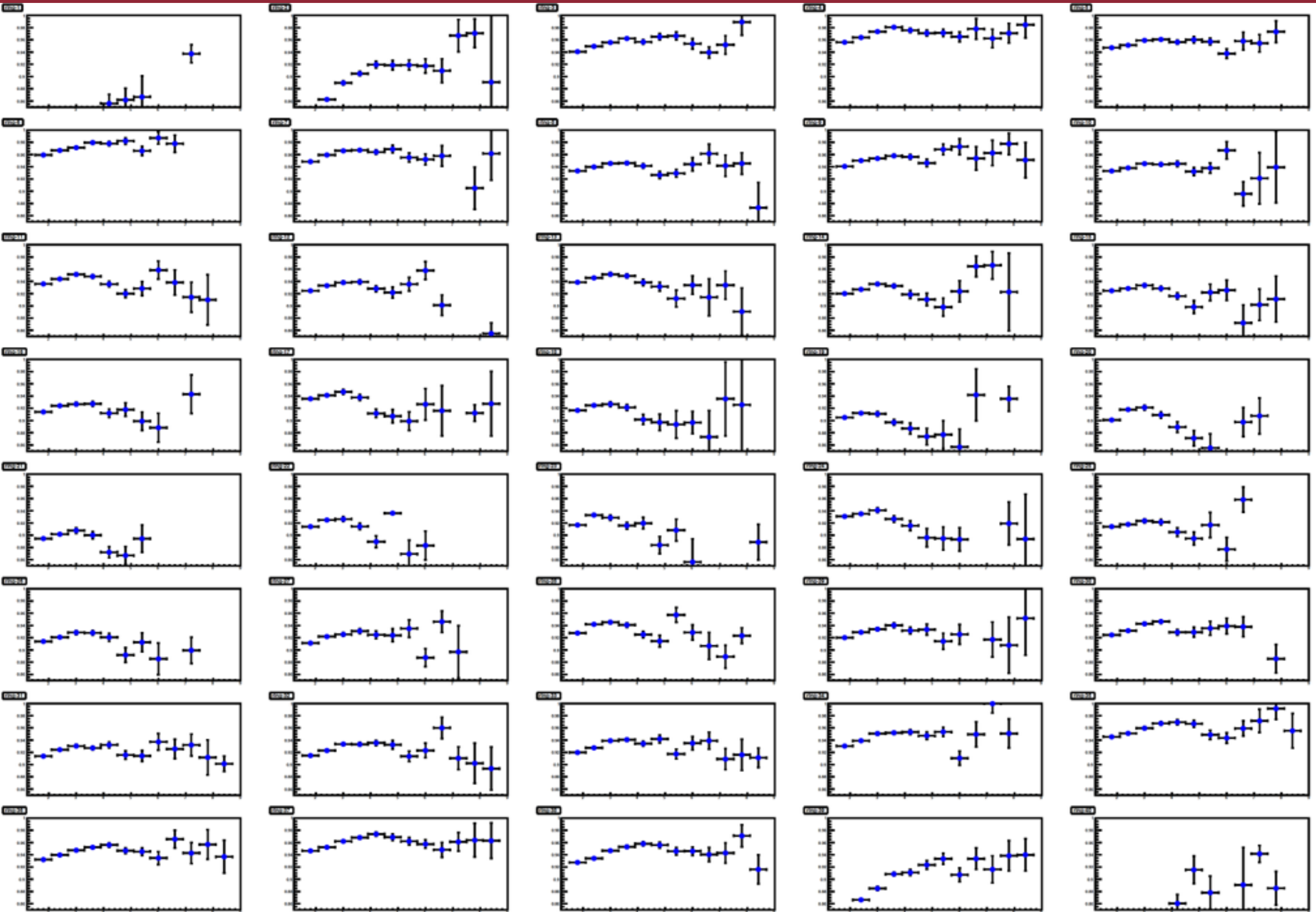
Y-axis => E/p , X axis - P



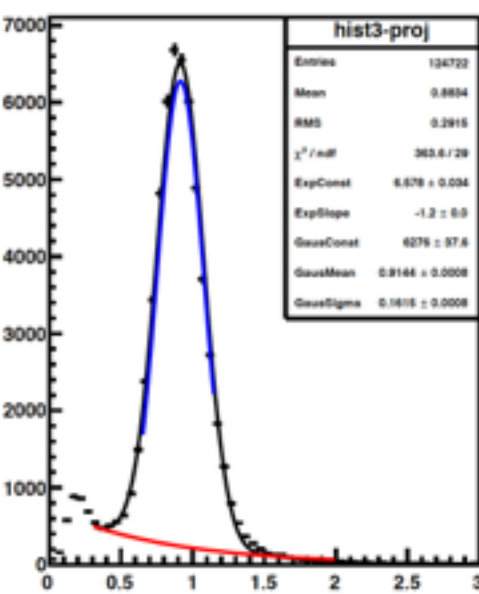
Upper P cut == 4.0 GeV ?

