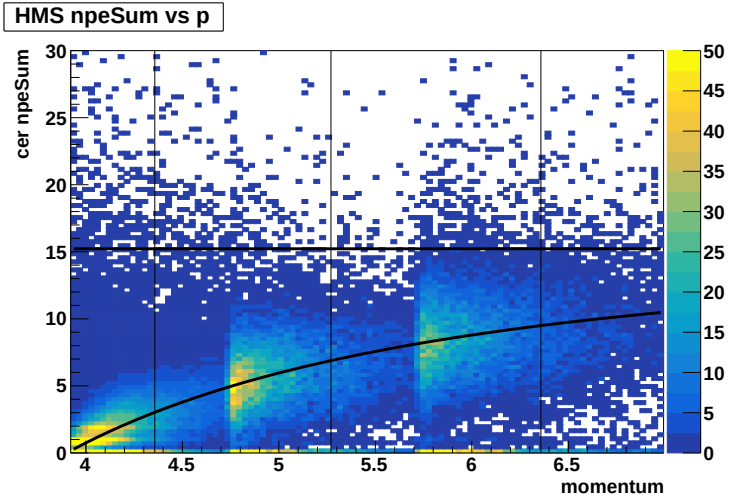
# PID efficiencies

Shuo Jia

# HMS,electron arm

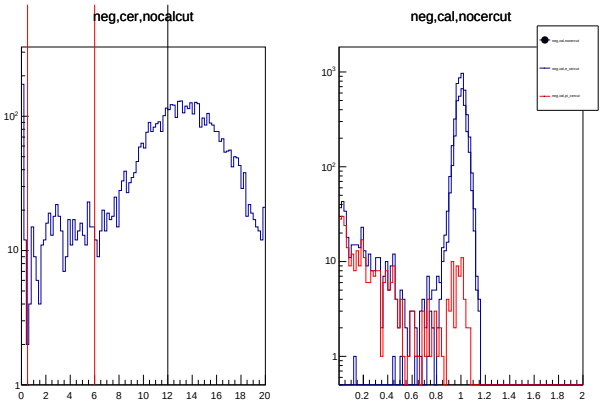
| Cuts | HMS cal | HMS cer |
|---|---|---|
| cointime | 1.5/2.5 | same |
| H dp | -8,8 | same |
| P dp | -10,20 | same |
| H xptar | -0.06,0.06 | same |
| H yptar | -0.022,0.022 | same |
| P xptar | -0.045,0.045 | same |
| P yptar | -0.028,0.028 | same |
| bg | -3,+3 | same |
| P cal | 0.05,0.85 | same |
| P hgcer | no | no |
| P rf | 0.5,1.5 | same |
| P aero | 2 | same |
| H cal | varies | 1 |
| H cer | 10 | varies |

# HMS Cer, not a good pion rejector




pion threshold 3.8, not a good pion rejector. To select good electron sample, I use cernpe greater than 12.

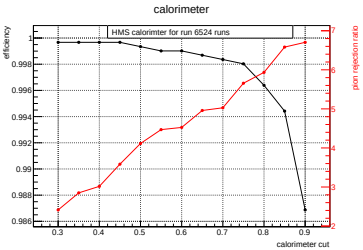
# efficiency with cut

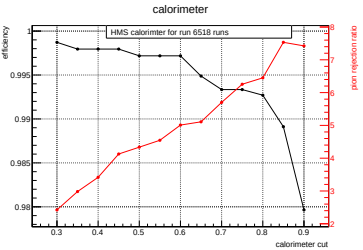



RunNumber 6524, in run group 360, momentum 4.736, neg

$$cal\_eff = \frac{e\_did[cer\_cut\&cal\_cuts]}{e\_sample[cer\_cut]}$$

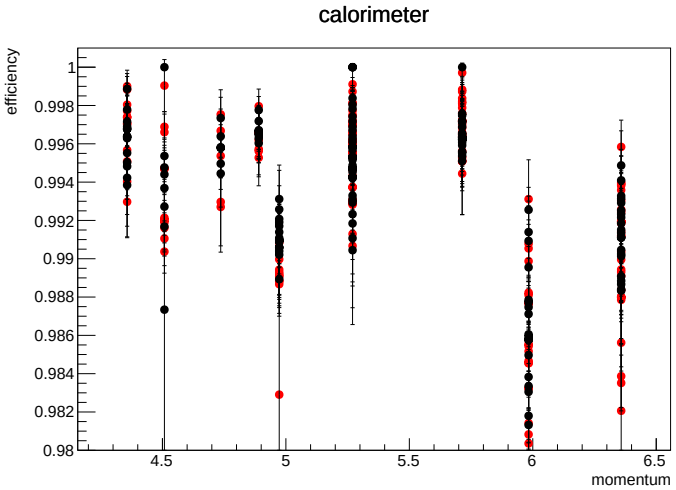
# efficiency with cut



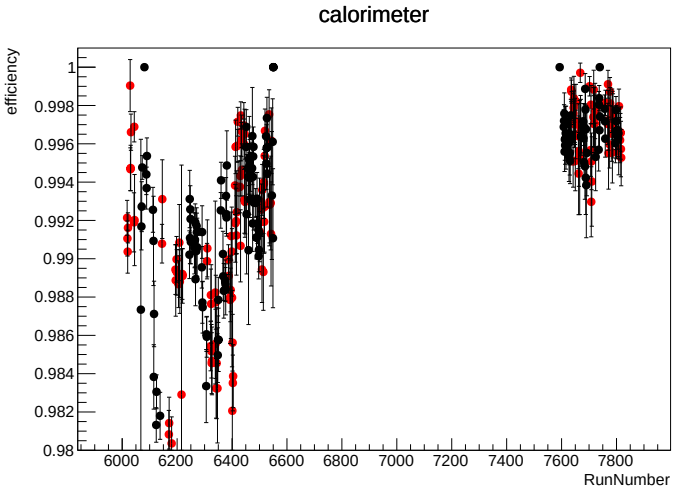




left is neg run 6524,right is pos run 6518, in run group 360, momentum 4.736

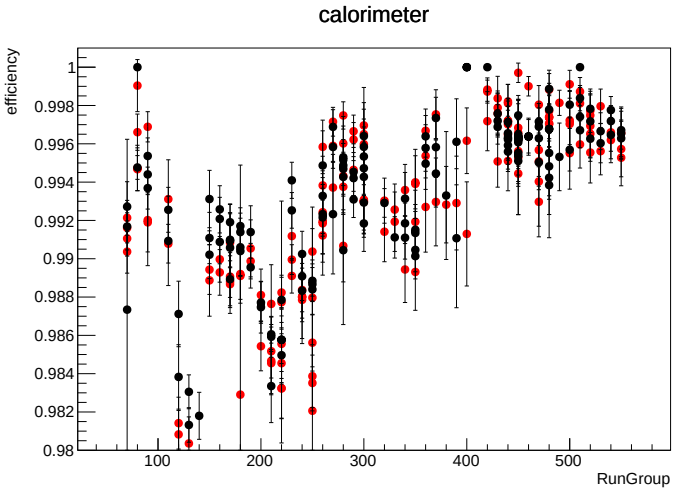
# HMS Detector efficiency verse momentum



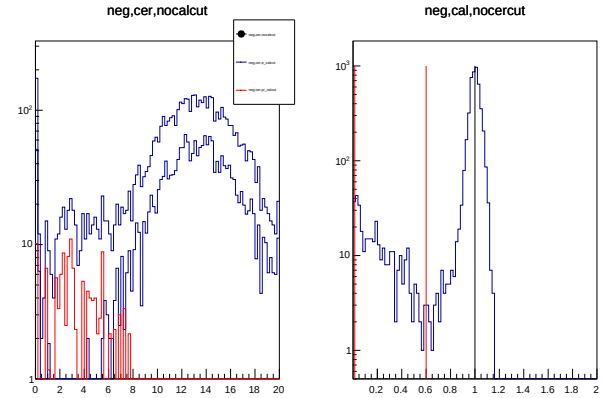
# HMS Detector efficiency verse RunNumber



