# Test beam 2018: beam composition and purity

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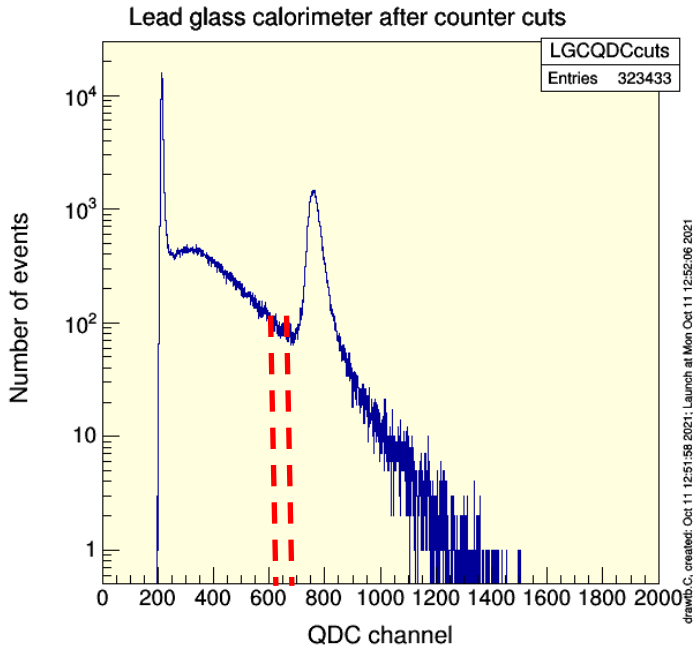
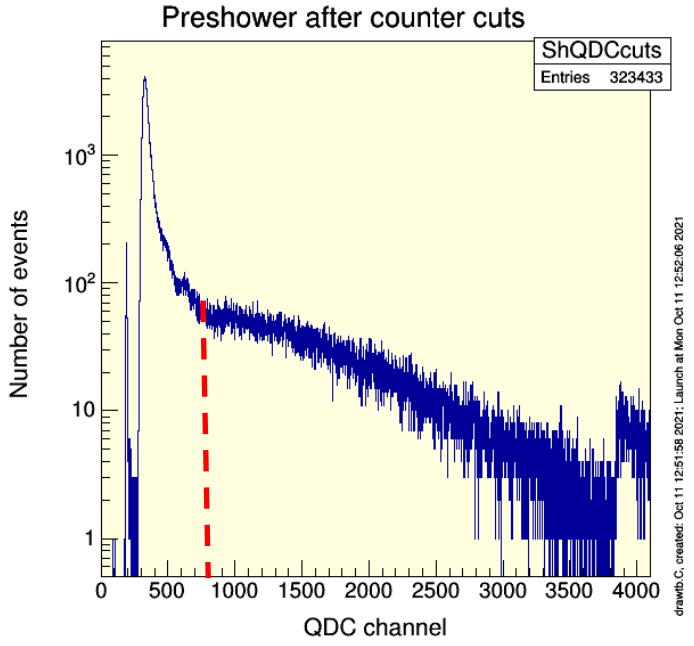
TRD meeting, 27.10.2021


Lead glass calorimeter after counter cuts
LGCQDCcuts
Entries 323433
Number of events
QDC channel
drawtb.C, created: Oct 11 12:51:58 2021; Launch at Mon Oct 11 12:52:06 2021