# Condition 4 - ring by ring - momentum slices- fit

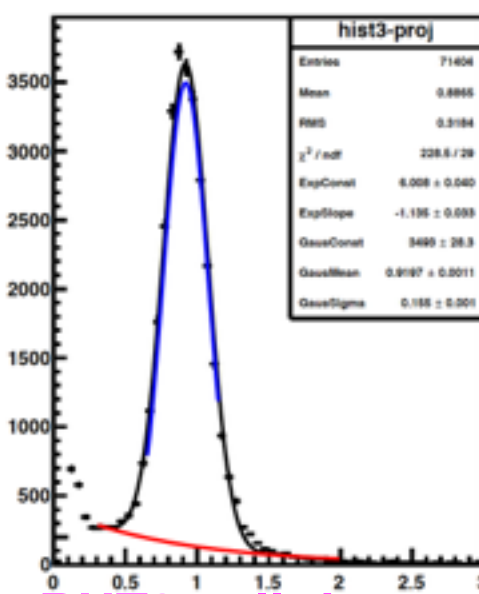
Y-axis =>  $E/p$  , X axis - P



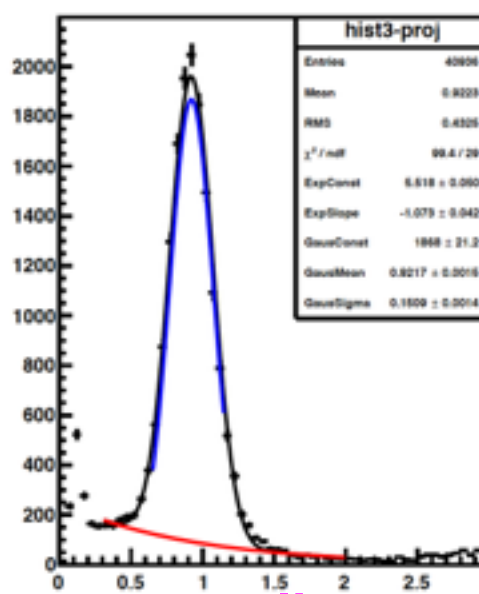
mom-slice-1.5&lt;P&lt;2.0



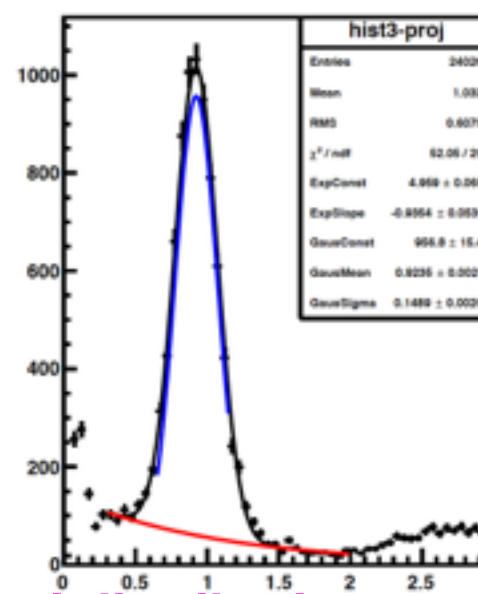
mom-slice-2.0&lt;P&lt;2.5



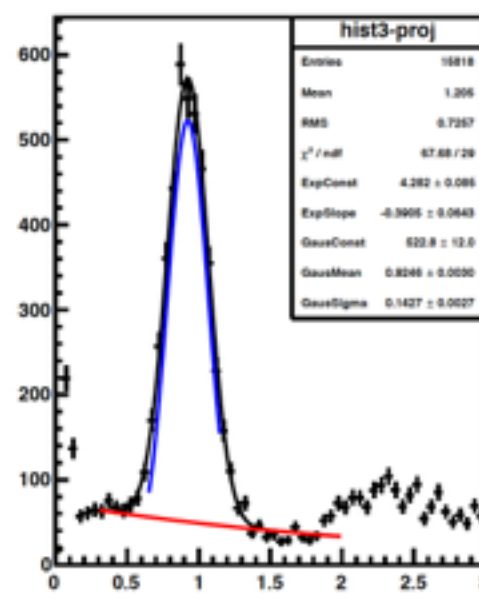
mom-slice-2.5&lt;P&lt;3.0



mom-slice-3.0&lt;P&lt;3.5

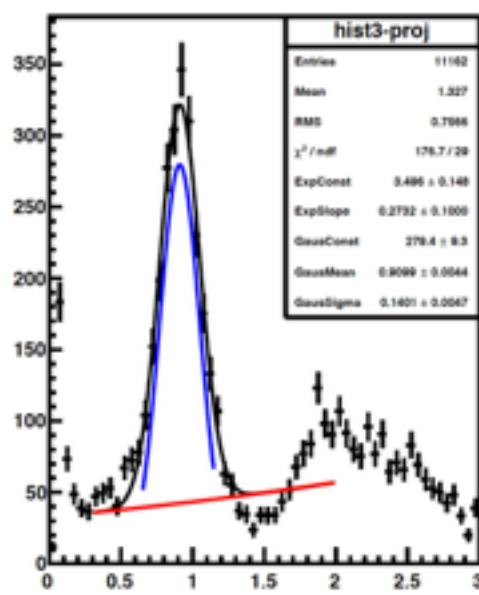


mom-slice-3.5&lt;P&lt;4.0

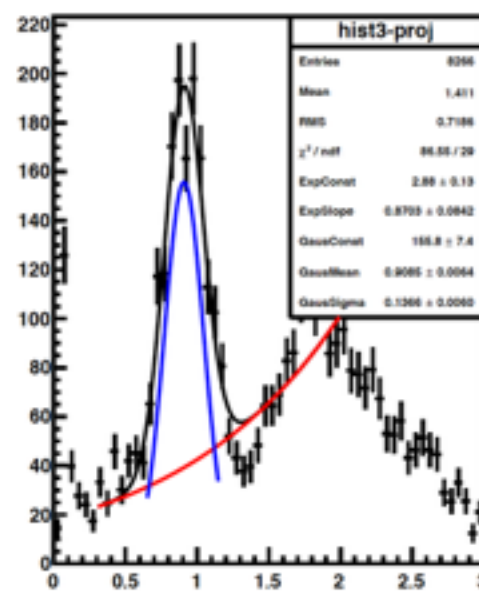


BHT3 - all rings - momentum slices - actual distributions

mom-slice-4.0&lt;P&lt;4.5



mom-slice-4.5&lt;P&lt;5.0



mom-slice-5.0&lt;P&lt;5.5



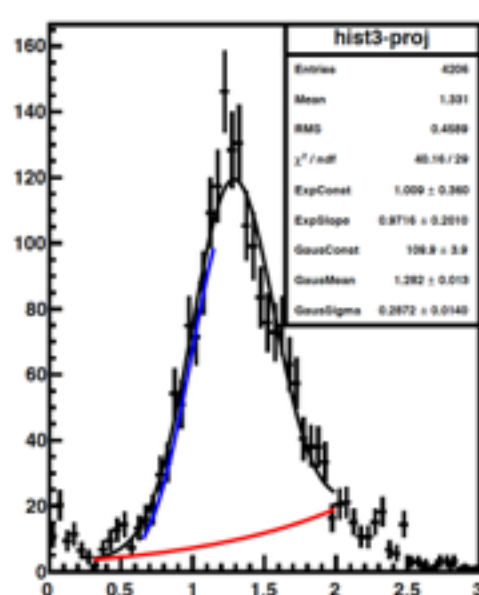
mom-slice-5.5&lt;P&lt;6.0



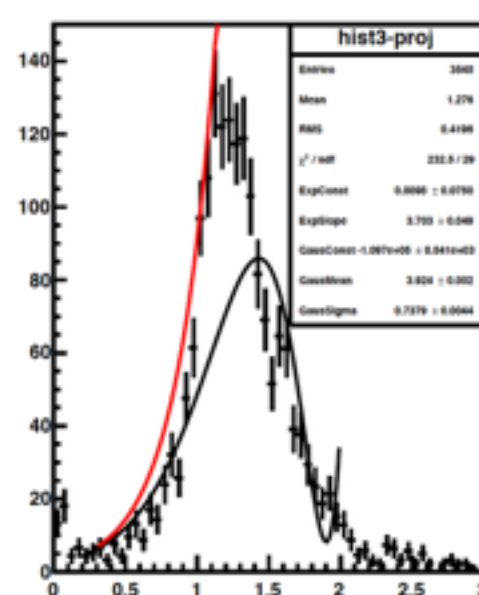
mom-slice-6.0&lt;P&lt;6.5



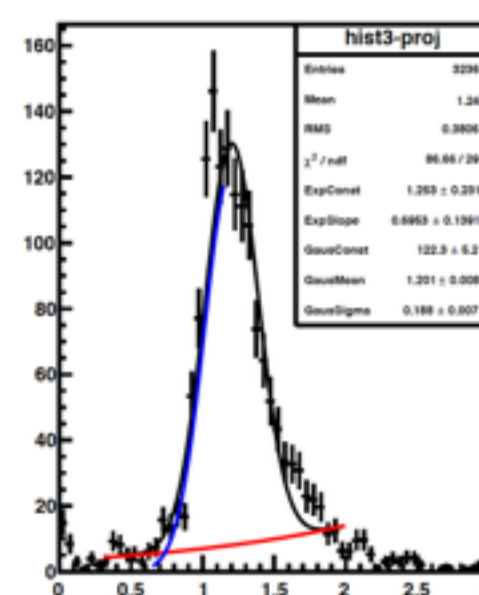
mom-slice-6.5&lt;P&lt;7.0



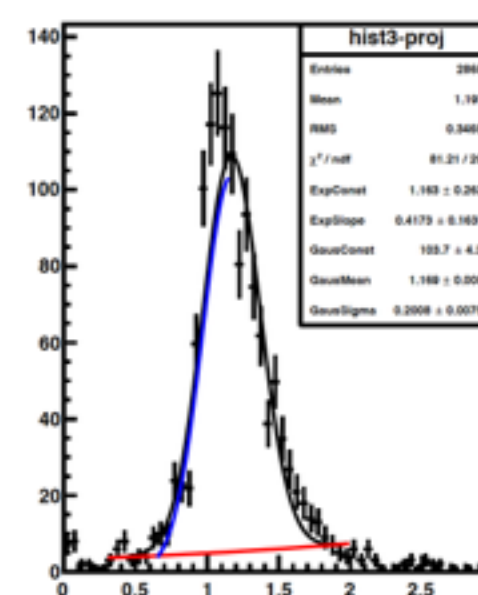
mom-slice-7.0&lt;P&lt;7.5



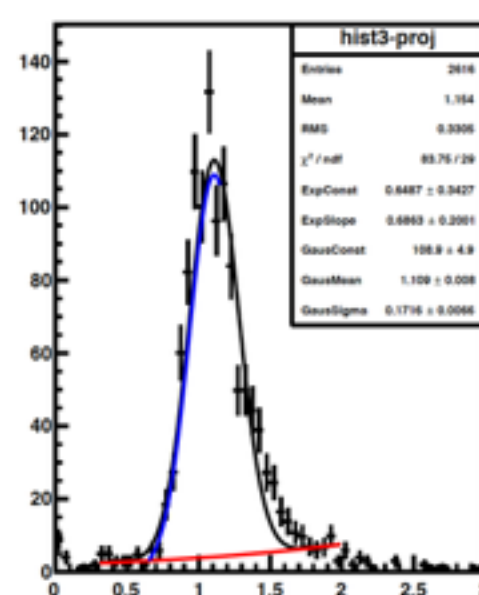
mom-slice-7.5&lt;P&lt;8.0



mom-slice-8.0&lt;P&lt;8.5

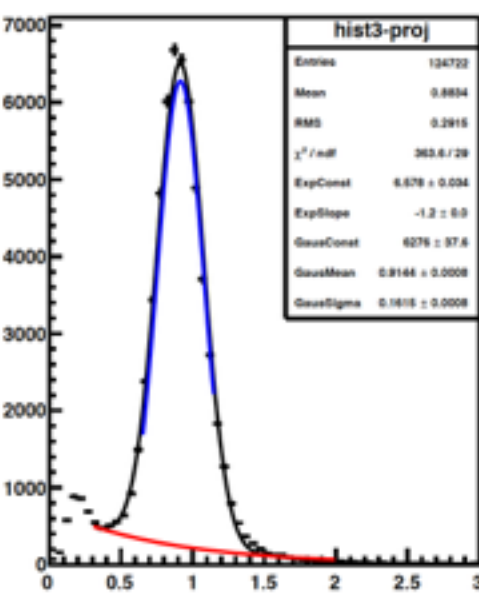


mom-slice-8.5&lt;P&lt;9.0

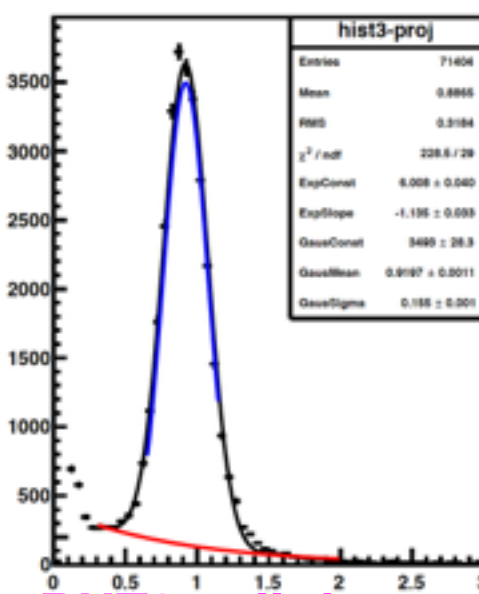