# HMS Detector efficiency verse RunGroup



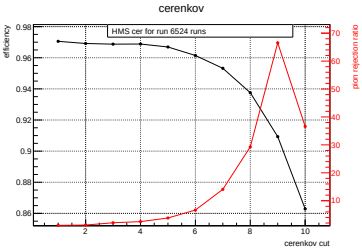
# efficiency with cut

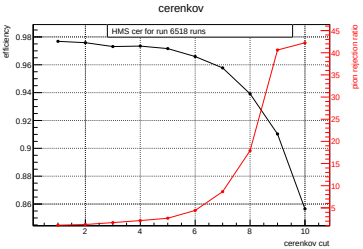



RunNumber 6524, in run group 360, momentum 4.736, neg, cal cut greater than 1

$$cer\_eff = \frac{e\_did[cal\_cuts \& cer\_cuts]}{e\_sample[cal\_cut]}$$

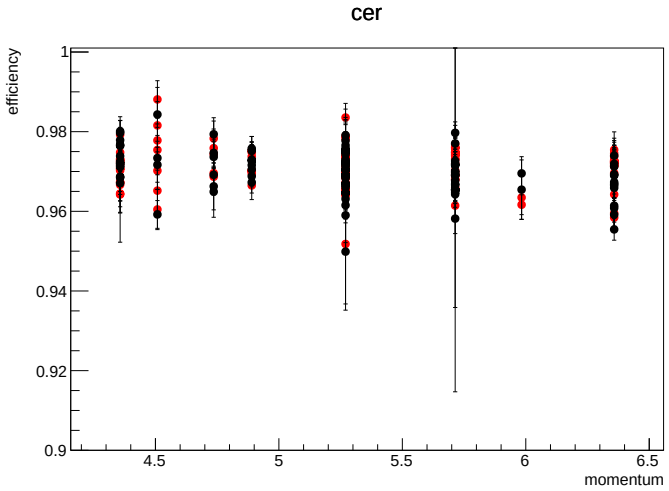
# efficiency with cut



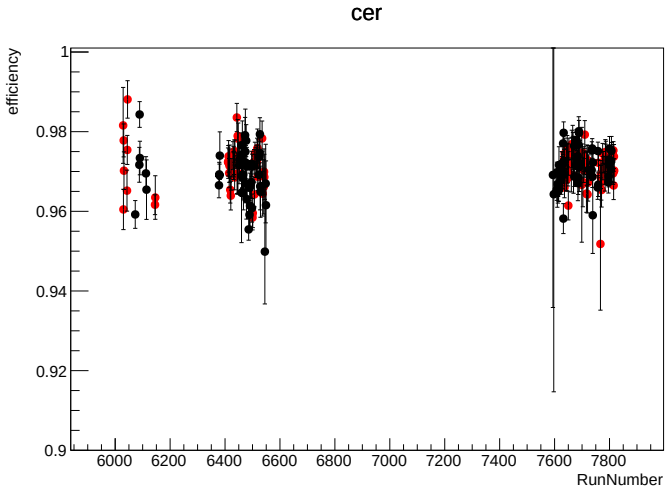




left is neg run 6524,right is pos run 6518, in run group 360, momentum 4.736

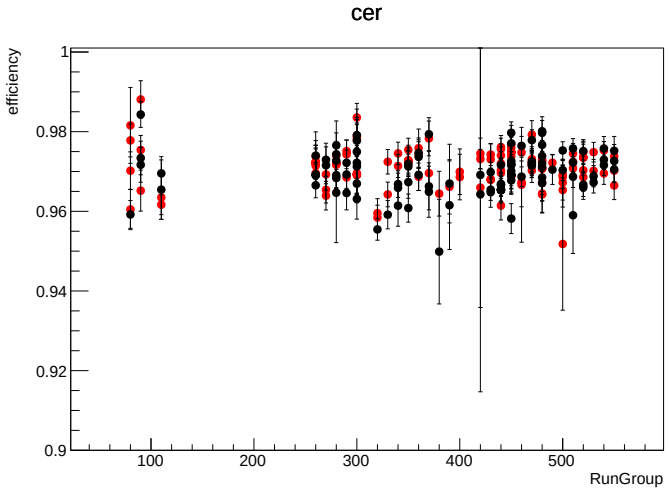
# HMS Detector efficiency verse momentum



# HMS Detector efficiency verse RunNumber



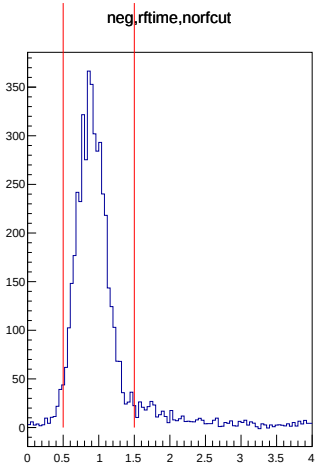
# HMS Detector efficiency verse RunGroup

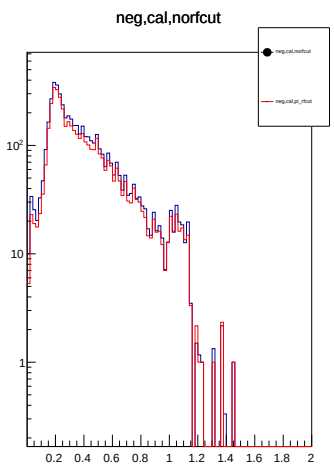


# SHMS pion arm

| Cuts | HMS cal | HMS cer | SHMS cal | SHMS aero | SHMS rf |
|---|---|---|---|---|---|
| cointime | 1.5/2.5 | same | same | same | same |
| H dp | -8,8 | same | same | same | same |
| P dp | -10,20 | same | same | same | same |
| H xptar | -0.06,0.06 | same | same | same | same |
| H yptar | -0.022,0.022 | same | same | same | same |
| P xptar | -0.045,0.045 | same | same | same | same |
| P yptar | -0.028,0.028 | same | same | same | same |
| bg | -3,+3 | same | same | same | same |
| P cal | 0.05,0.85 | same | varies | 0.05,0.85 | same |
| P hgcer | non | non | non | non | 2 |
| P rf | 0.5,1.5 | same | same | same | varies |
| P aero | 2 | same | same | varies | 10 |
| H cal | varies | 1 | 0.8 | same | same |
| H cer | 12 | varies | 2 | same | same |