Preshower after counter cuts
ShQDCcuts
Entries 323433
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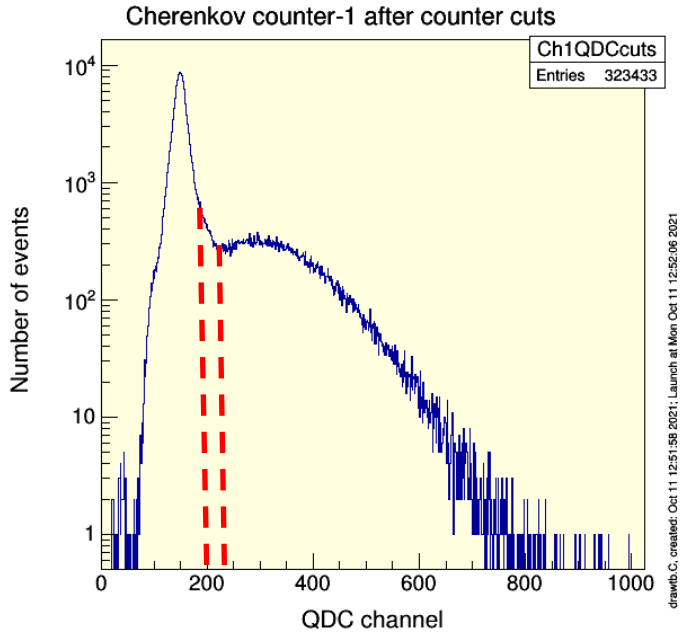
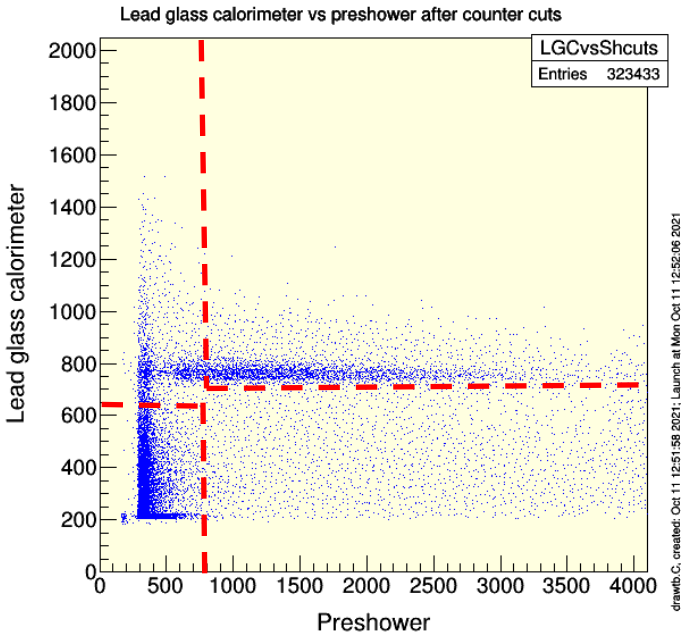