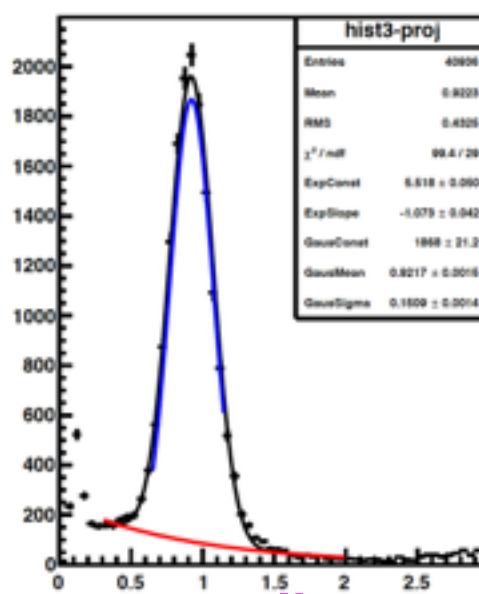
mom-slice-1.5&lt;P&lt;2.0



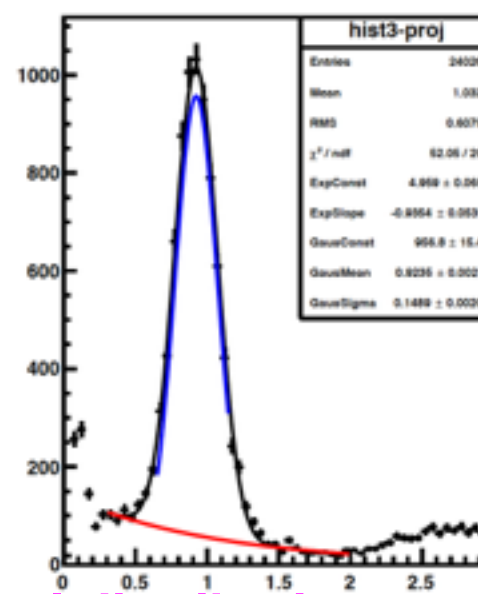
mom-slice-2.0&lt;P&lt;2.5



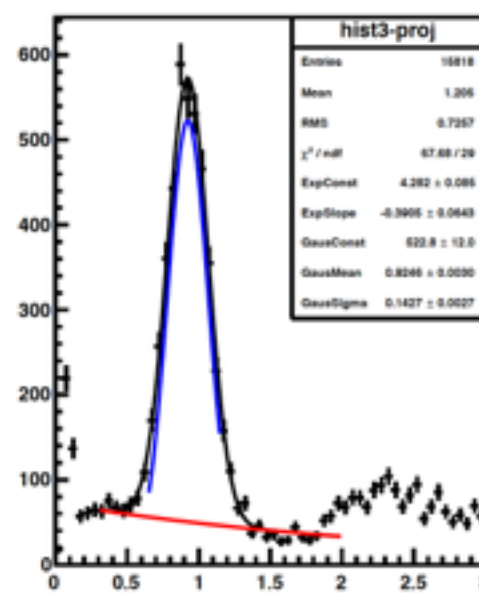
mom-slice-2.5&lt;P&lt;3.0



mom-slice-3.0&lt;P&lt;3.5

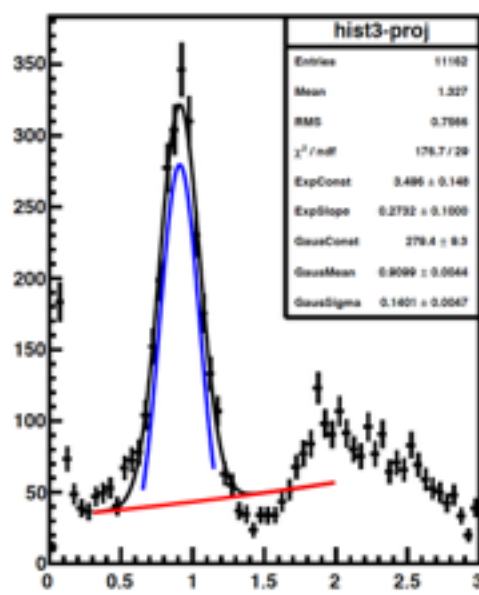


mom-slice-3.5&lt;P&lt;4.0

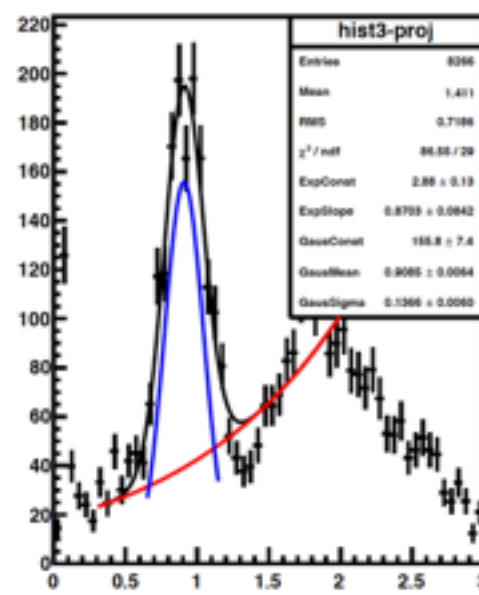


BHT3 - all rings - momentum slices - actual distributions

mom-slice-4.0&lt;P&lt;4.5



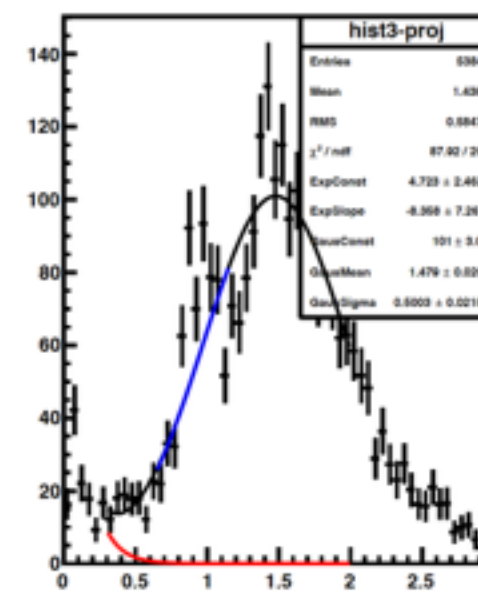
mom-slice-4.5&lt;P&lt;5.0



mom-slice-5.0&lt;P&lt;5.5



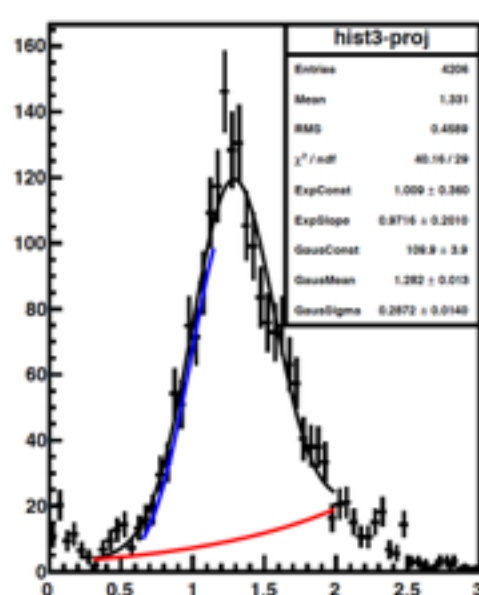
mom-slice-5.5&lt;P&lt;6.0



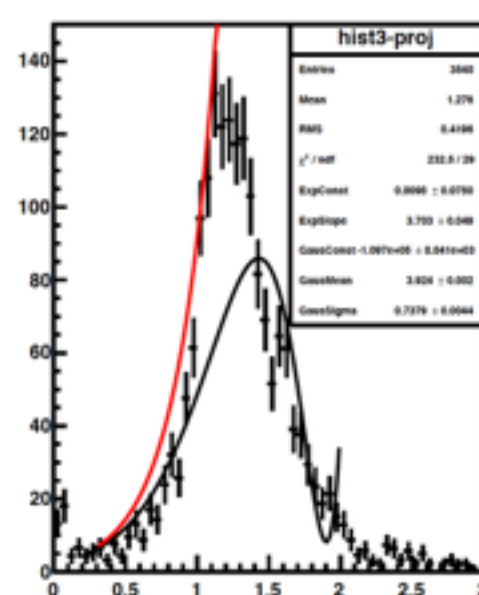
mom-slice-6.0&lt;P&lt;6.5



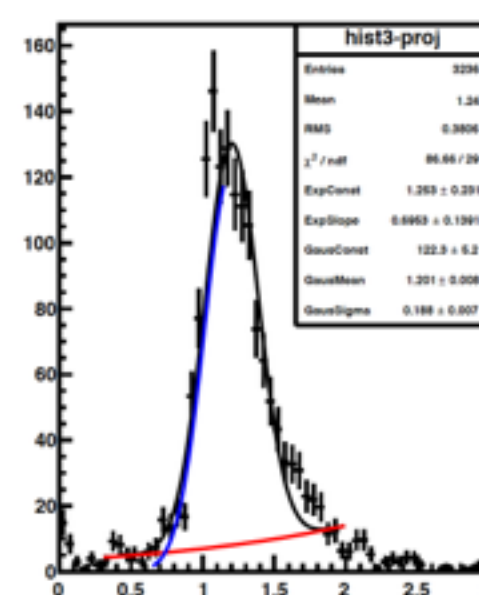
mom-slice-6.5&lt;P&lt;7.0



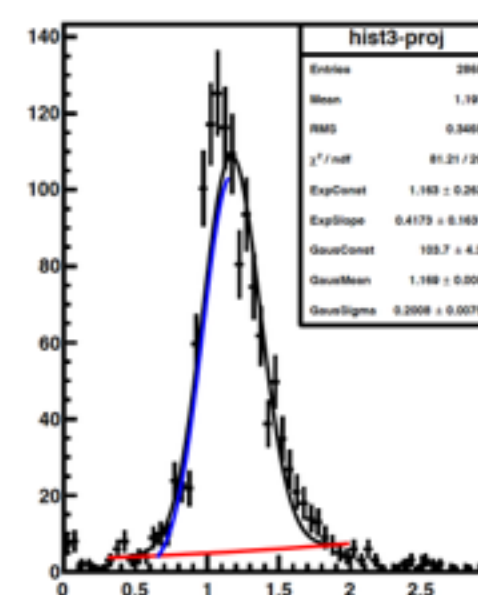
mom-slice-7.0&lt;P&lt;7.5



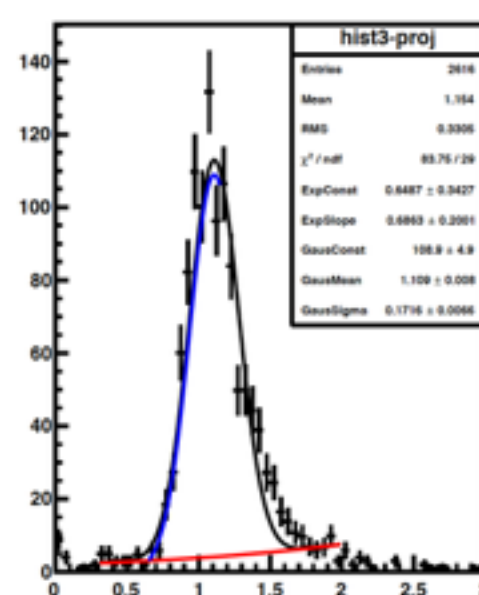
mom-slice-7.5&lt;P&lt;8.0



mom-slice-8.0&lt;P&lt;8.5



mom-slice-8.5&lt;P&lt;9.0



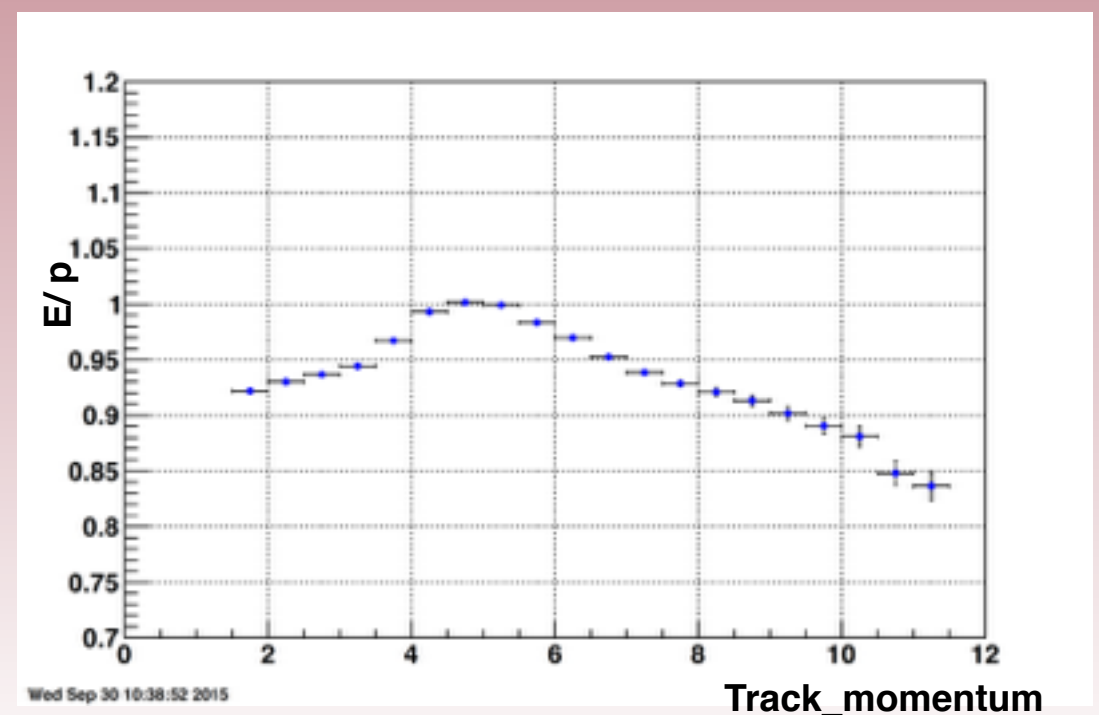
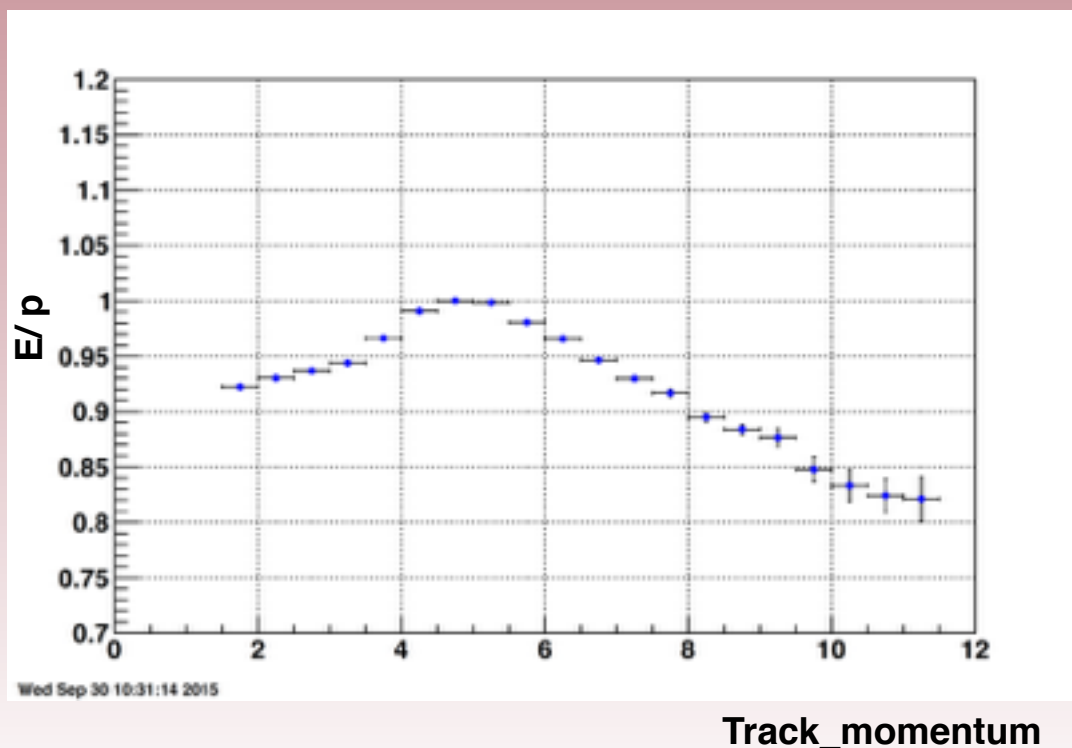
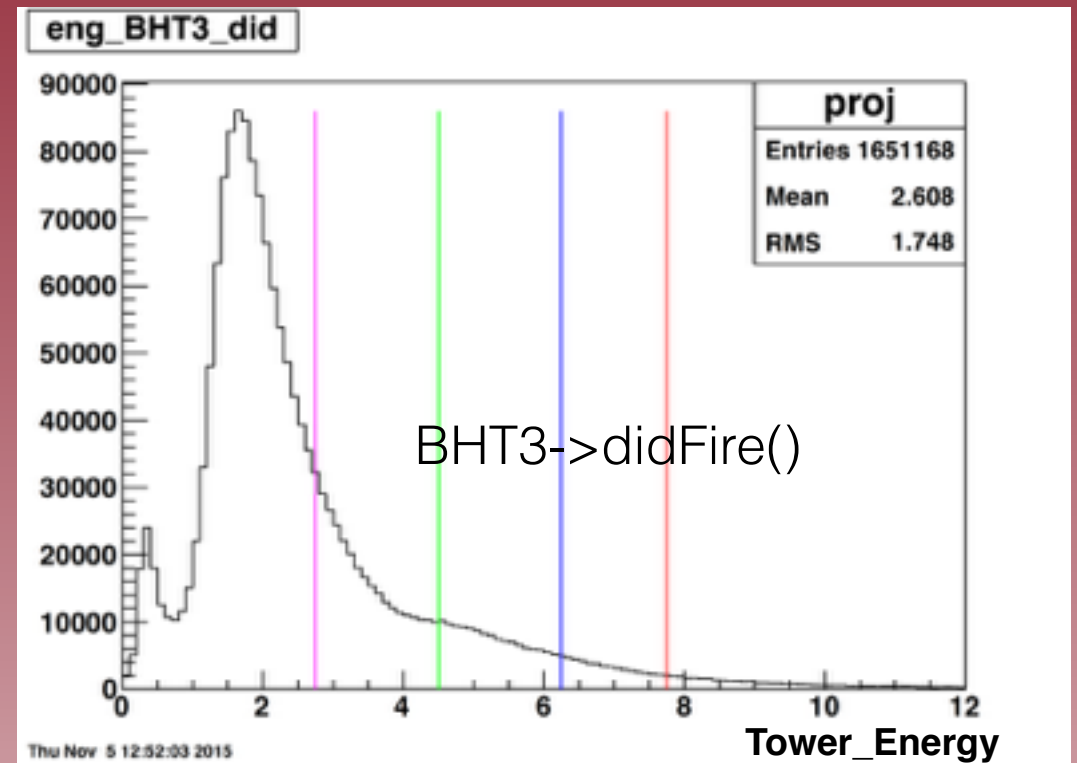
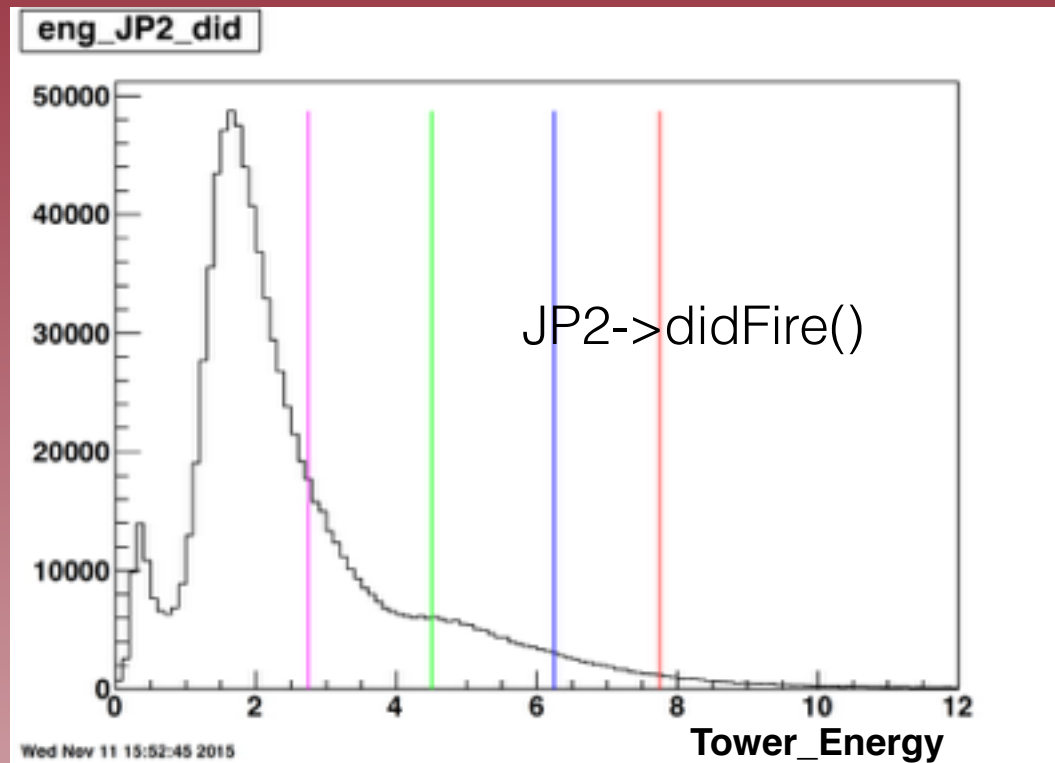