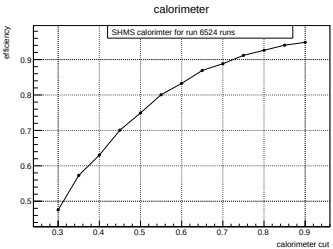
# SHMS efficiency with cut

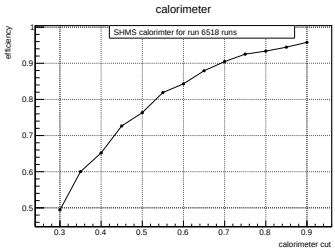



RunNumber 6524, in run group 360, momentum 4.102, neg

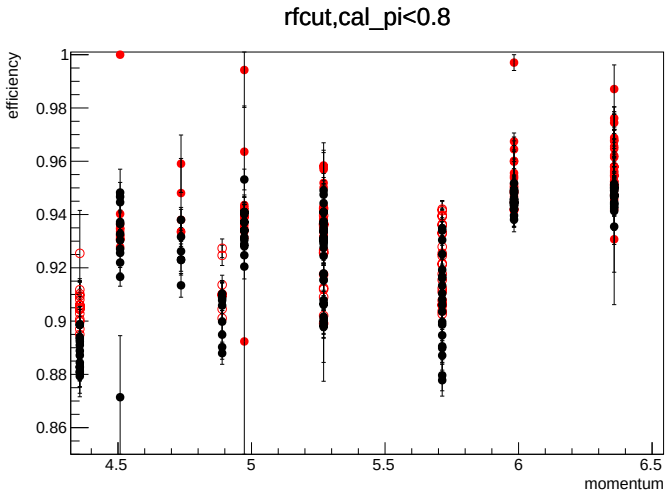
# SHMS efficiency with cut



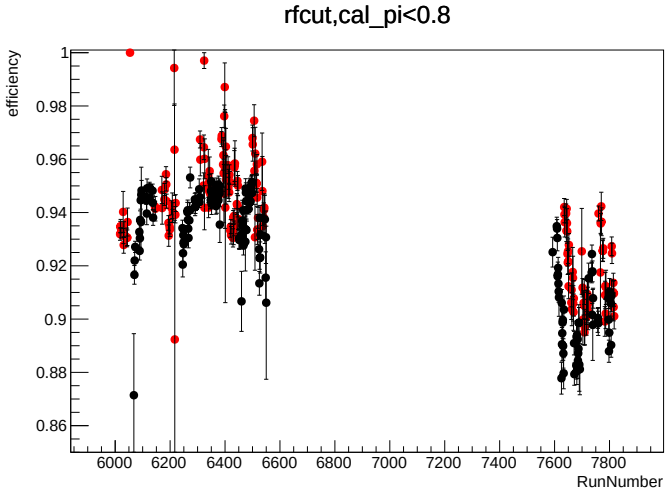




Left, neg 6524, right pos 6518, in run group 360, momentum 4.102

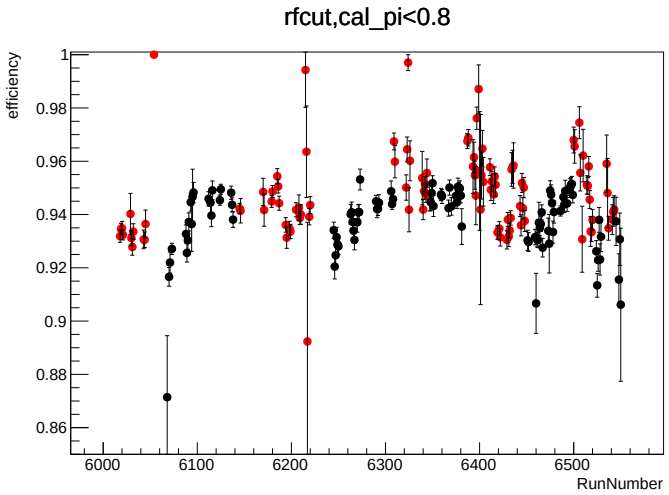
# SHMS cal efficiency verse momentum



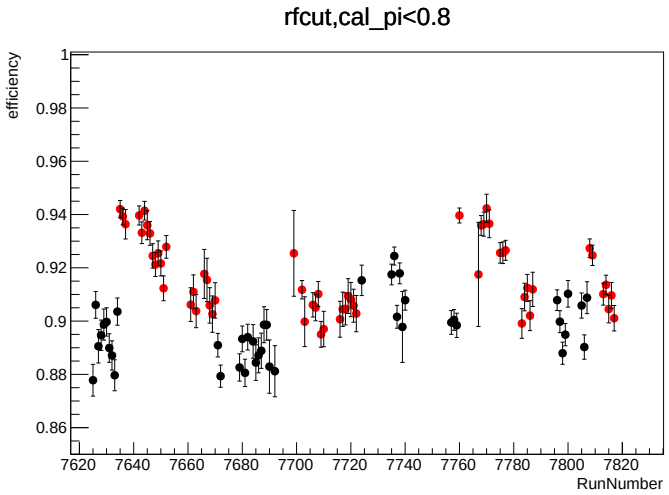
# SHMS cal efficiency verse RunNumber



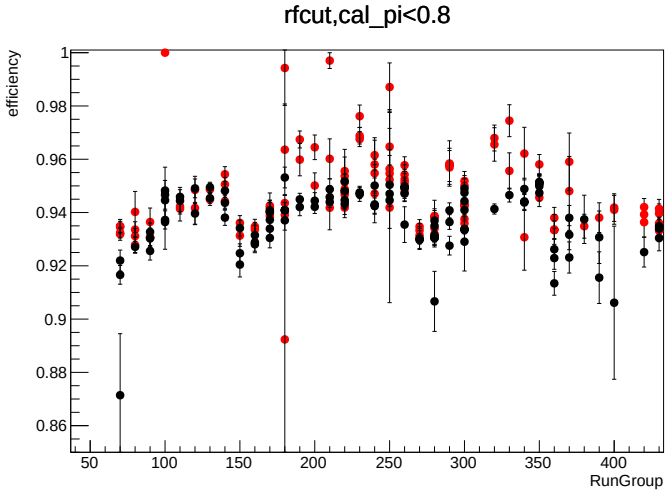
# SHMS cal efficiency verse RunNumber



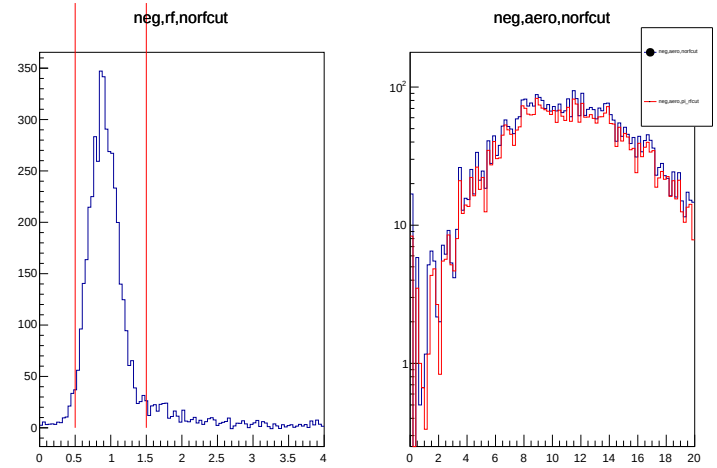
# SHMS cal efficiency verse RunNumber



# SHMS cal efficiency verse RunGroup

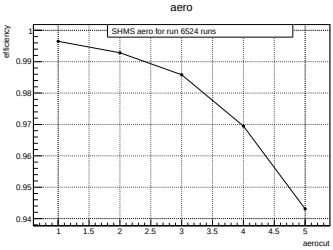


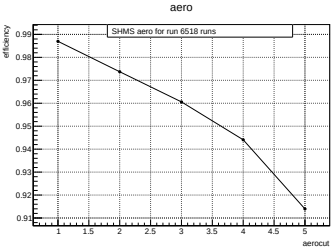
# SHMS efficiency with cut




RunNumber 6524, in run group 360, momentum 4.102, neg

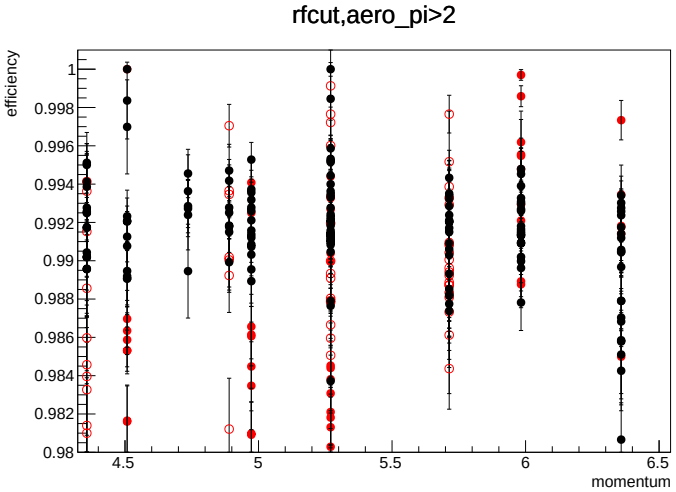
# efficiency with cut



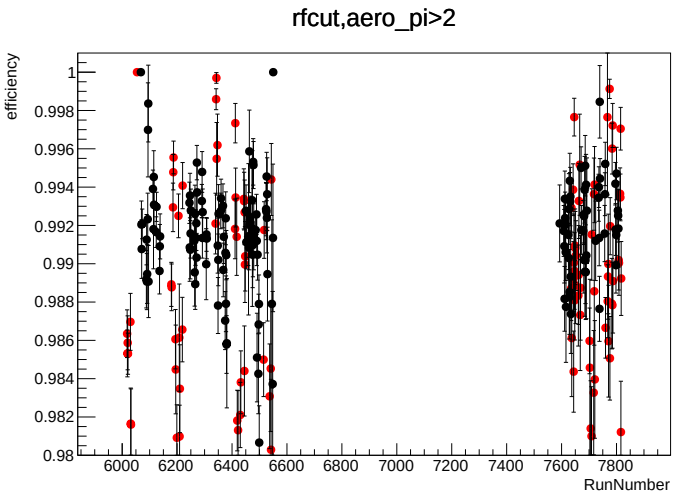




RunNumber 6524, in run group 360, momentum 4.102, neg

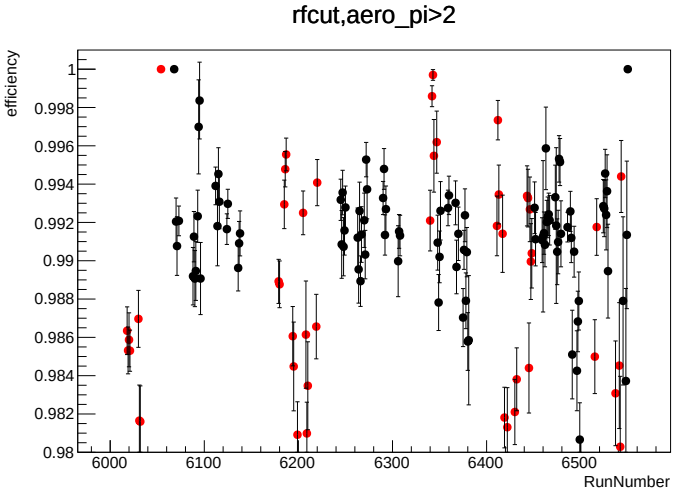
# SHMS aero efficiency verse momentum



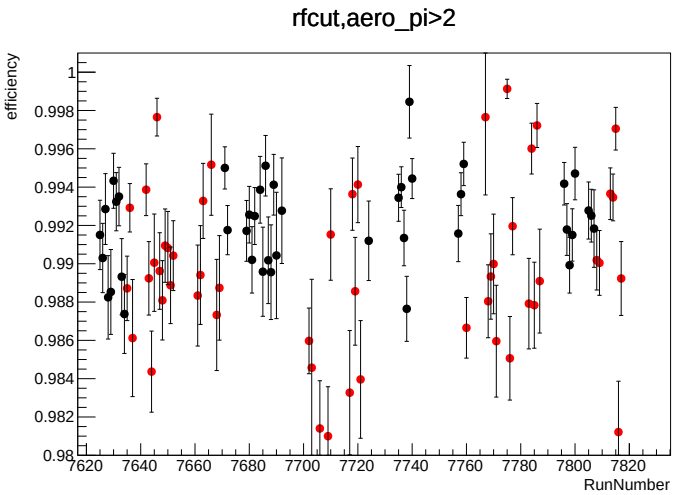
# SHMS aero efficiency verse RunNumber



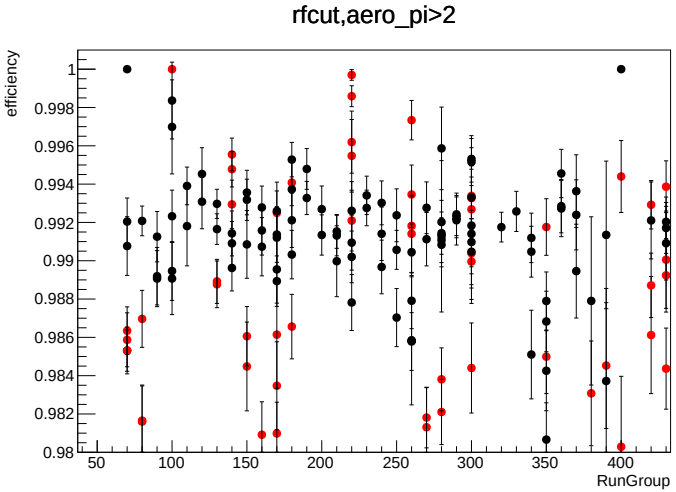
# SHMS aero efficiency verse RunNumber



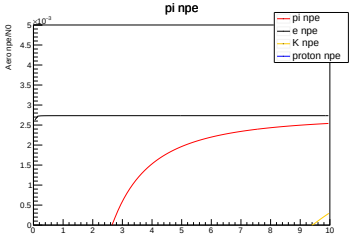
# SHMS aero efficiency verse RunNumber



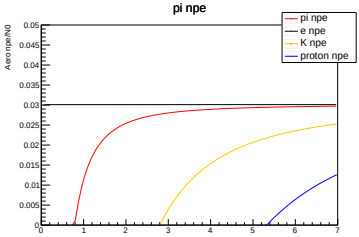