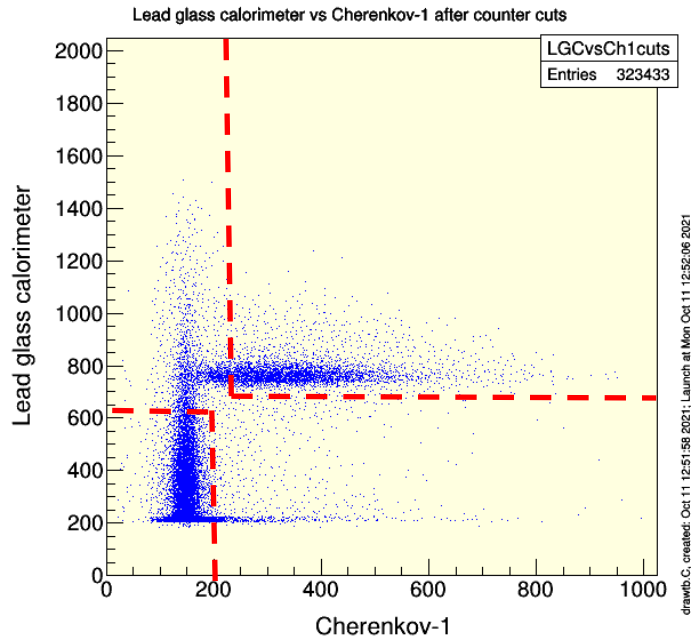
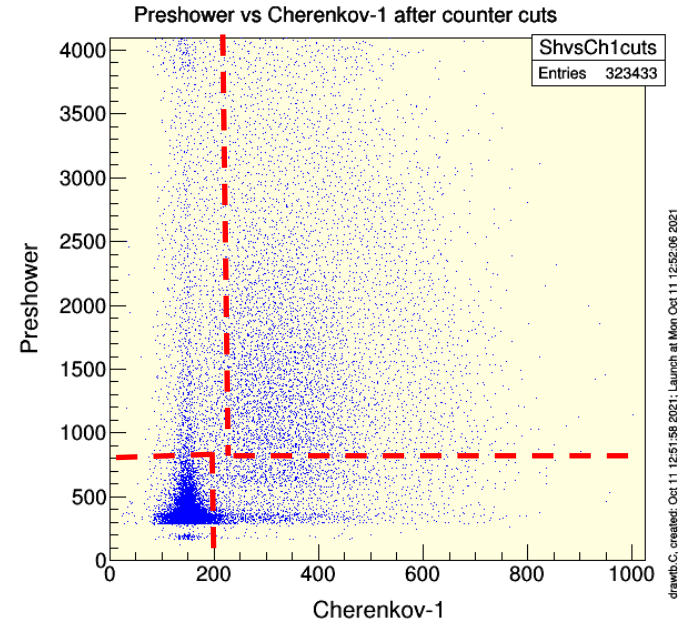
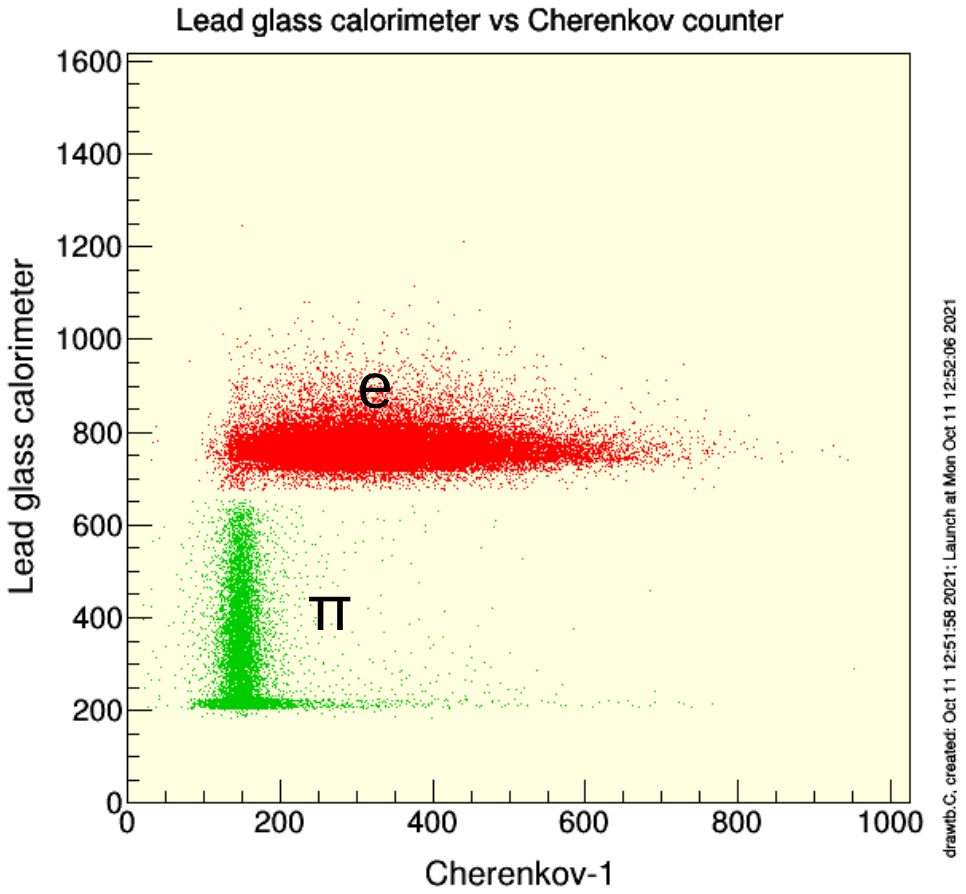
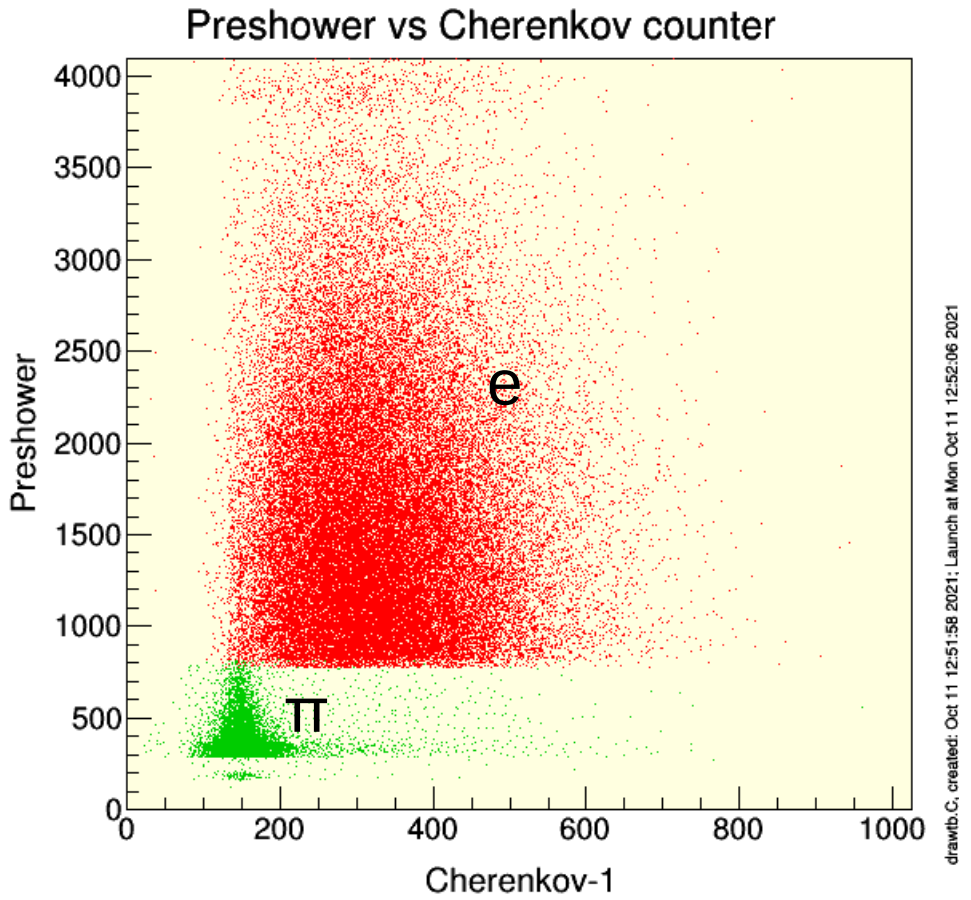