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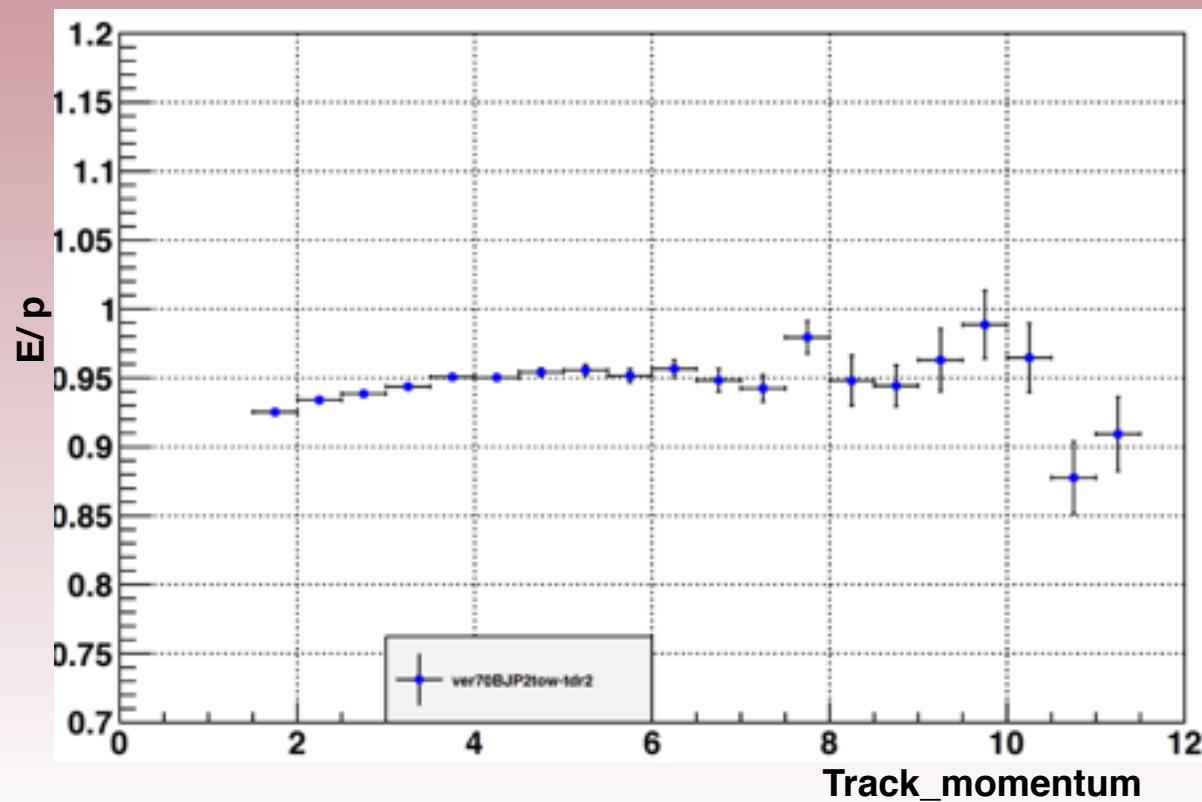
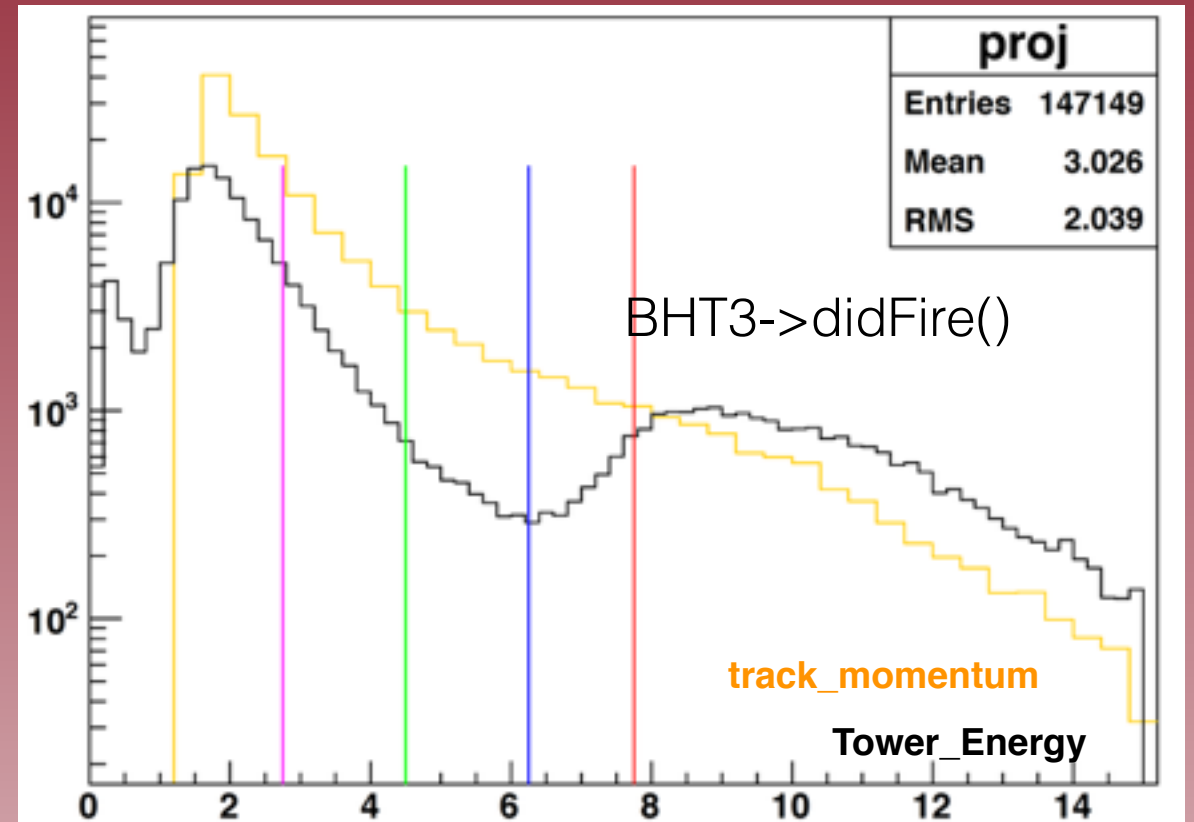
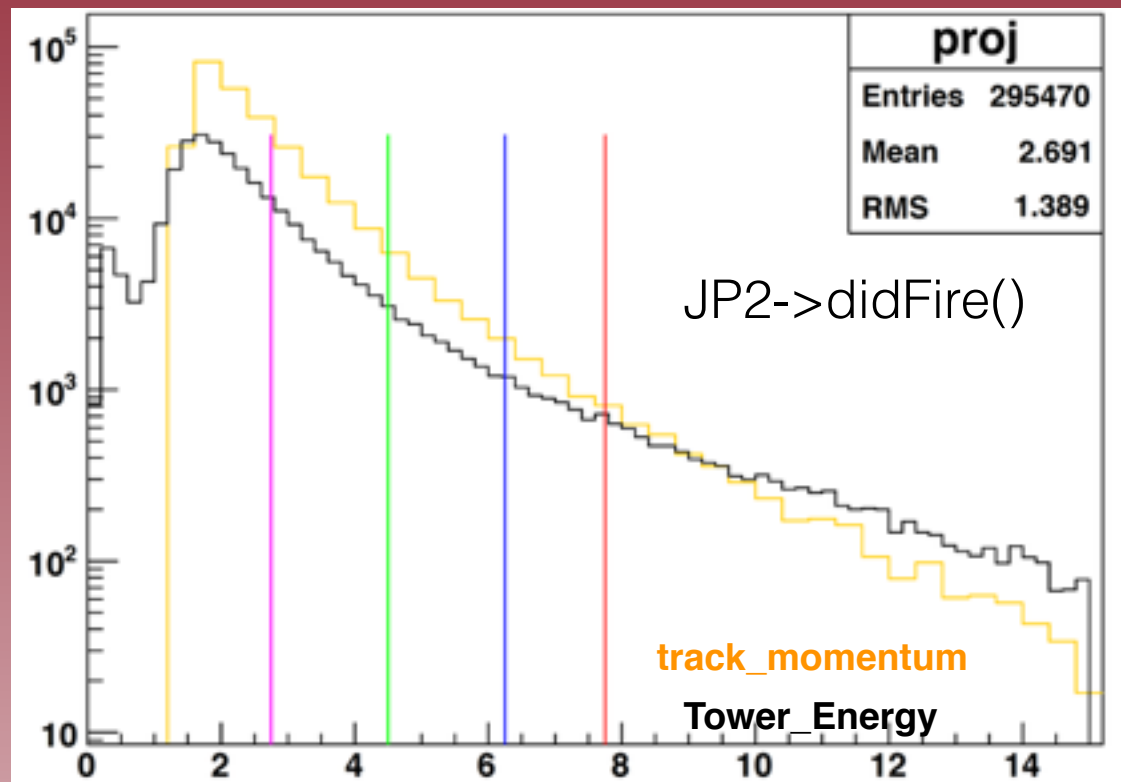
# Back up