# SHMS aero efficiency verse RunGroup



# SHMS rftime cut, pion efficiency and karon contamination



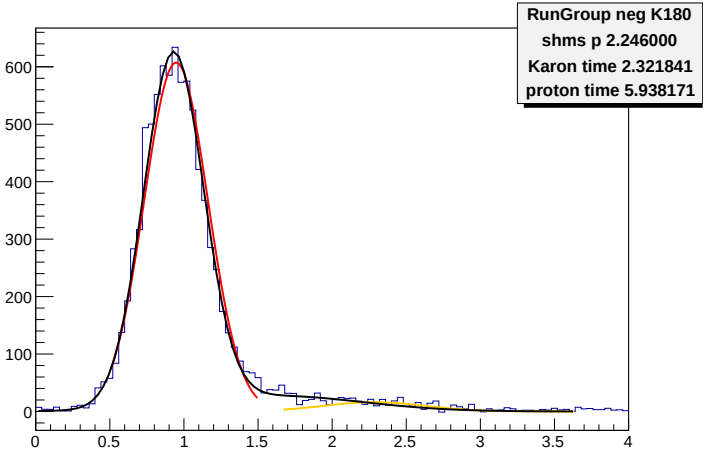

hgcer npe verse momentum

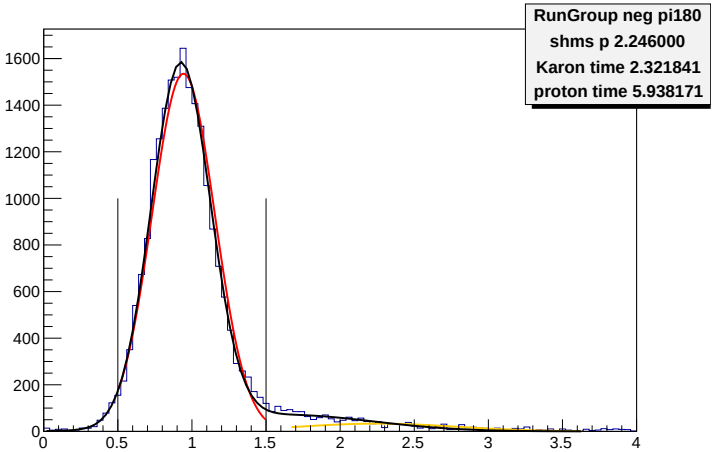



aero npe verse momentum

# SHMS pion arm

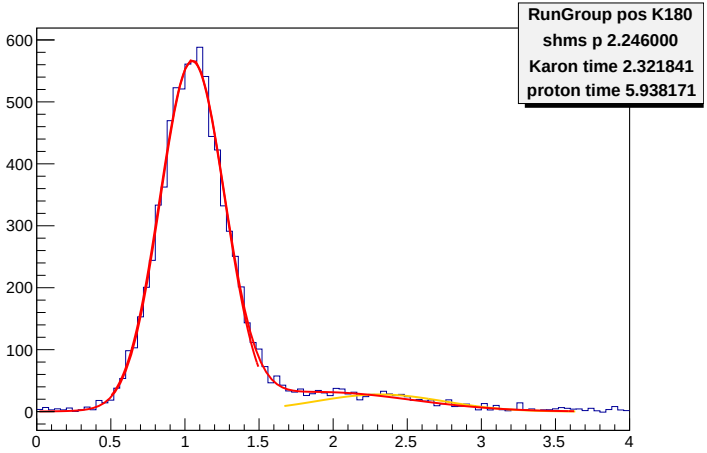
| Cuts | HMS cal | HMS cer | SHMS cal | SHMS aero | SHMS rf |
|---|---|---|---|---|---|
| cointime | 1.5/2.5 | same | same | same | same |
| H dp | -8,8 | same | same | same | same |
| P dp | -10,20 | same | same | same | same |
| H xptar | -0.06,0.06 | same | same | same | same |
| H yptar | -0.022,0.022 | same | same | same | same |
| P xptar | -0.045,0.045 | same | same | same | same |
| P yptar | -0.028,0.028 | same | same | same | same |
| bg | -3,+3 | same | same | same | same |
| P cal | 0.05,0.85 | same | varies | 0.05,0.85 | same |
| P hgcer | non | non | non | non | 2 |
| P rf | 0.5,1.5 | same | same | same | varies |
| P aero | 2 | same | same | varies | 10 |
| H cal | varies | 1 | 0.8 | same | same |
| H cer | 12 | varies | 2 | same | same |

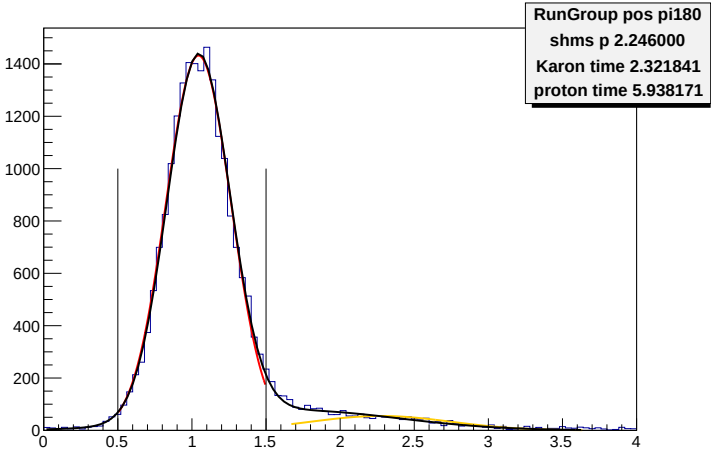

RunGroup neg K180
shms p 2.246000
Karon time 2.321841
proton time 5.938171
600
500
400
300
200
100
0
0
0.5
1
1.5
2
2.5
3
3.5
4

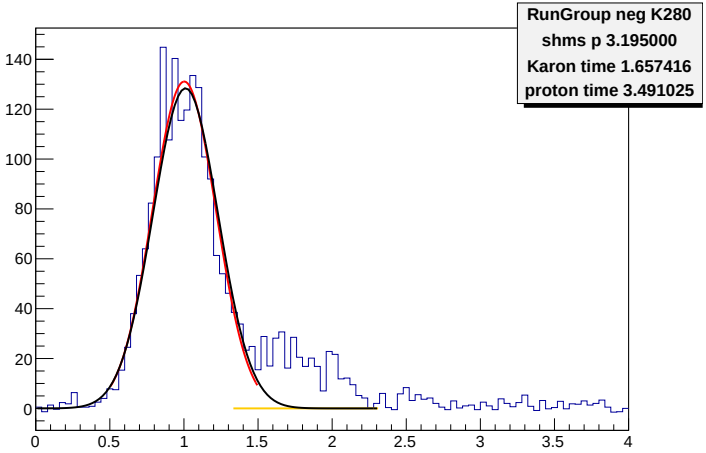


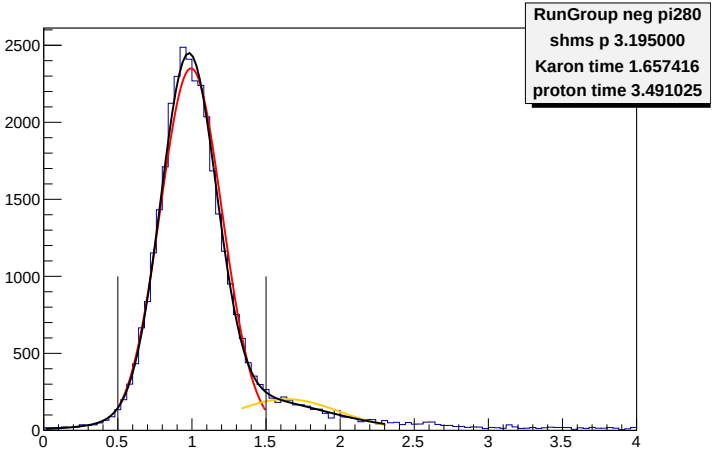

$$pi\_eff = gaussiandistribution$$

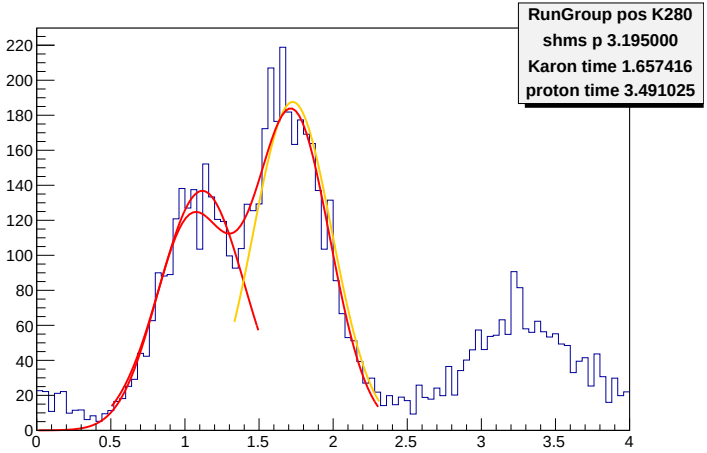
$$karoncon = \frac{karonfitintegral[rfcut]}{pionfitintegral[rfcut]}$$

