

N photons raw

Maria

Track selection:

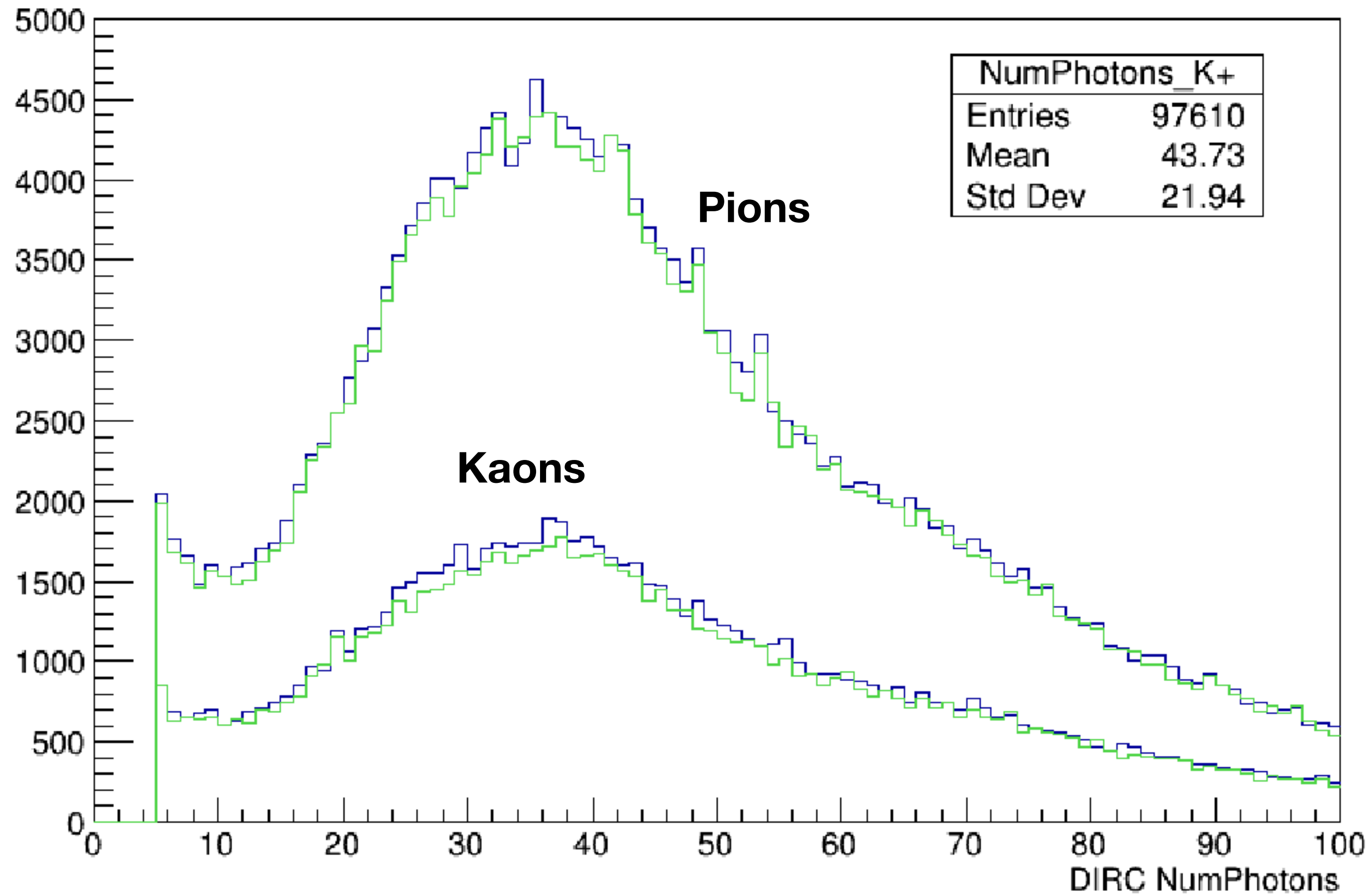
1. preliminary selection - reconstruction of reactions: $\text{pho} \rightarrow \text{pi}^+$, pi^- and $\text{phi} \rightarrow \text{K}^+$, K^- using `dirc_reaction` plugin (no cut on missing mass!)
2. tracks with best χ^2 of kinematic fit (out of all possible combos)
3. tracks of pi and K , which hit the lower DIRC half
4. for the Cherenkov photons I use a loose time cut: [10, 120] ns
5. I consider only tracks pi , L with $p > 4 \text{ GeV}/c$.