---

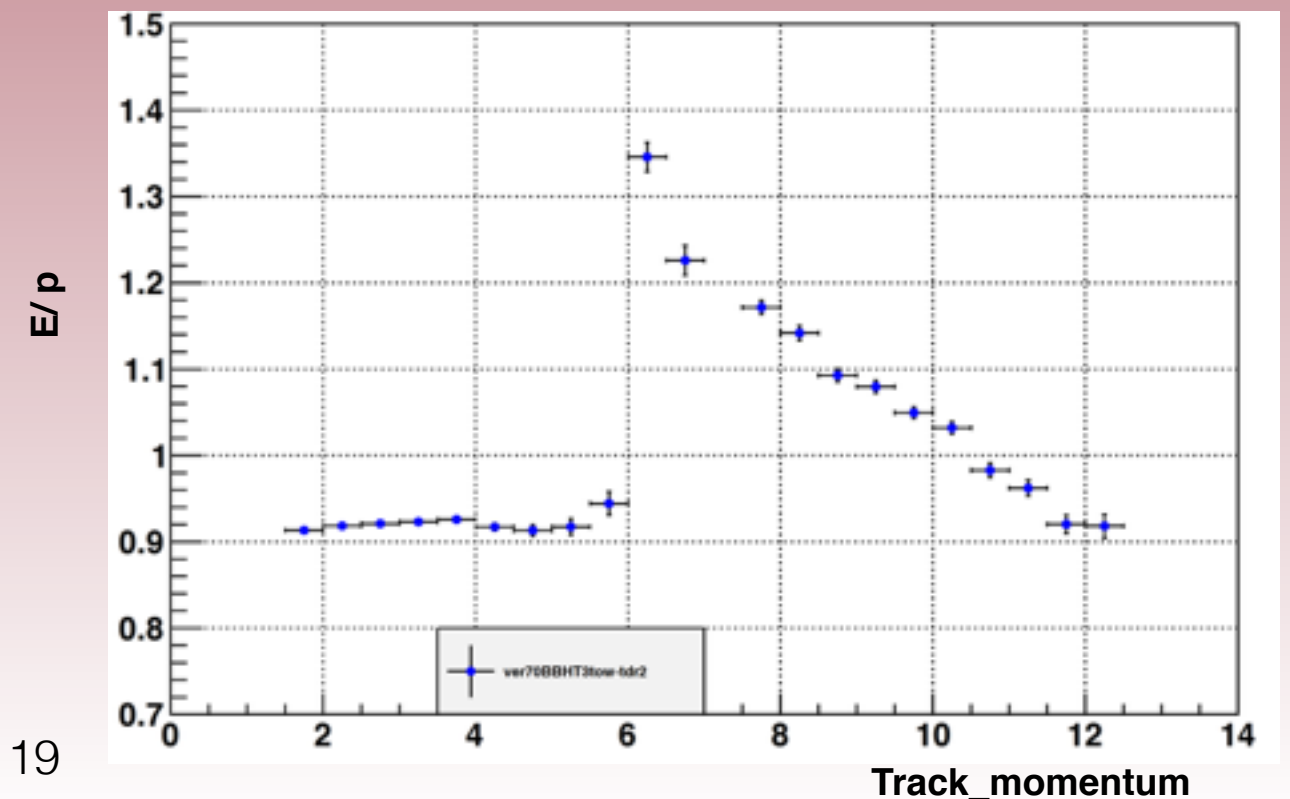
# wrong [bug]



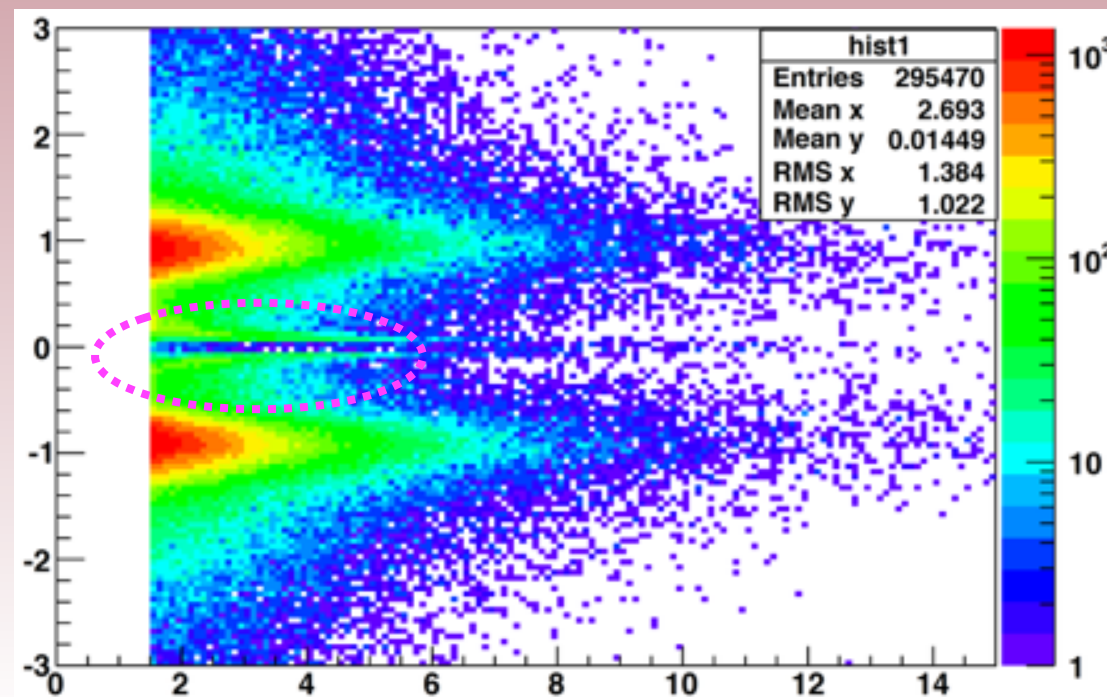
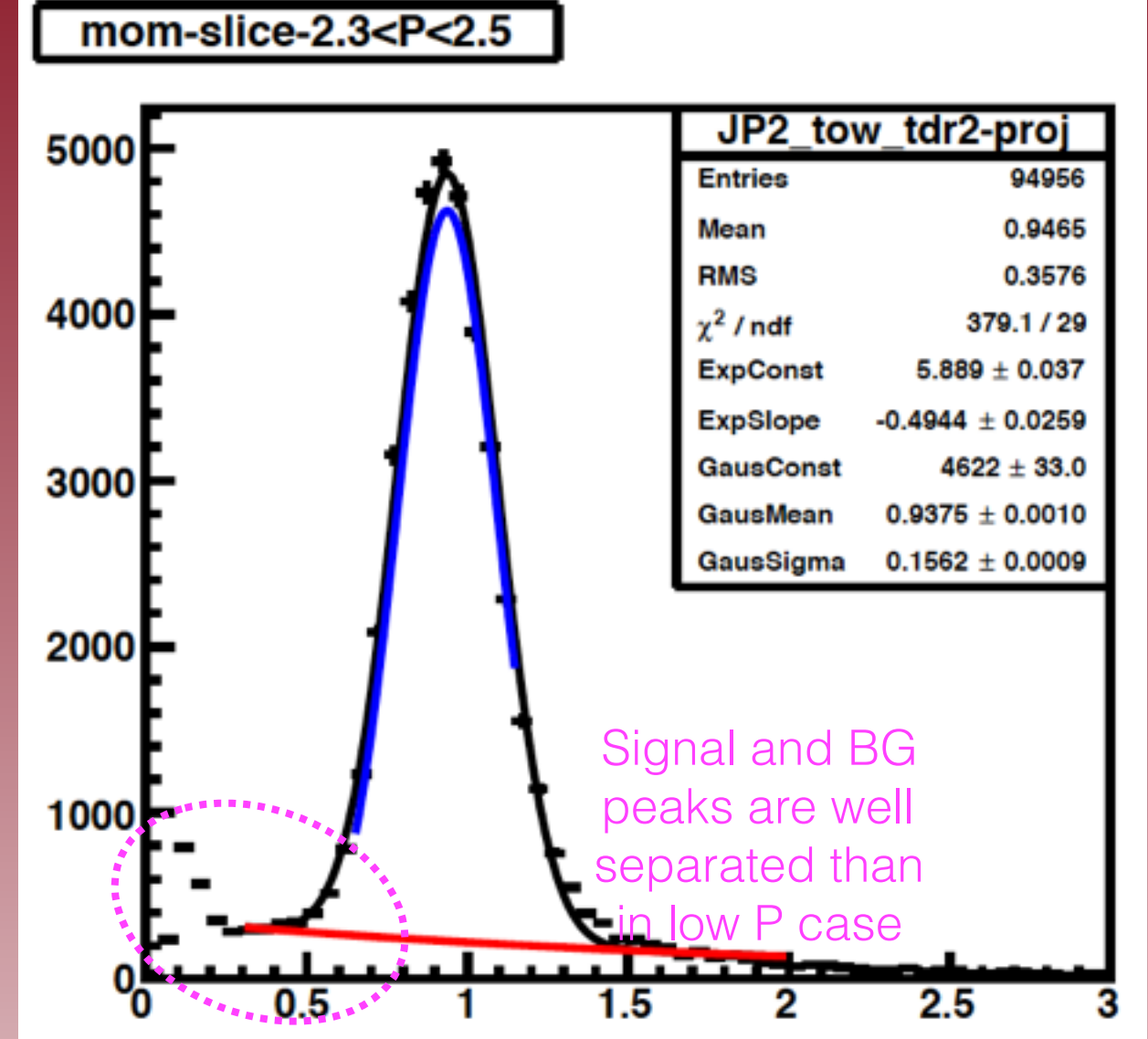
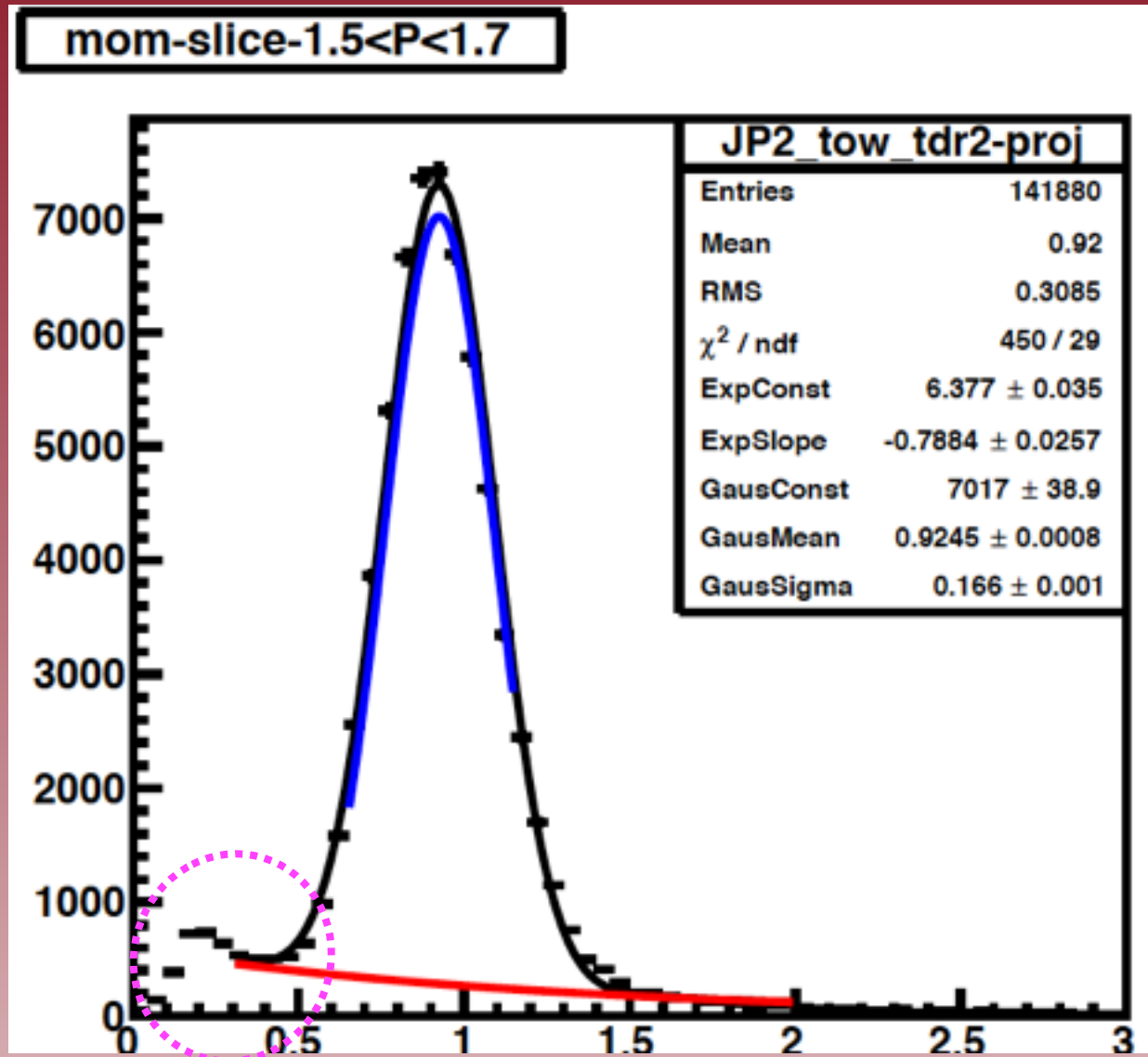
# correct [bug fixed!]