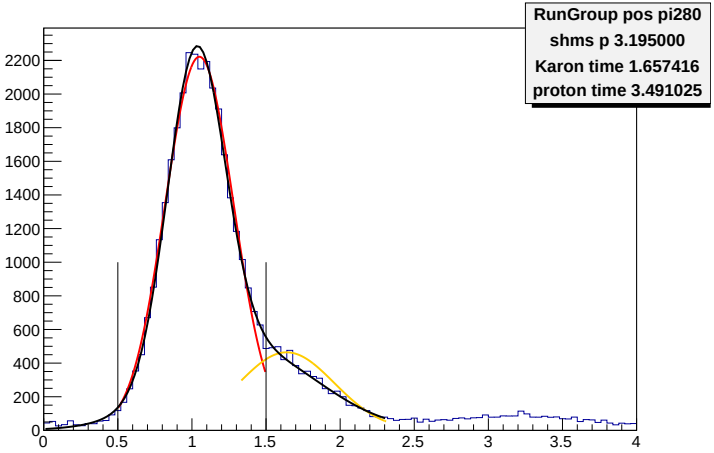

RunGroup pos K180
shms p 2.246000
Karon time 2.321841
proton time 5.938171
600
500
400
300
200
100
0
0
0.5
1
1.5
2
2.5
3
3.5
4

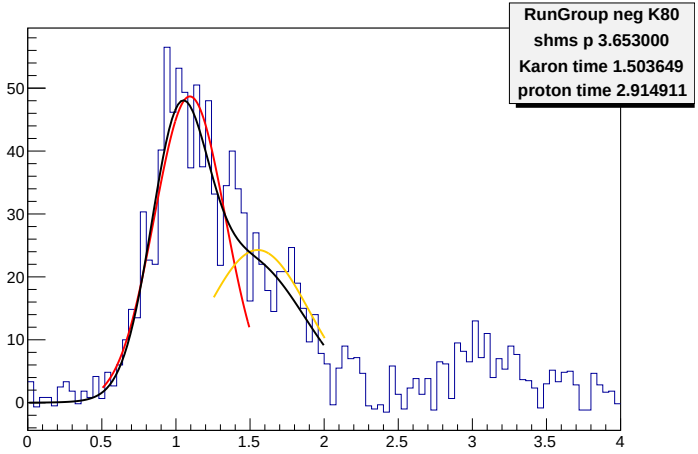

RunGroup pos pi180
shms p 2.246000
Karon time 2.321841
proton time 5.938171
1400
1200
1000
800
600
400
200
0
0
0.5
1
1.5
2
2.5
3
3.5
4

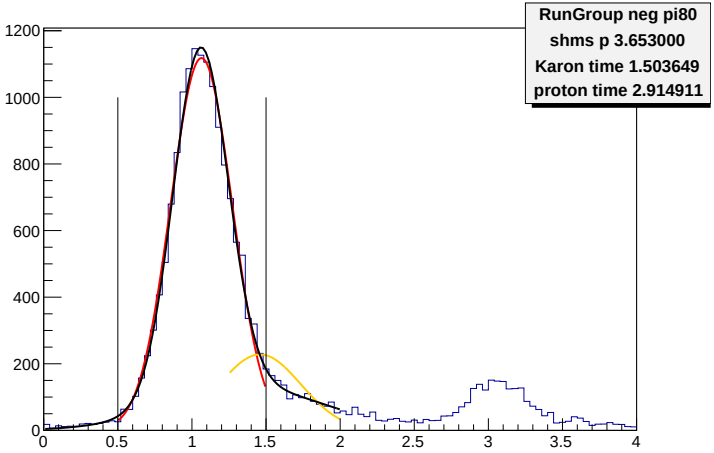

RunGroup neg K280
shms p 3.195000
Karon time 1.657416
proton time 3.491025
140
120
100
80
60
40
20
0
0
0.5
1
1.5
2
2.5
3
3.5
4

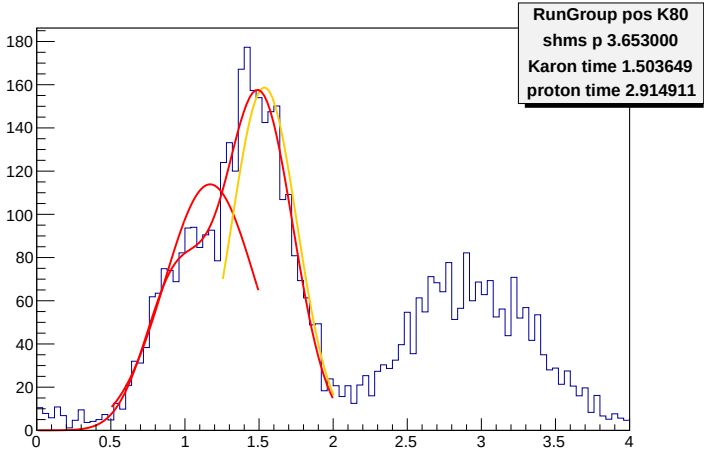

RunGroup neg pi280
shms p 3.195000
Karon time 1.657416
proton time 3.491025
2500
2000
1500
1000
500
0
0
0.5
1
1.5
2
2.5
3
3.5
4

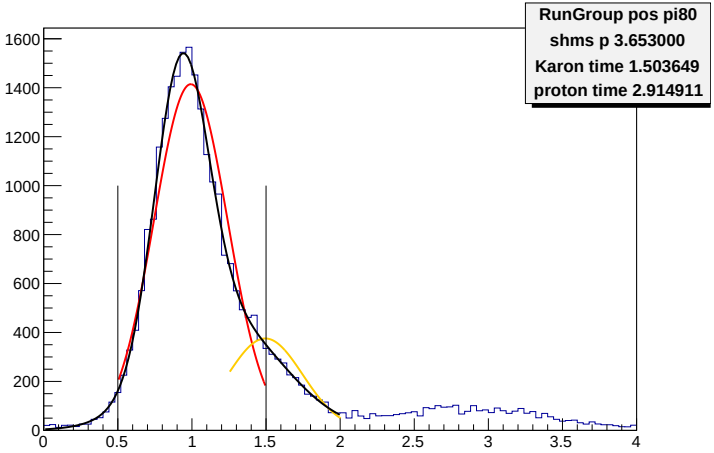

RunGroup pos K280
shms p 3.195000
Karon time 1.657416
proton time 3.491025
220
200
180
160
140
120
100
80
60
40
20
0
0
0.5
1
1.5
2
2.5
3
3.5
4

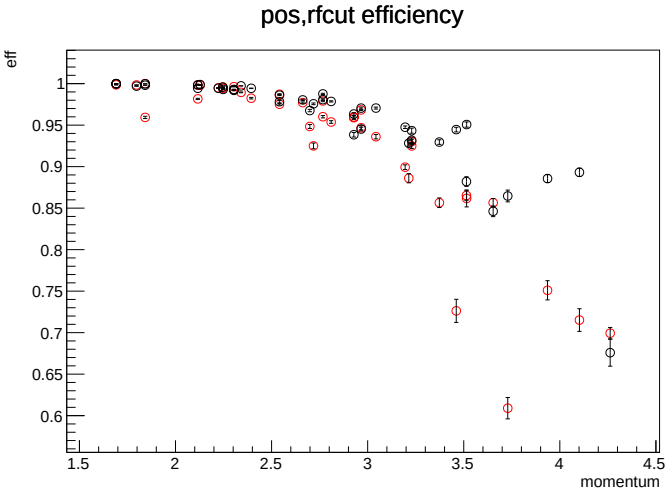

RunGroup pos pi280
shms p 3.195000
Karon time 1.657416
proton time 3.491025
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
0
0
0.5
1
1.5
2
2.5
3
3.5
4


RunGroup neg K80
shms p 3.653000
Karon time 1.503649
proton time 2.914911
50
40
30
20
10
0
0
0.5
1
1.5
2
2.5
3
3.5
4

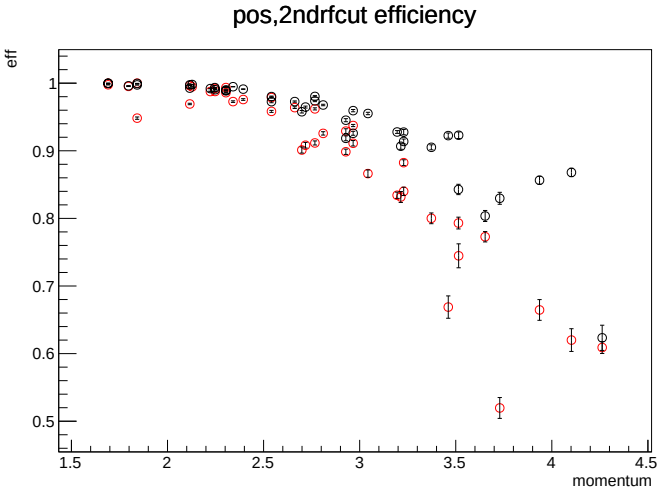

RunGroup neg pi80
shms p 3.653000
Karon time 1.503649
proton time 2.914911
1200
1000
800
600
400
200
0
0
0.5
1
1.5
2
2.5
3
3.5
4


RunGroup pos K80
shms p 3.653000
Karon time 1.503649
proton time 2.914911
180
160
140
120
100
80
60
40
20
0
0
0.5
1
1.5
2
2.5
3
3.5
4


RunGroup pos pi80
shms p 3.653000
Karon time 1.503649
proton time 2.914911
1600
1400
1200
1000
800
600
400
200
0
0
0.5
1
1.5
2
2.5
3
3.5
4


pos,rfcut efficiency
eff
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
1.5
2
2.5
3
3.5
4
4.5
momentum