Missing dipion mass for my current sample for the 1 and 2 track cases. Did not check if there a nice ρ peak in both? (Same question for the phi .)

Track selection is not optimal. These are preliminary plots with the existing data set

Npho does not depend on charge of the track

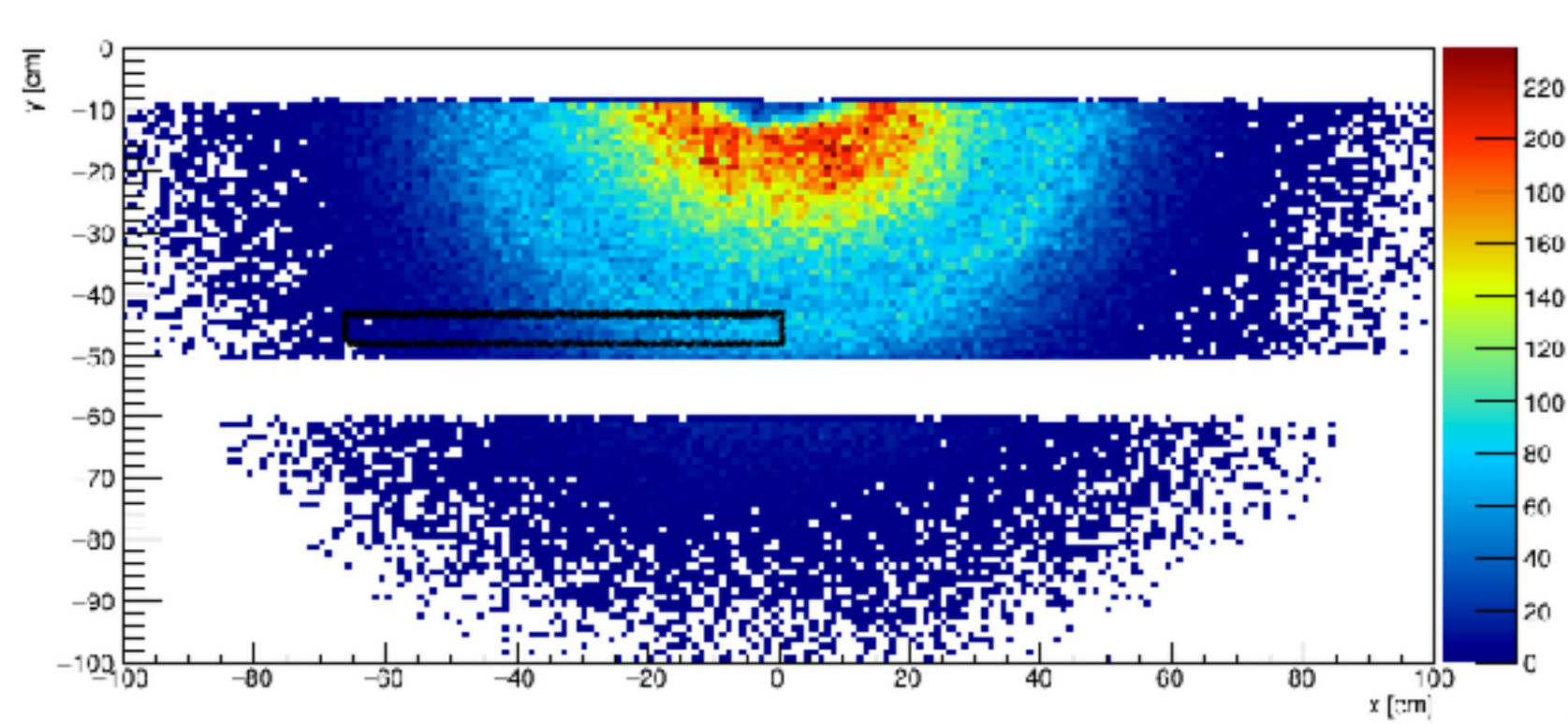
kaons from phi, pions from rho



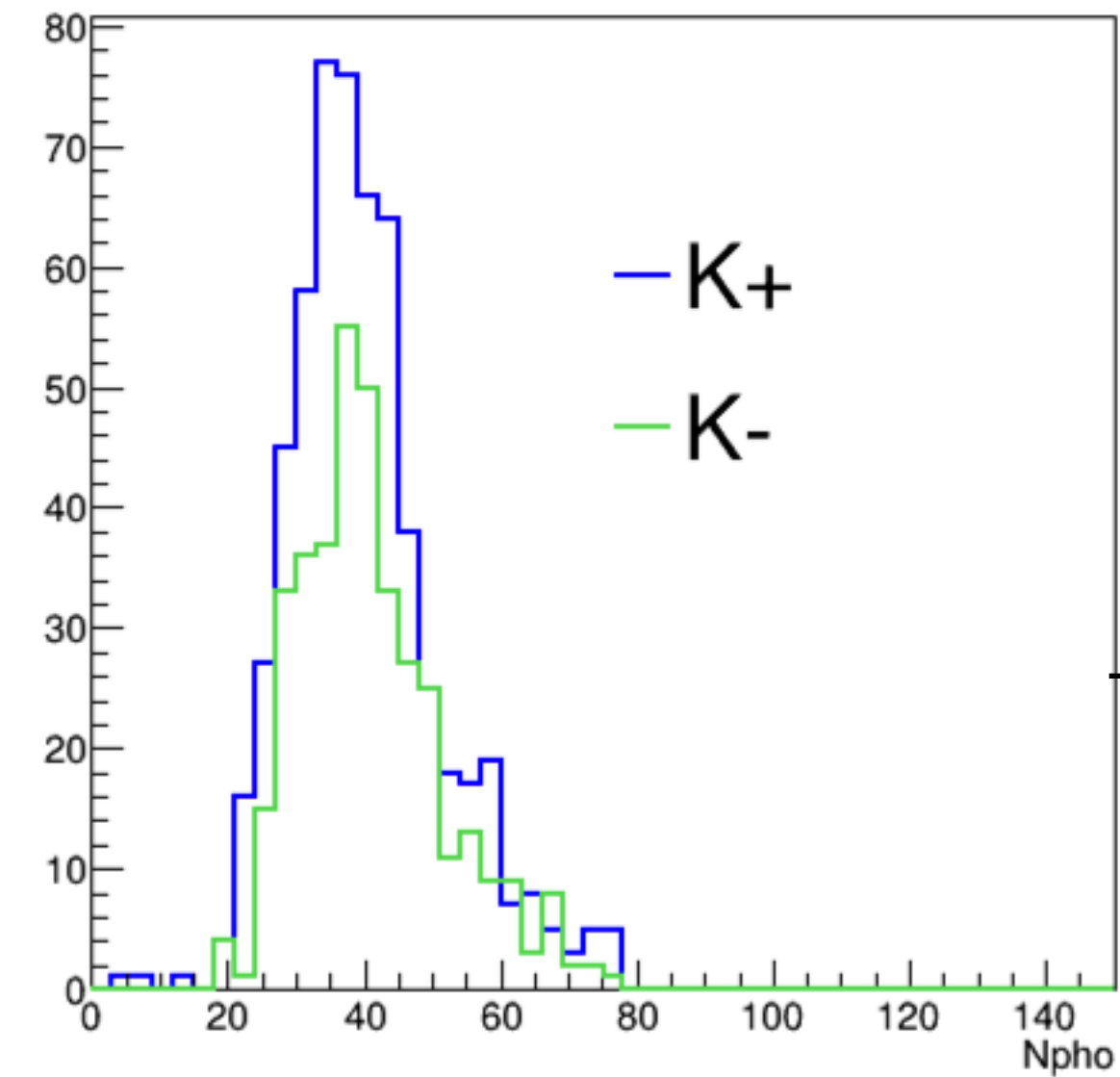
-> for my N pho