19



# Low P E /p rise





```
!(mBHT0 && mBHT0->didFire()) &&  
!(mBHT1 && mBHT1->didFire()) &&  
!(mBHT2 && mBHT2->didFire()) &&  
!(mBHT3 && mBHT3->didFire())
```

```
|| ( !mBHT0 && !mBHT1 && !mBHT2 && !mBHT3 )
```

condition 3

```
!(mBHT0 && mBHT0->didFire()) &&  
!(mBHT1 && mBHT1->didFire()) &&  
!(mBHT2 && mBHT2->didFire()) &&  
!(mBHT3 && mBHT3->didFire())
```

Gives exact same # of events as  
statistics(144 K)

==> ( !mBHT0 && !mBHT1 && !mBHT2 && !mBHT3 ) is a subset of condition 2

---

```
JP2->didFire() || ( !mBHT0 && !mBHT1 && !mBHT2 && !mBHT3 ) statistics(810 K)
```

```
JP2->didFire() statistics(295 K)
```

```
( !mBHT0 && !mBHT1 && !mBHT2 && !mBHT3 ) statistics(550 K)
```

```
!(mBHT0 && mBHT0->didFire()) &&  
!(mBHT1 && mBHT1->didFire()) &&  
!(mBHT2 && mBHT2->didFire()) &&  
!(mBHT3 && mBHT3->didFire())
```

```
|| JP2->didFire()
```

```
statistics(1540 K)
```

```
JP2->didFire()
```

```
statistics(295 K)
```

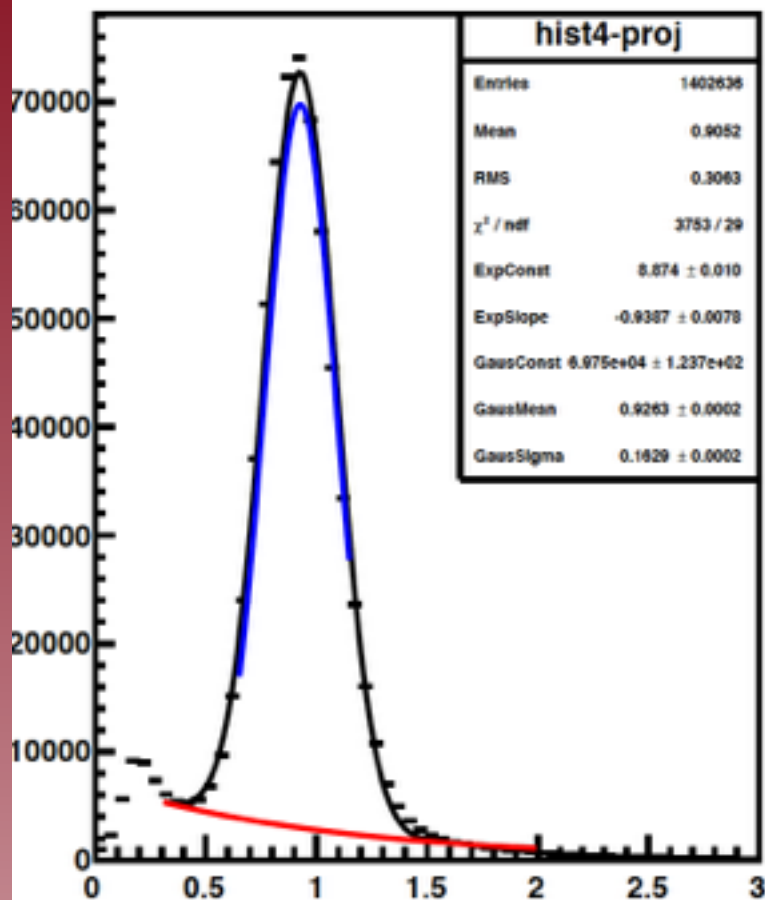
==>

```
(1736 K)
```

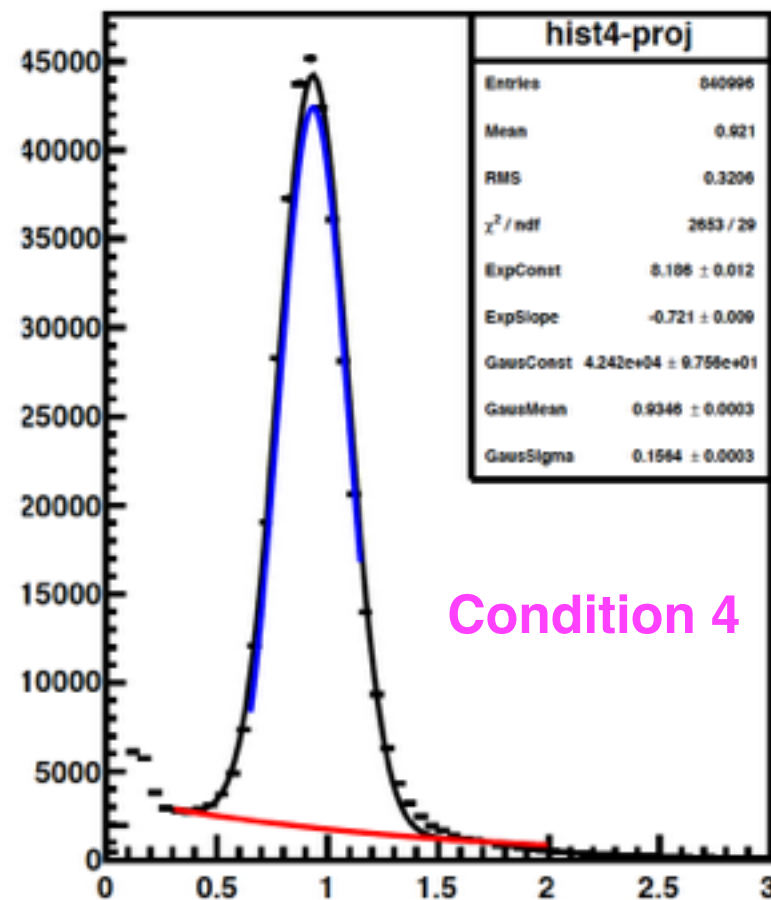
Events counts ,  
various trigger  
conditions

```
statistics(1441 K)
```