Cherenkov counter-1 after counter cuts
Ch1QDCcuts
Entries 323433
Number of events
QDC channel
drawtb.C, created: Oct 11 12:51:58 2021; Launch at Mon Oct 11 12:52:06 2021


Lead glass calorimeter vs preshower after counter cuts
LGCvsShcuts
Entries 323433
Lead glass calorimeter
Preshower
drawtb.C, created: Oct 11 12:51:58 2021; Launch at Mon Oct 11 12:52:06 2021


Lead glass calorimeter vs Cherenkov-1 after counter cuts
LGCvsCh1cuts
Entries 323433
Lead glass calorimeter
Cherenkov-1
drawtb.C, created: Oct 11 12:51:58 2021; Launch at Mon Oct 11 12:52:06 2021


Preshower vs Cherenkov-1 after counter cuts
ShvsCh1cuts
Entries 323433
Preshower
Cherenkov-1
drawtb.C, created: Oct 11 12:51:58 2021; Launch at Mon Oct 11 12:52:06 2021

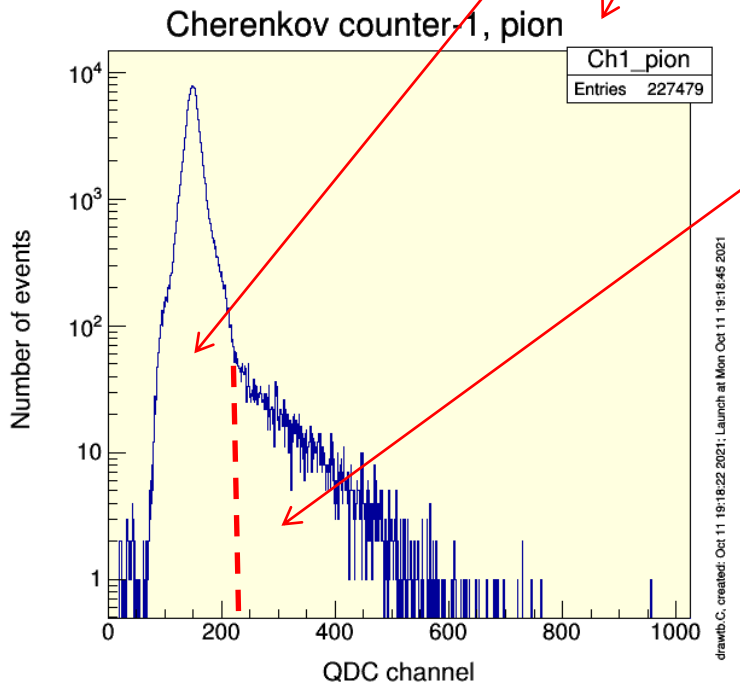


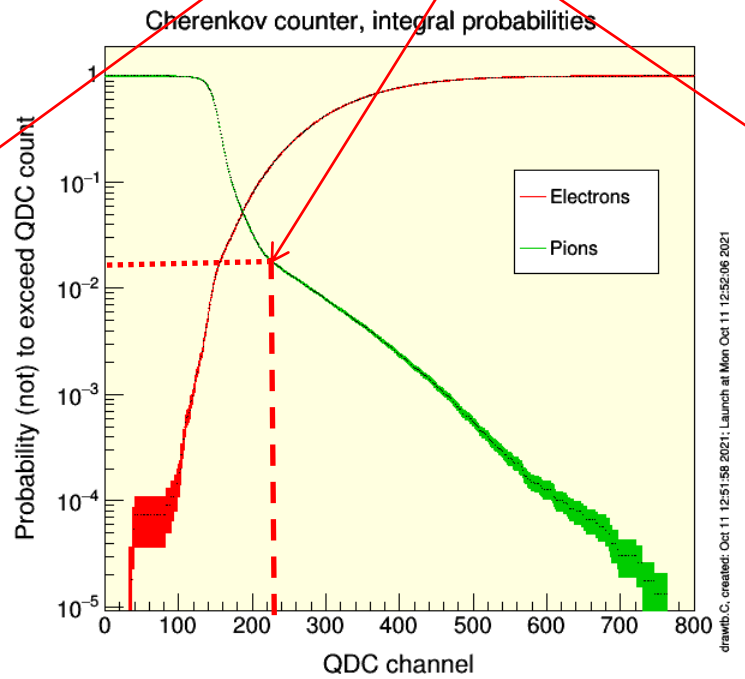



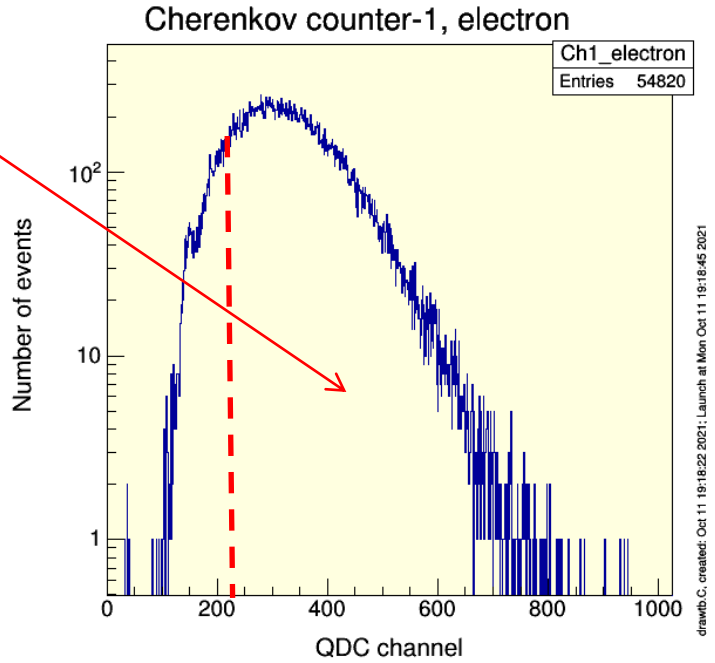

e and π in the plots here are samples selected via Preshower and Lead glass cuts as shown on previous slide (left bottom distribution)

# Pion sample purity: method1

1. Get pion and electron samples using selection in Preshower and Lead Glass
2. Look on Cherenkov signal of pion sample
3. Calculate fraction of events in this distribution with signal above electron threshold (230 channel of QDC). This is first approximation to estimate electron contamination in the pion sample (= 0.017).
4. Apply correction: due to not 100% efficiency of Cherenkov some part of electrons may have a signal below 230 QDC threshold, so are situated in this region. To estimate this efficiency of Cherenkov counter look on electron sample and calculate fraction of events above 230 threshold (= 0.84).
5. Final estimation of pion sample impurity (i.e. fraction of electrons in pion sample): 0.017/0.84 = 0.02