# What if I use 3 sigma cut on pi fit

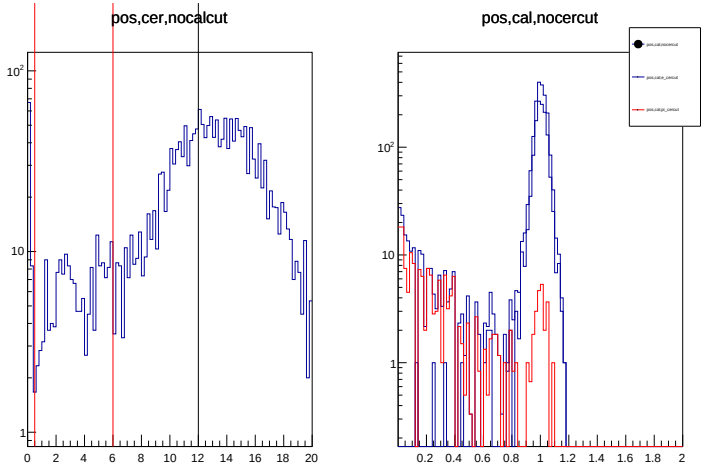



pion eff = 99.7

karon con = $\frac{karonfit[newrfcut]}{pifit[newrfcut]}$

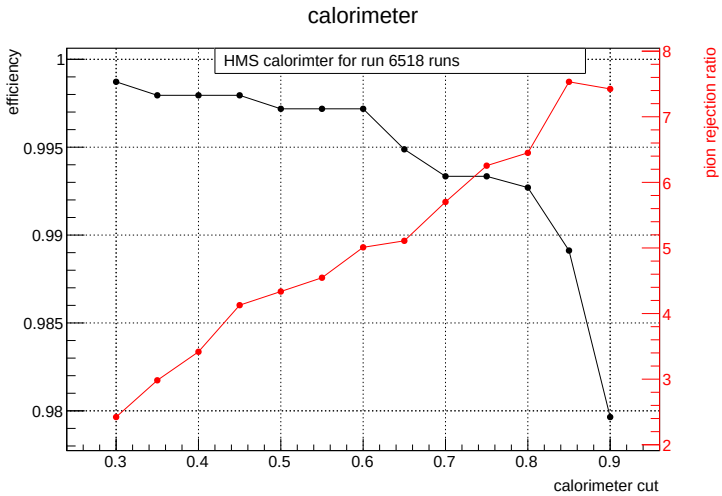
backup

# efficiency with cut



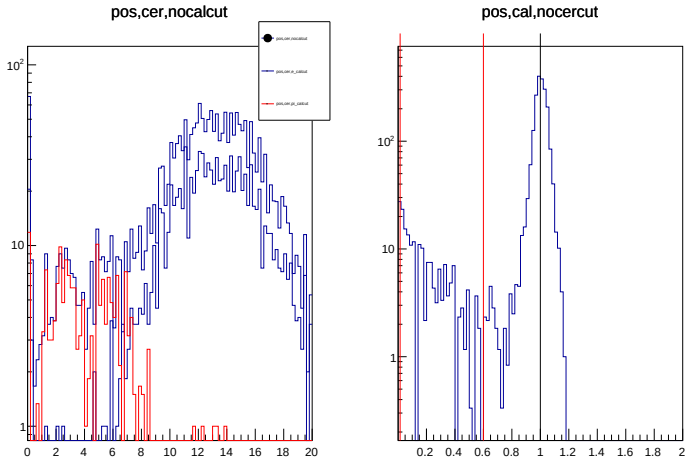

RunNumber 6518, in run group 360, momentum 4.736, pos

# efficiency with cut



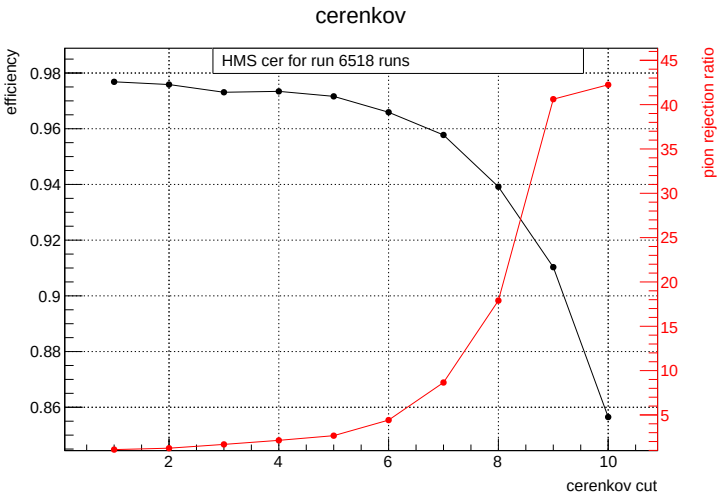

RunNumber 6518, in run group 360, momentum 4.736, pos

# efficiency with cut



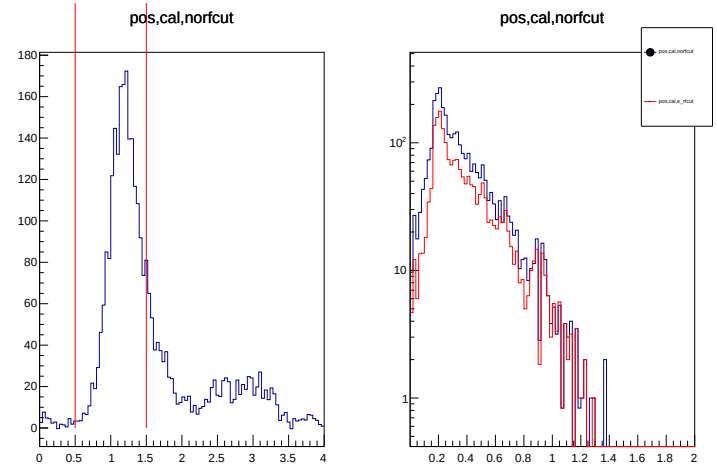

RunNumber 6518, in run group 360, momentum 4.736, pos

# efficiency with cut



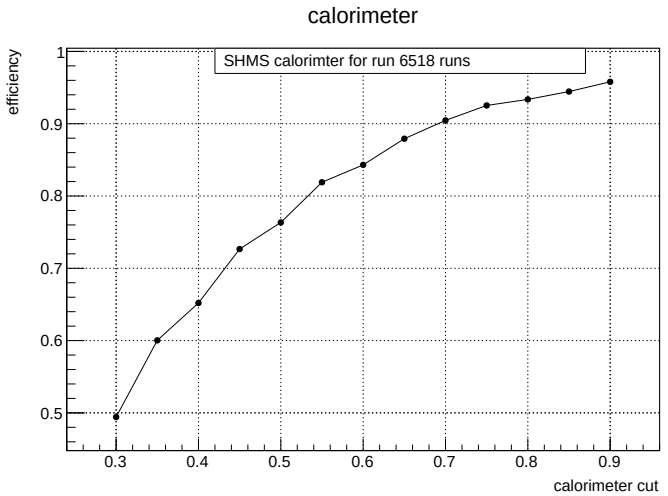

RunNumber 6518, in run group 360, momentum 4.736, pos

# efficiency with cut



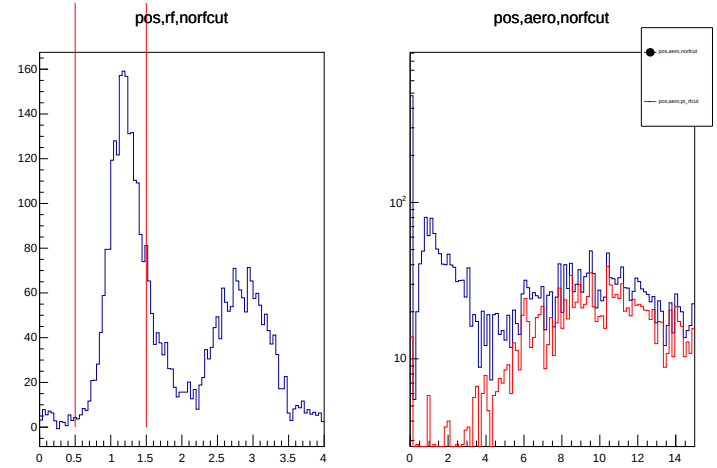

RunNumber 6518, in run group 360, momentum 4.102, pos

# efficiency with cut



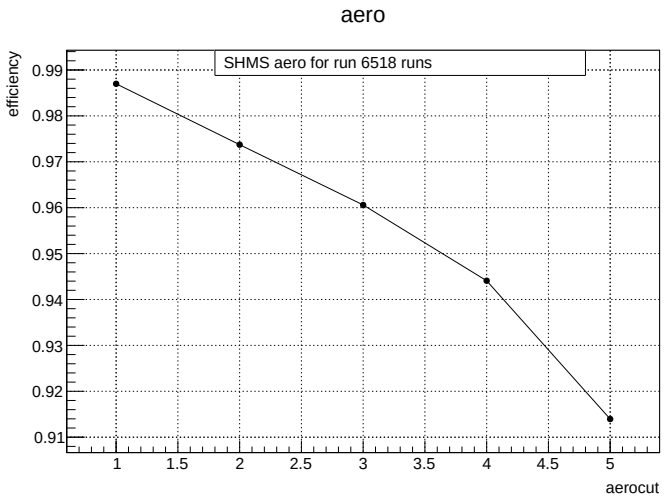

RunNumber 6518, in run group 360, momentum 4.102, pos

# efficiency with cut



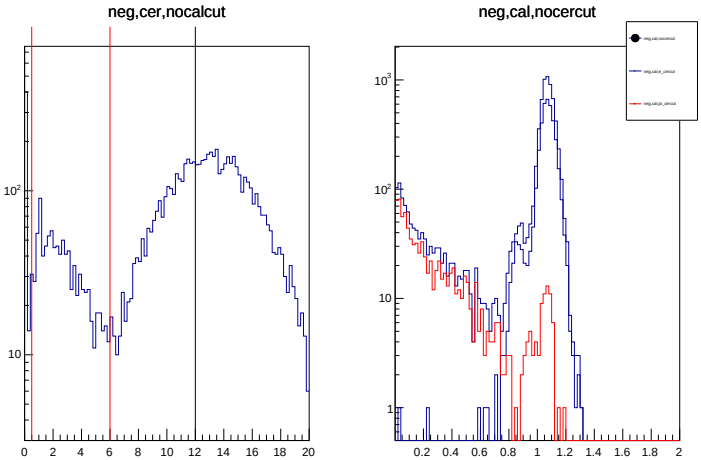