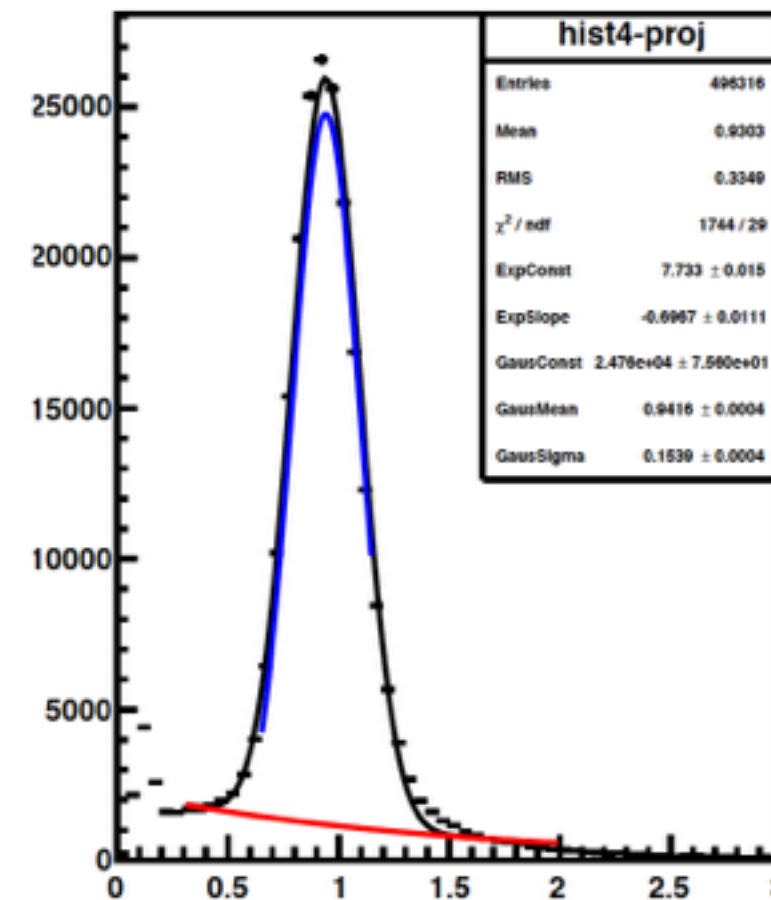
mom-slice-1.5<P<2.0



mom-slice-2.0<P<2.5

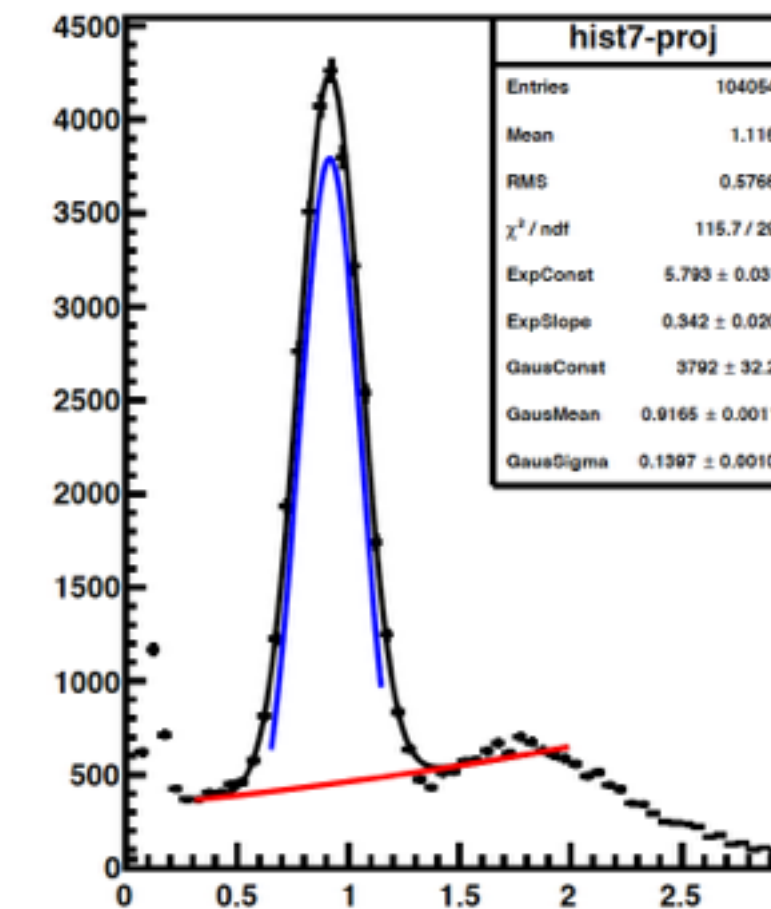
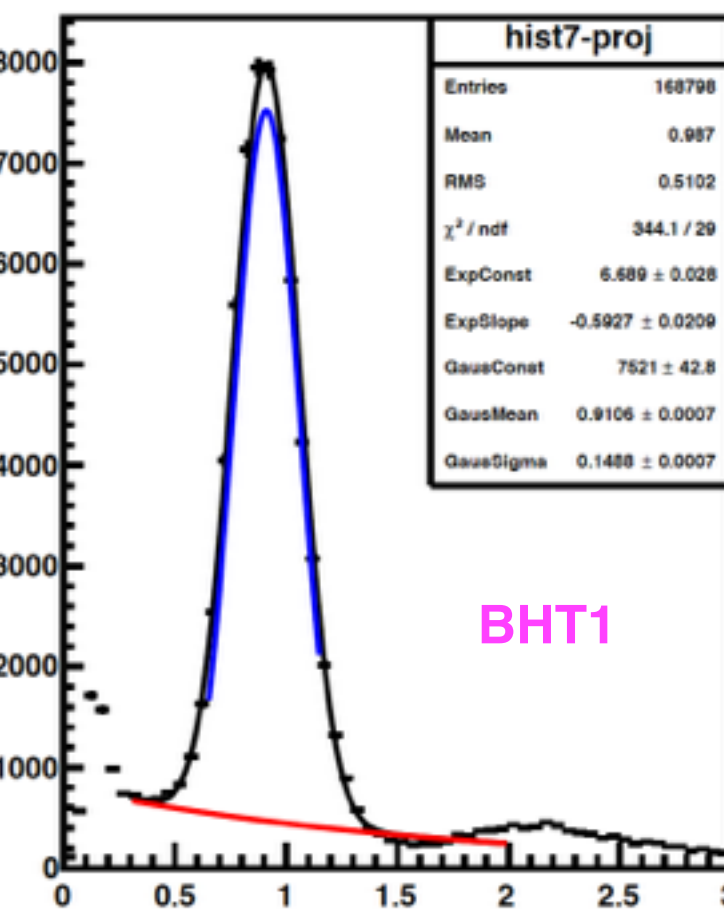
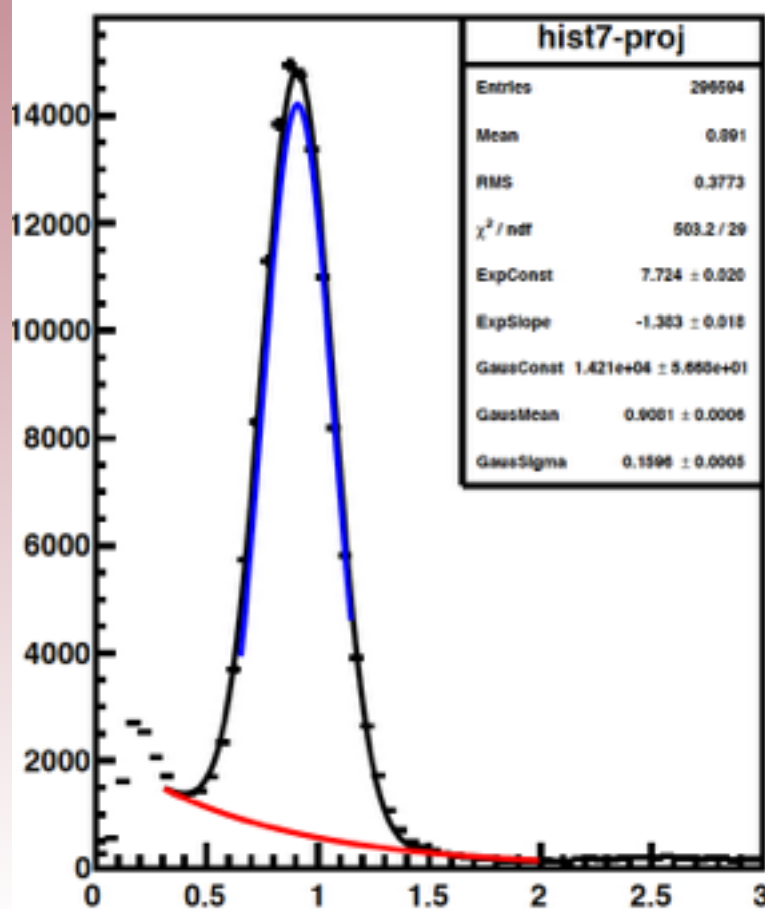


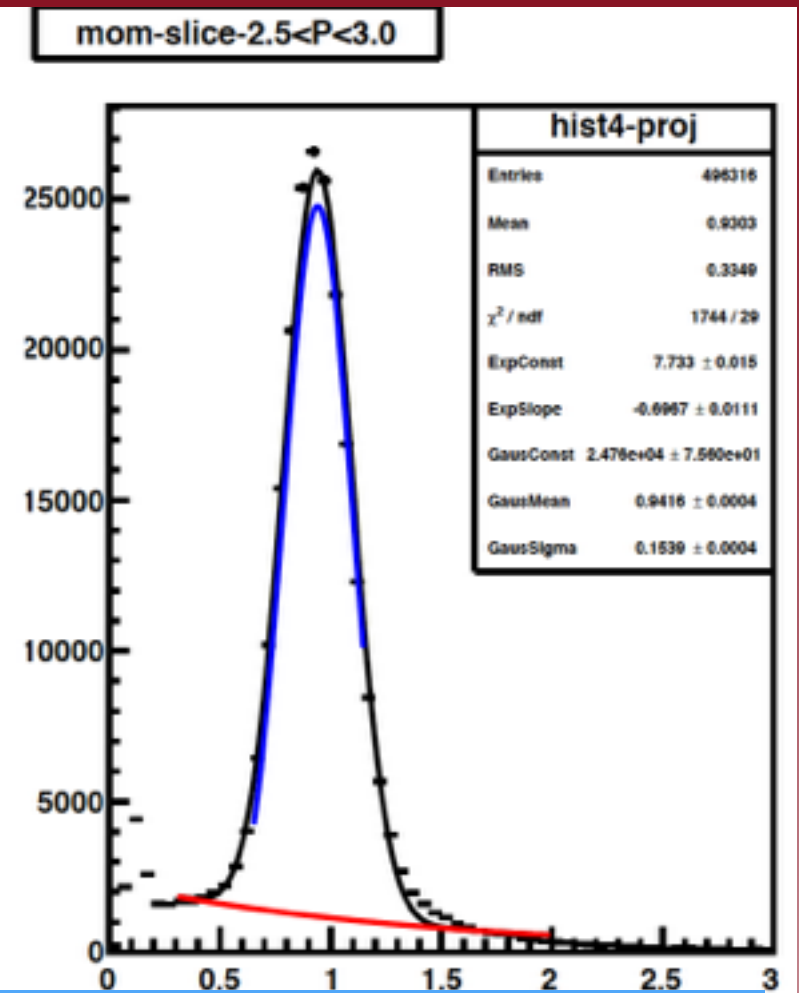
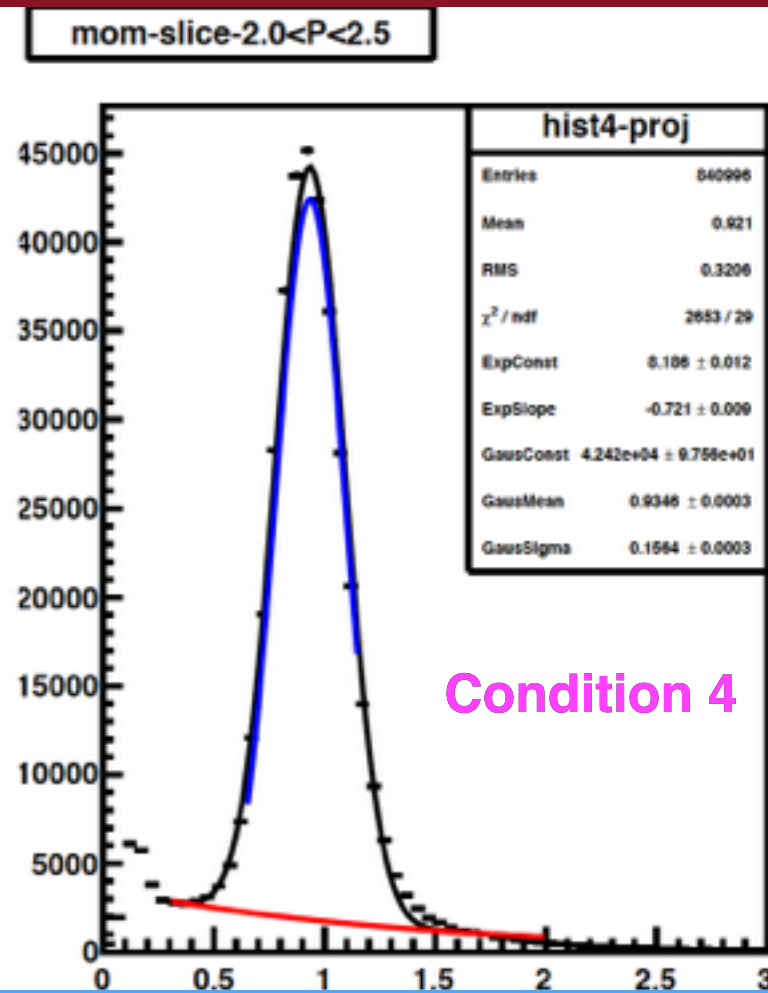
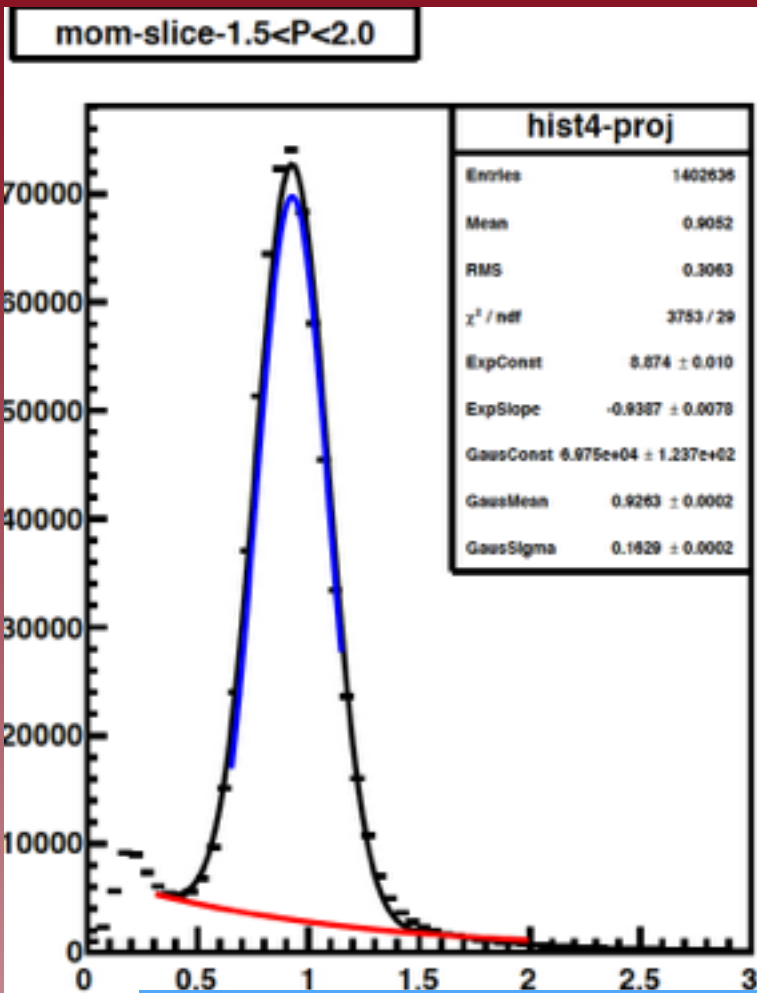
mom-slice-2.5<P<3.0