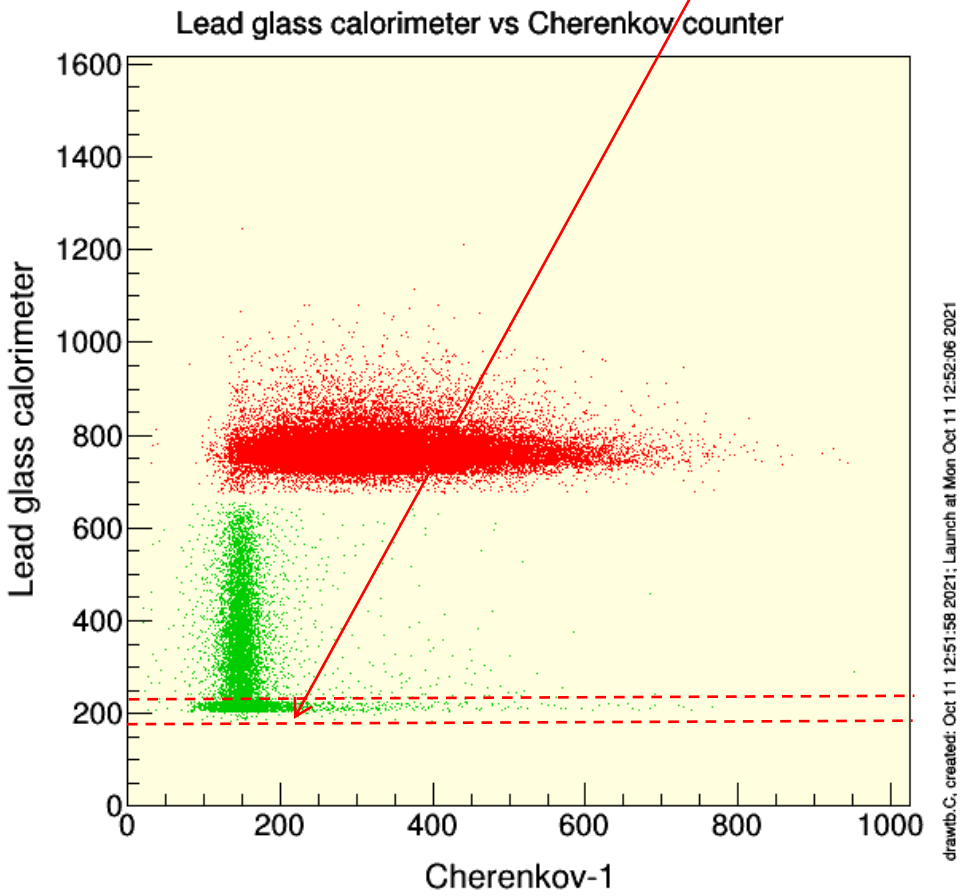


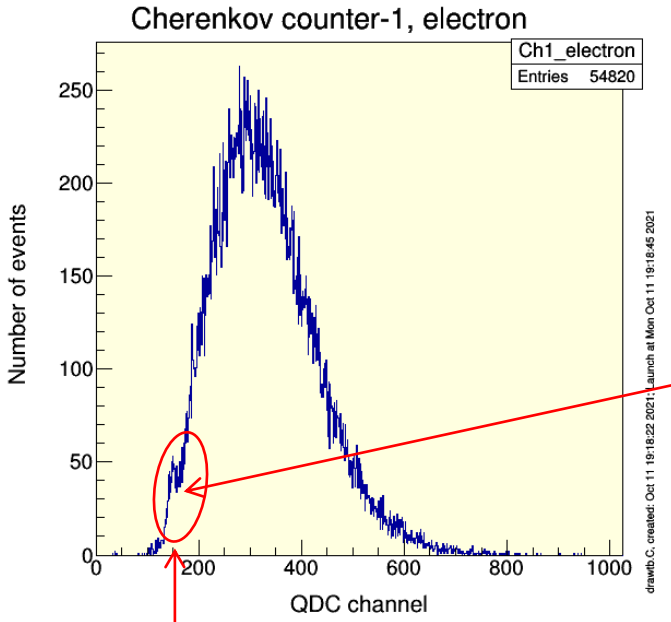



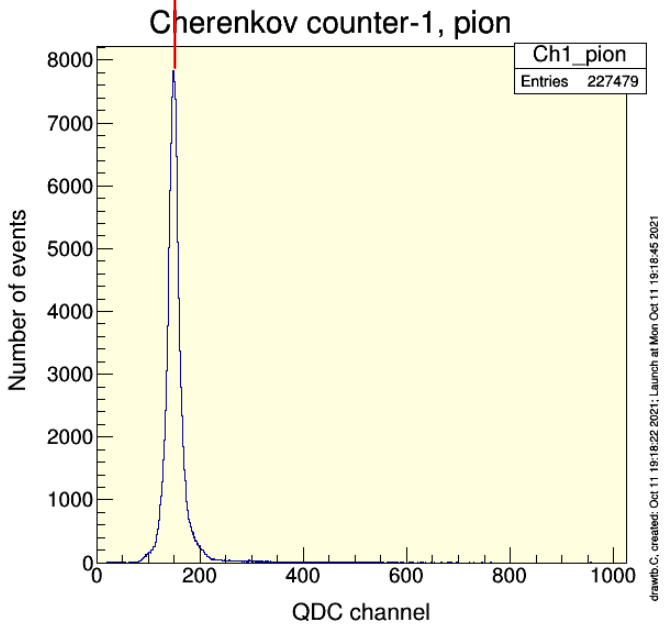
# Pion sample purity: method1

- Remark: if exclude this region from definition of pion sample, the pion sample impurity will be 0.004, i.e. 5 times smaller. Muons? Double particles in event?