RunNumber 6518, in run group 360, momentum 4.102, pos

# efficiency with cut



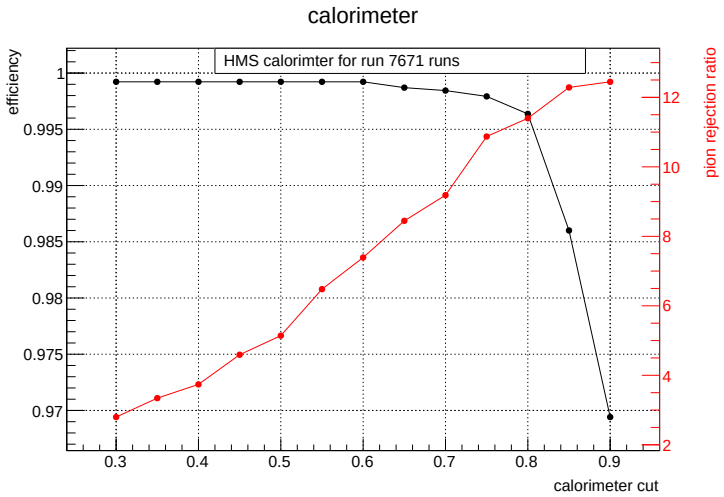

RunNumber 6518, in run group 360, momentum 4.102, pos

# efficiency with cut



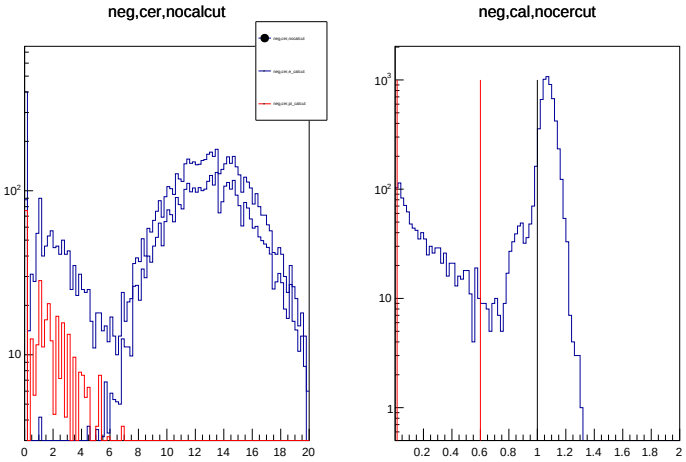

RunNumber 7671, in run group 460, momentum 4.357

# efficiency with cut



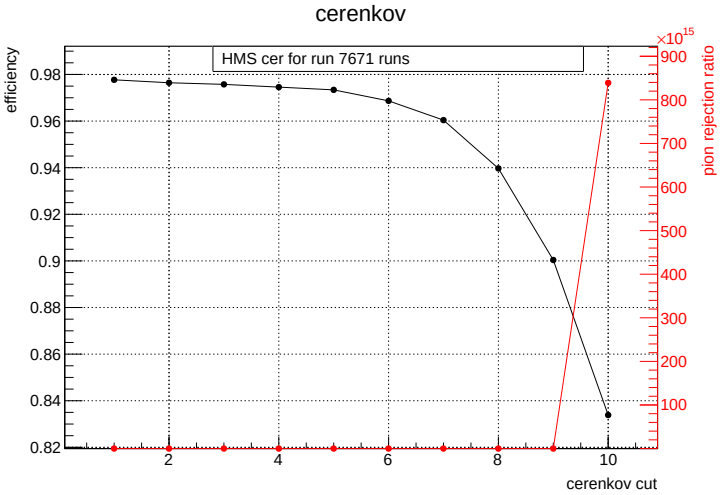

RunNumber 7671, in run group 460, momentum 4.357

# efficiency with cut



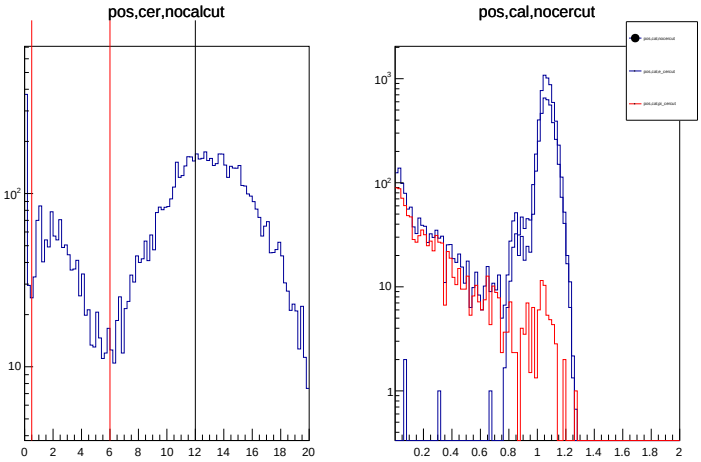

RunNumber 7671, in run group 460, momentum 4.357

# efficiency with cut



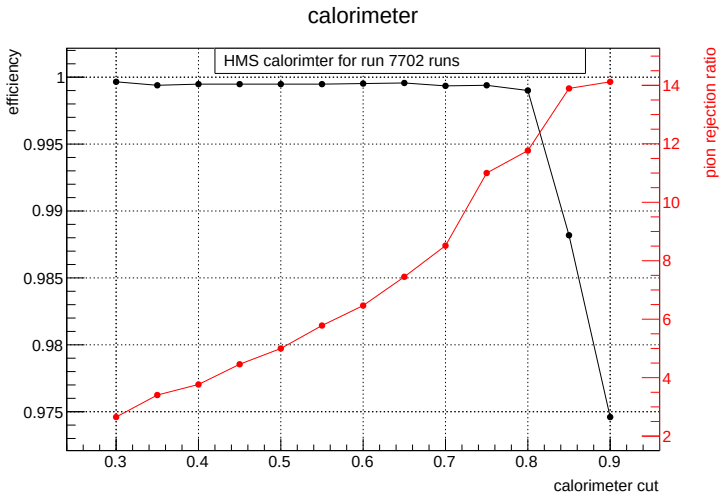

RunNumber 7671, in run group 460, momentum 4.357

# efficiency with cut



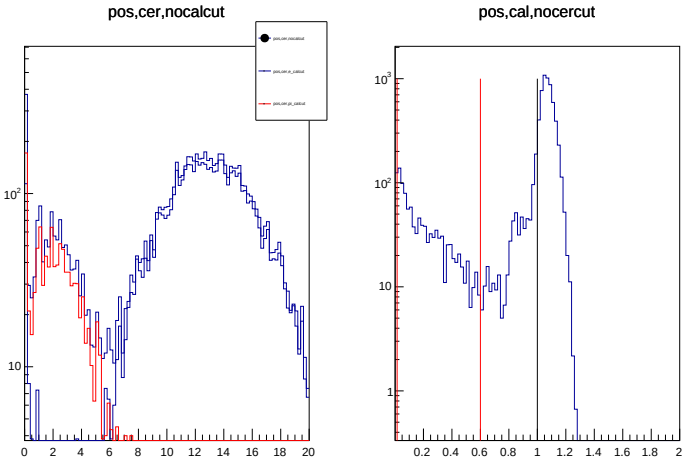

RunNumber 7702, in run group 460, momentum 4.357,pos

# efficiency with cut



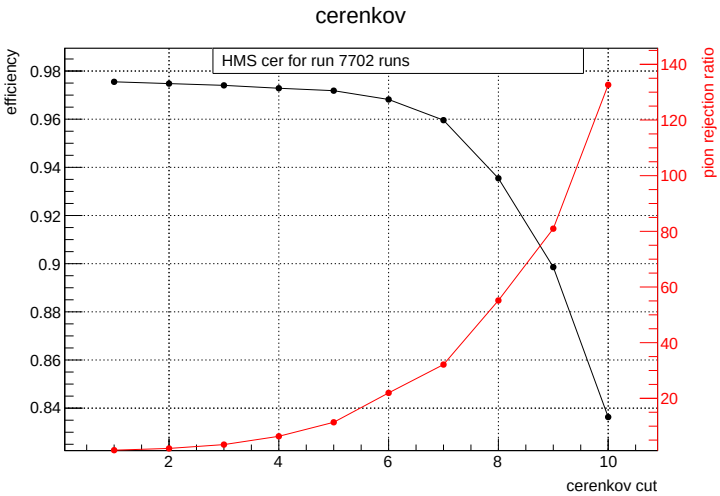

RunNumber 7702, in run group 460, momentum 4.357,pos

# efficiency with cut



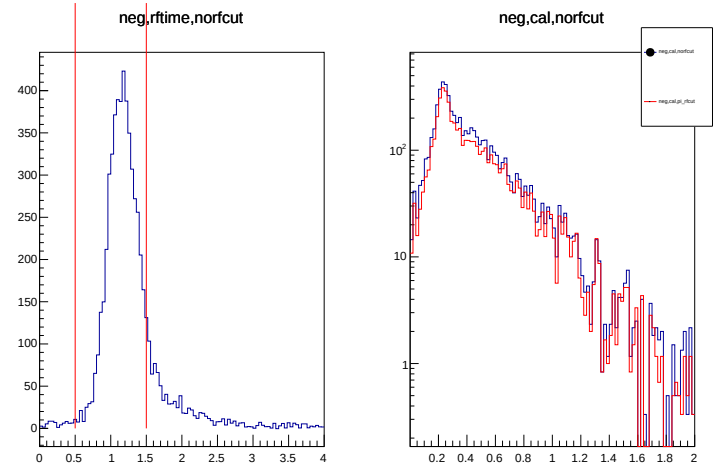

RunNumber 7702, in run group 460, momentum 4.357,pos