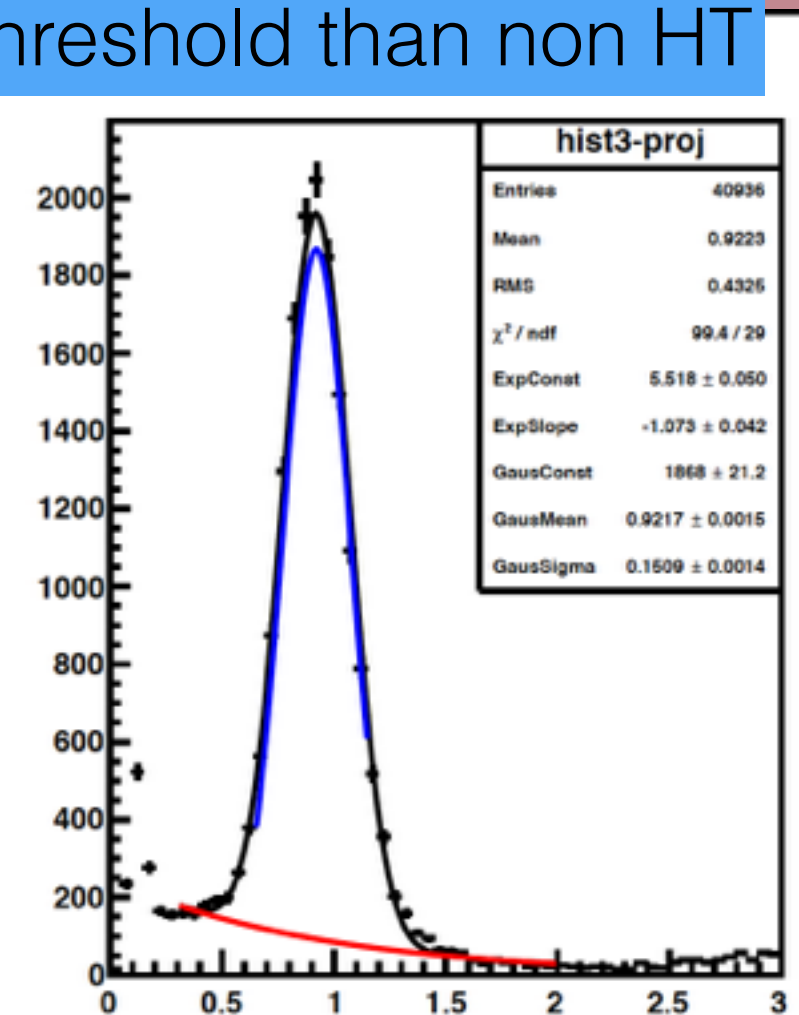
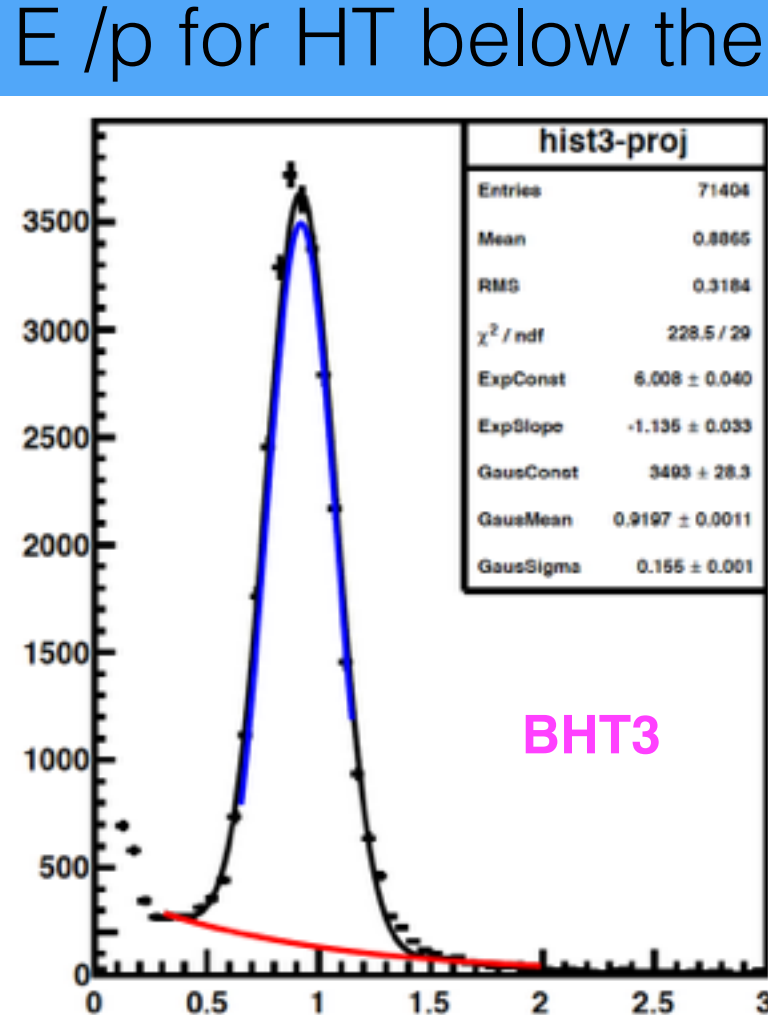
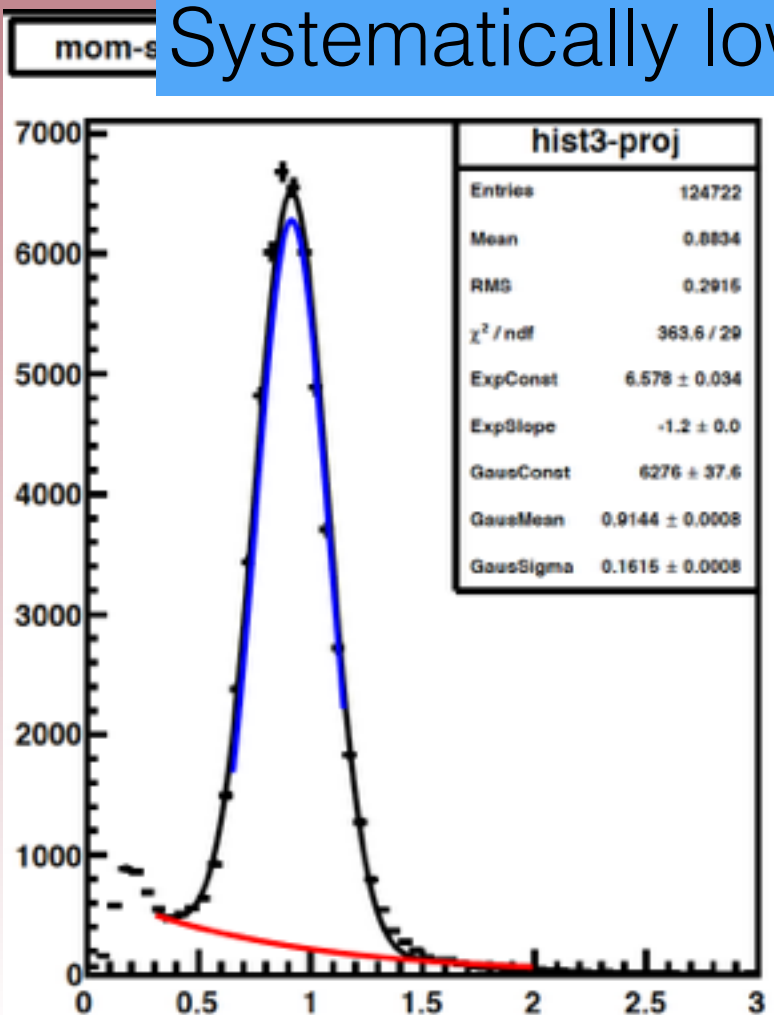
Systematically low E /p for HT below the threshold than non HT

mom-





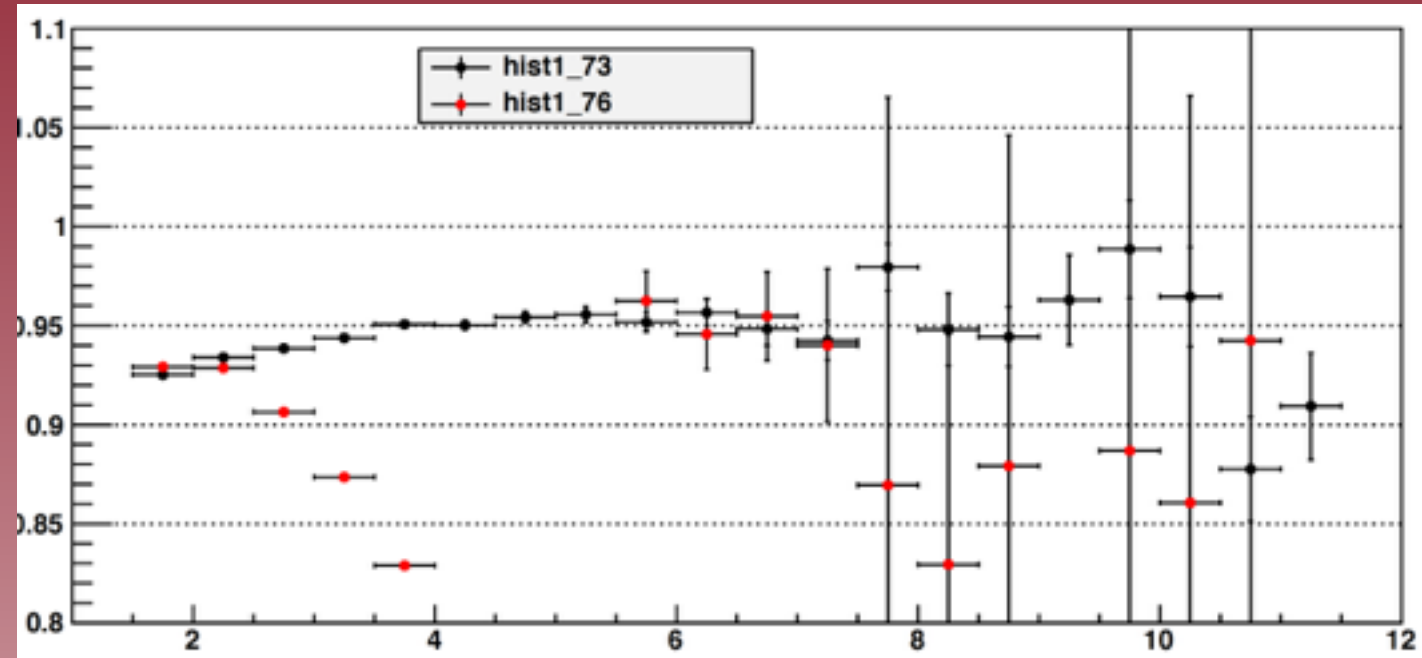
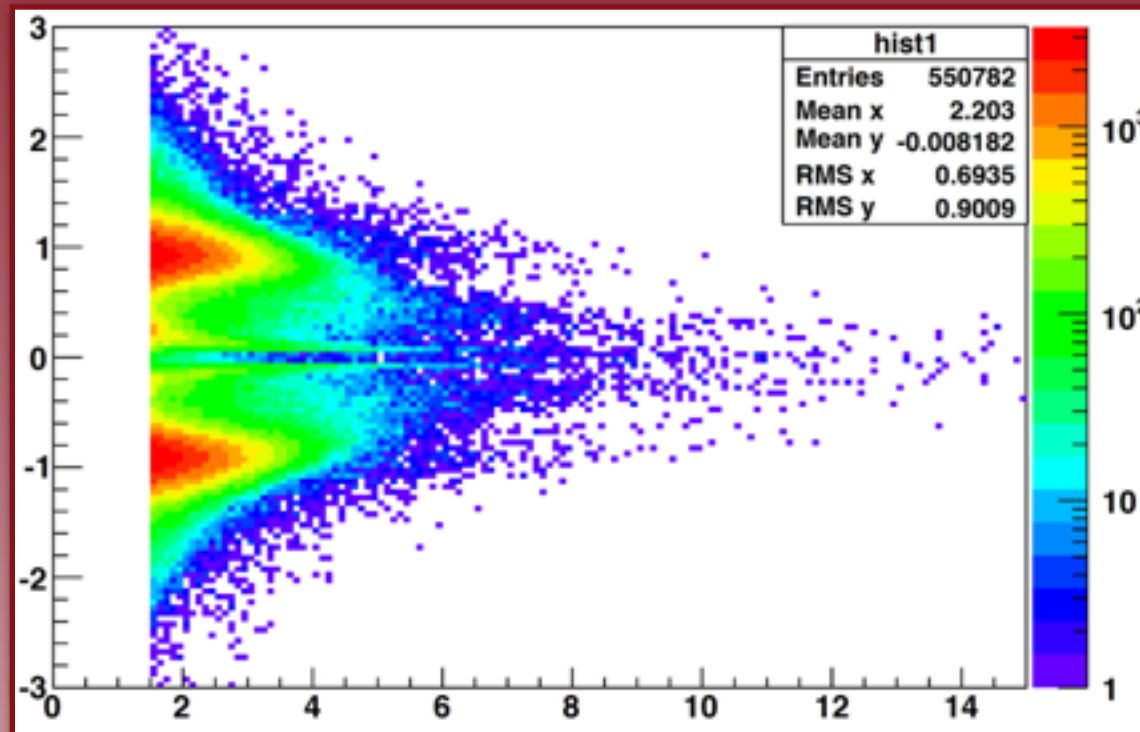
Systematically low E /p for HT below the threshold than non HT





# title

!mBHT0 && !mBHT1 && !mBHT2 && !mBHT3



(!mBHT0 && !mBHT1 && !mBHT2 && !mBHT3 ) || JP2->didFire()