# Electron sample purity: method1

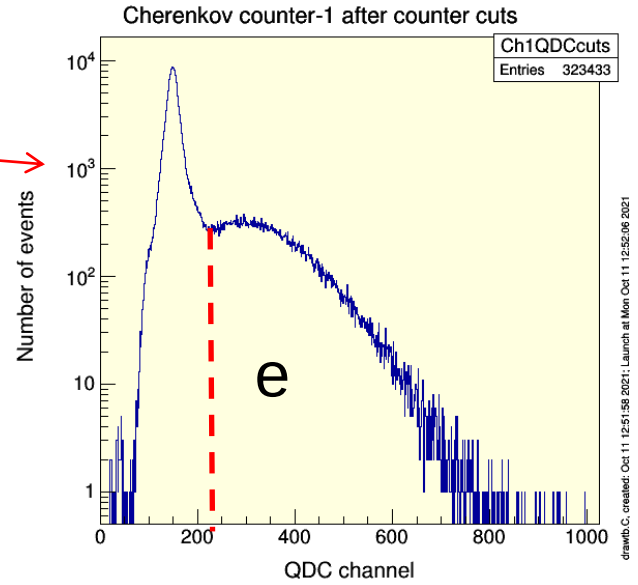


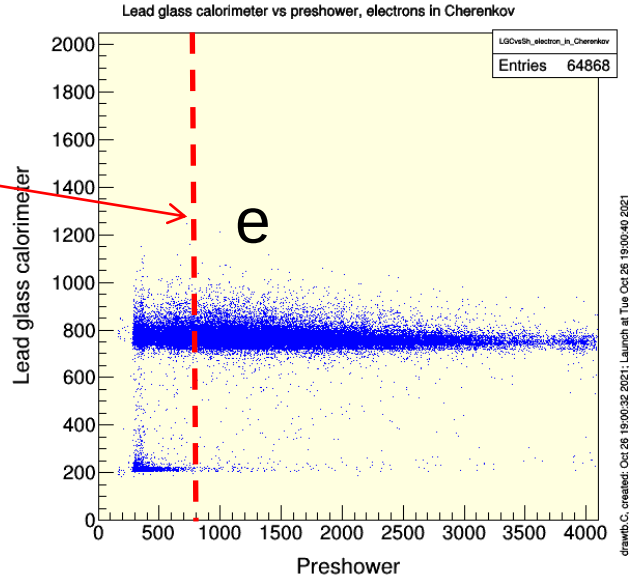

- Contamination of pions in selected electrons can be estimated via number of events in this excess. Rough estimation gives 0.005 of electron sample impurity, i.e. fraction of pions in elrectron sample.
- More accurate estimation can be obtained via fit - trying