# efficiency with cut



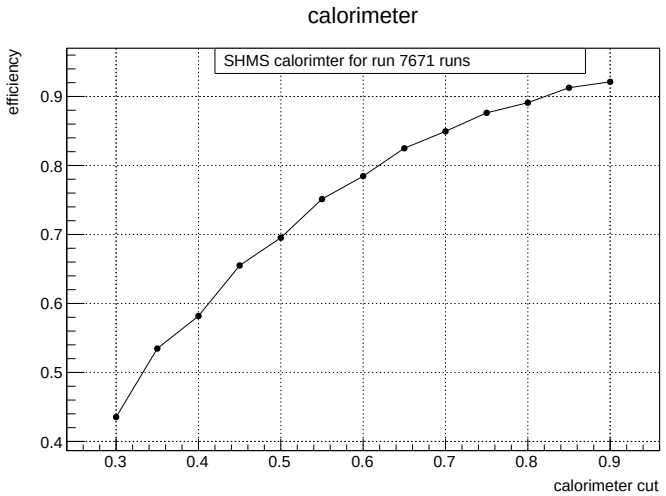

RunNumber 7702, in run group 460, momentum 4.357,pos

# efficiency with cut



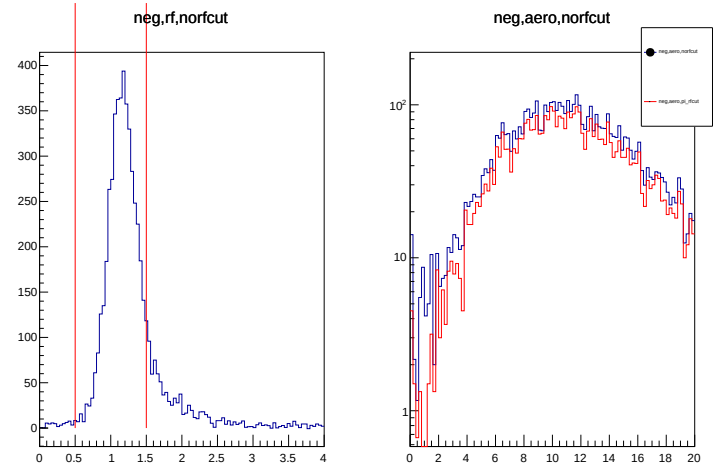

RunNumber 7671, in run group 460, momentum 3.514

# efficiency with cut



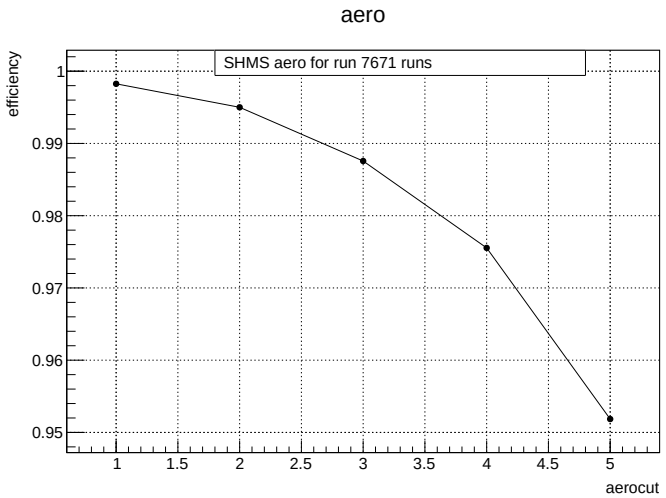

RunNumber 7671, in run group 460, momentum 3.514

# efficiency with cut



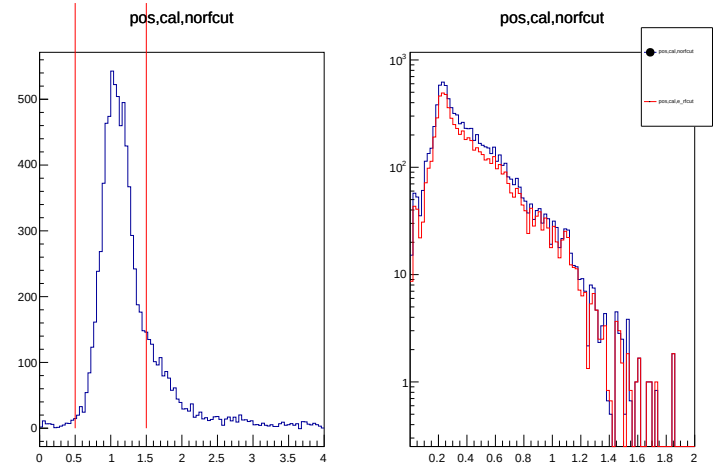

RunNumber 7671, in run group 460, momentum 3.514

# efficiency with cut



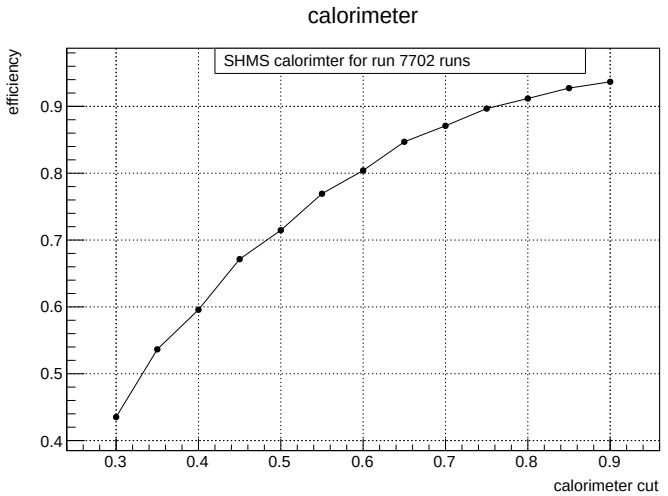

RunNumber 7671, in run group 460, momentum 3.514

# efficiency with cut



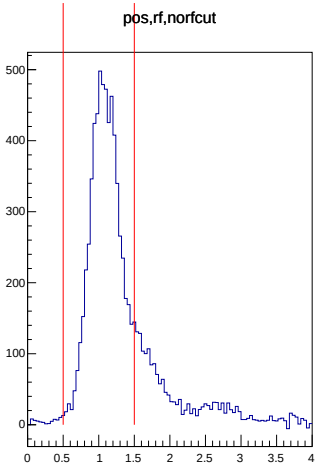

RunNumber 7702, in run group 460, momentum 3.514,pos

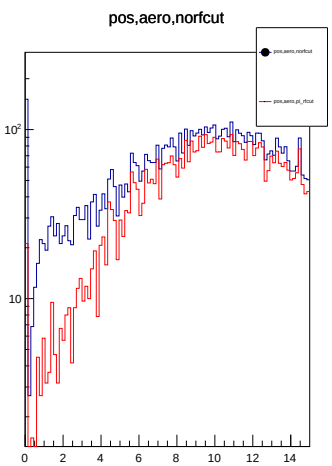
# efficiency with cut




RunNumber 7702, in run group 460, momentum 3.514,pos

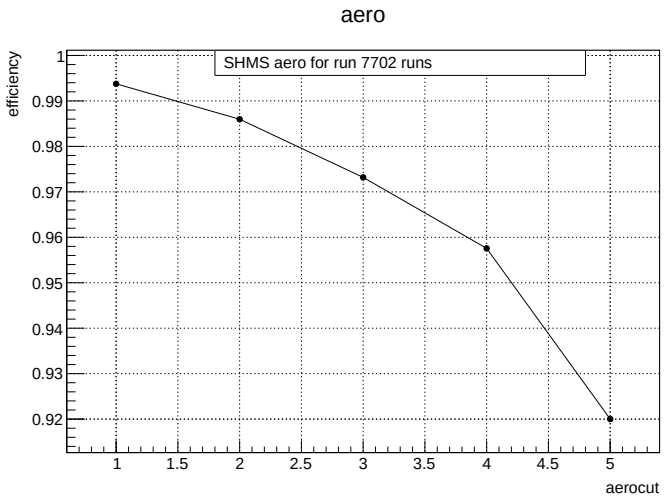
# efficiency with cut




RunNumber 7702, in run group 460, momentum 3.514,pos

# efficiency with cut




RunNumber 7702, in run group 460, momentum 3.514,pos