# Electron sample purity: method2

Step 1: Select electrons in Cherenkov counter.

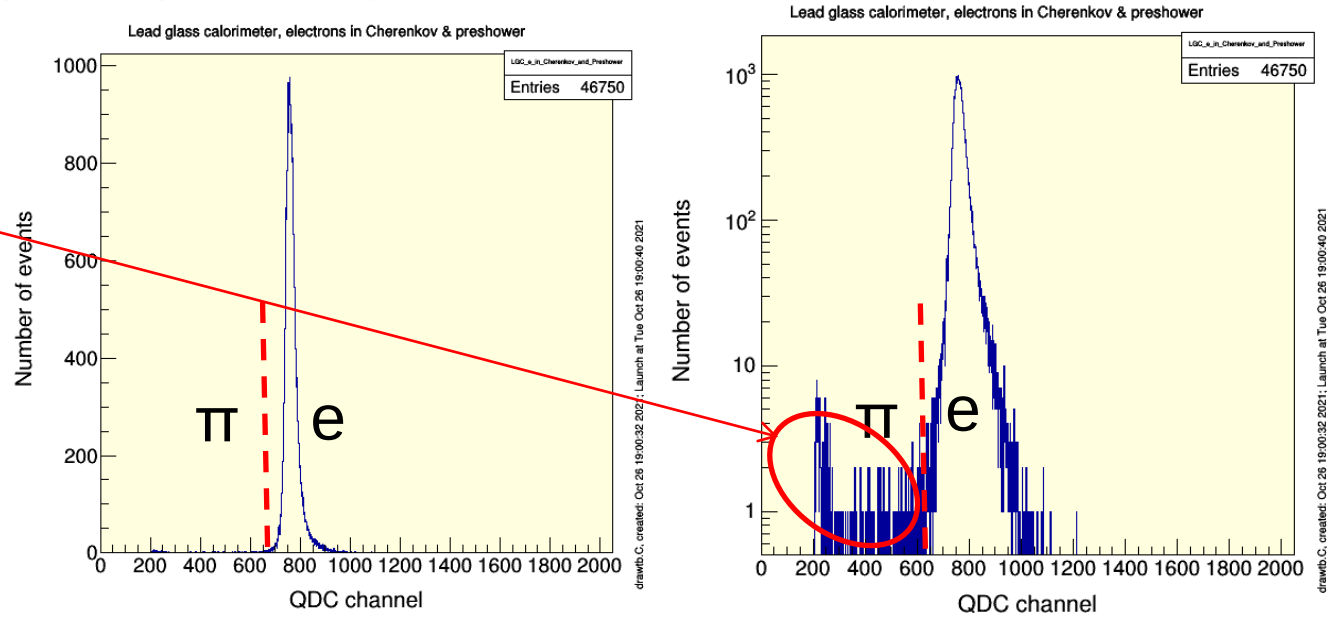



Step 2: Apply cuts for electrons in Preshower.



# Electron sample purity: method2

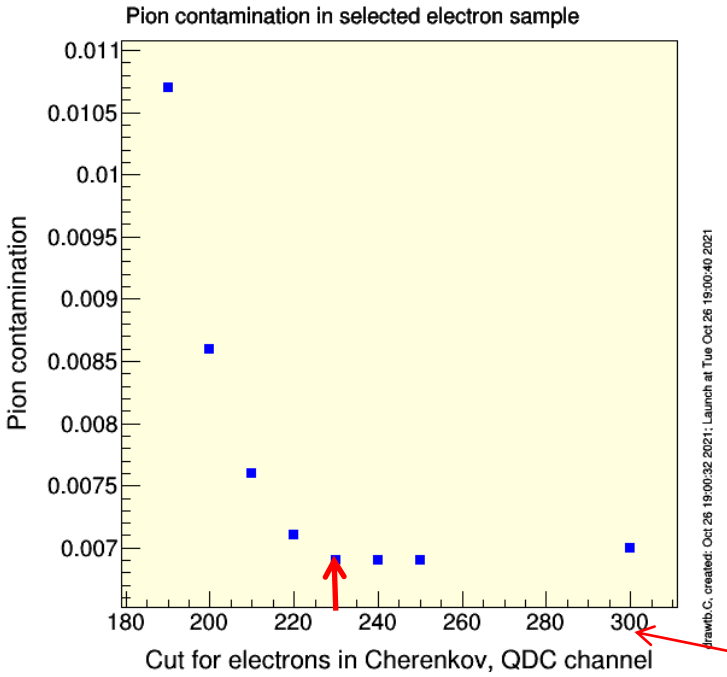
Step 3: Look on distribution of selected electron sample in Lead Glass and define fraction of pions

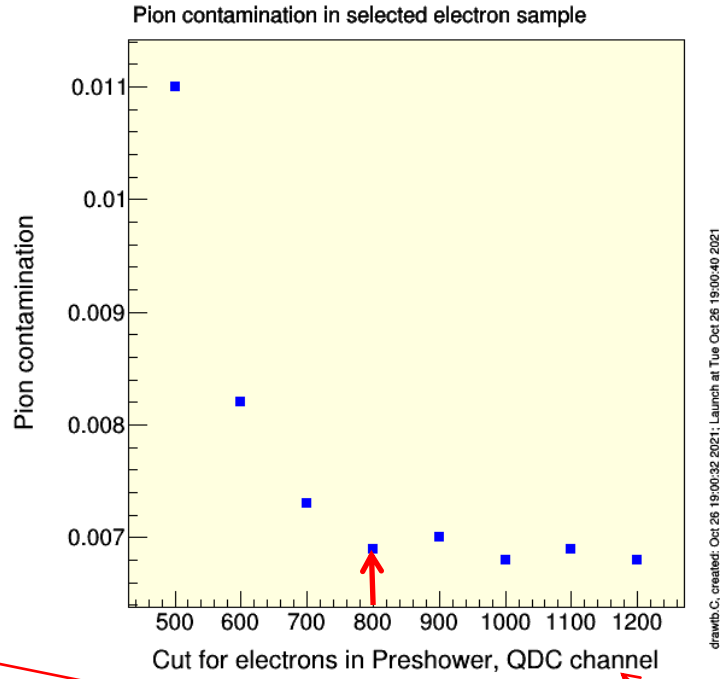


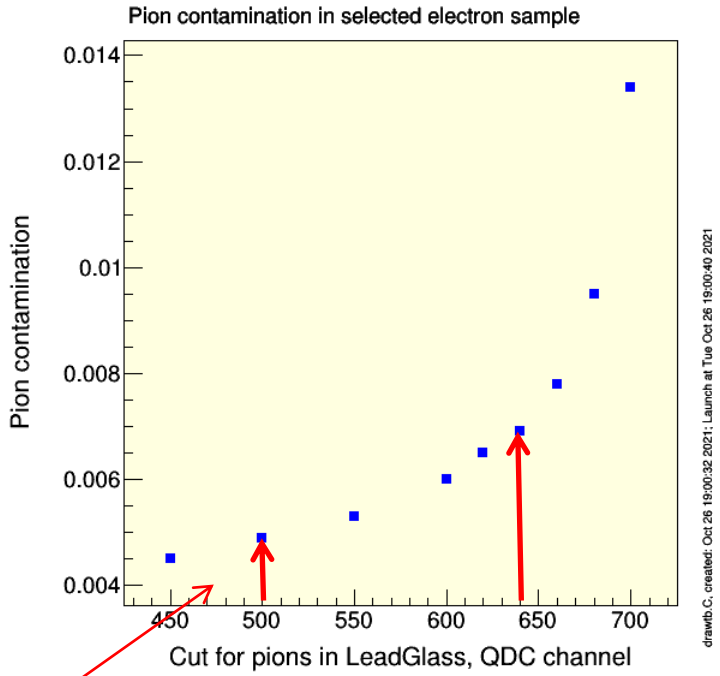

Result: obtained pion contamination in selected electron sample = 0.0069

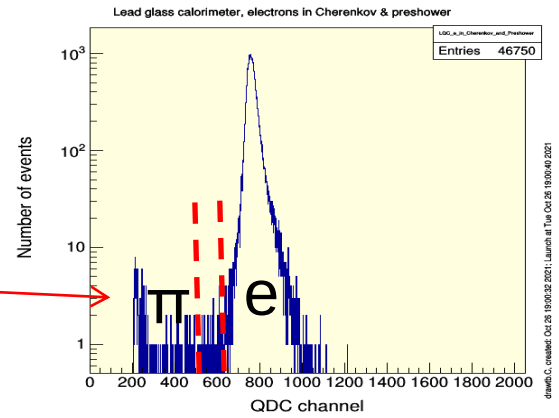
# Electron sample purity: method2

Remark: Both electron sample definition and pion contamination fraction are cut-dependent.




- Choice of cuts for electron sample definition in Cherenkov and Preshower looks reasonable.
- For definition of pion contamination the choice of cut in Lead Glass is more or less arbitrary. E.g. moving this cut from default 640 QDC to 500 changes estimation of pion contamination from ~0.007 to 0.005