expected

Npho and charge of the track for particular tracks

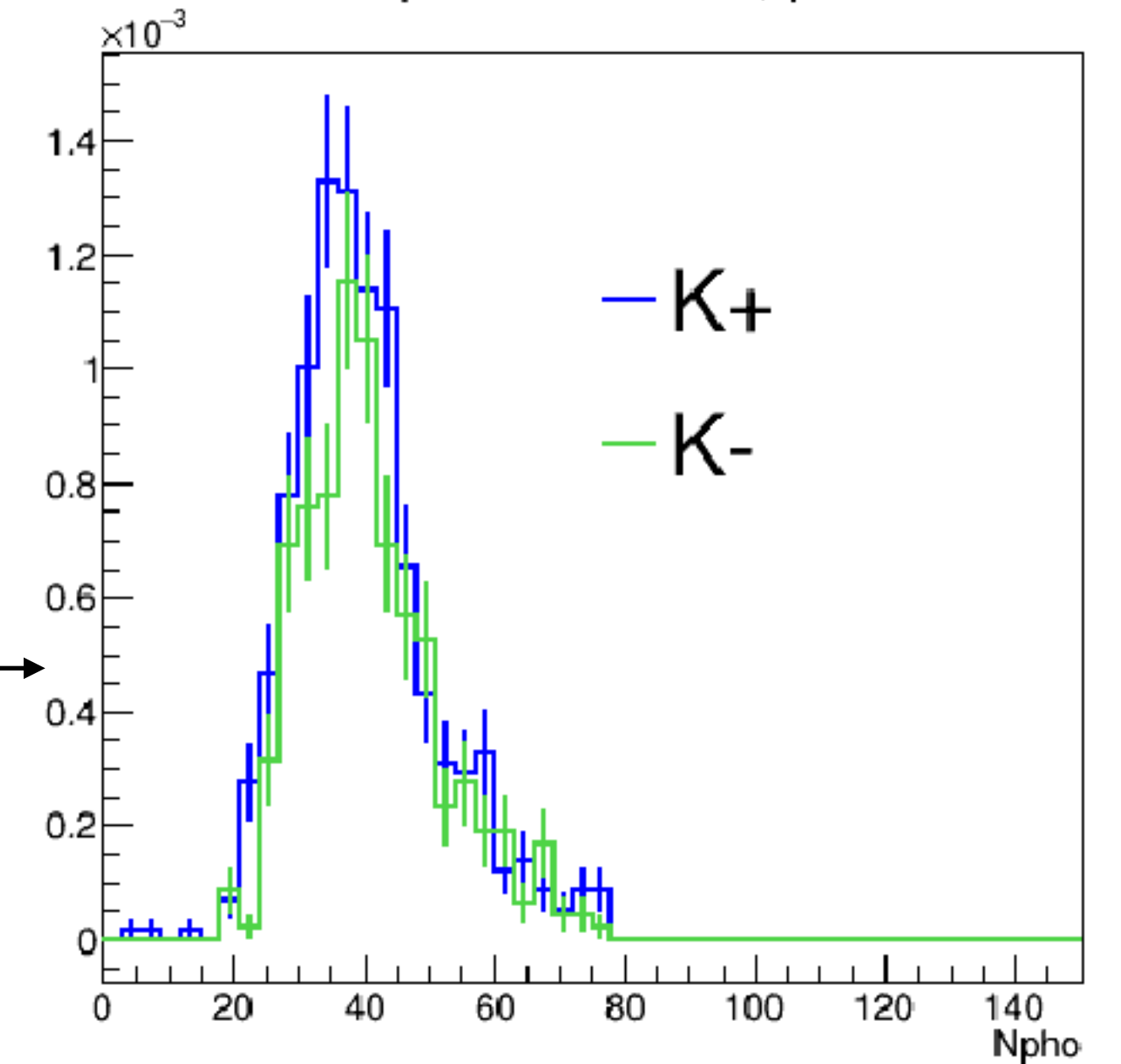
Single track events hitting the lower DIRC half
with $p > 4$ GeV/c , time cut [20; 120] ns



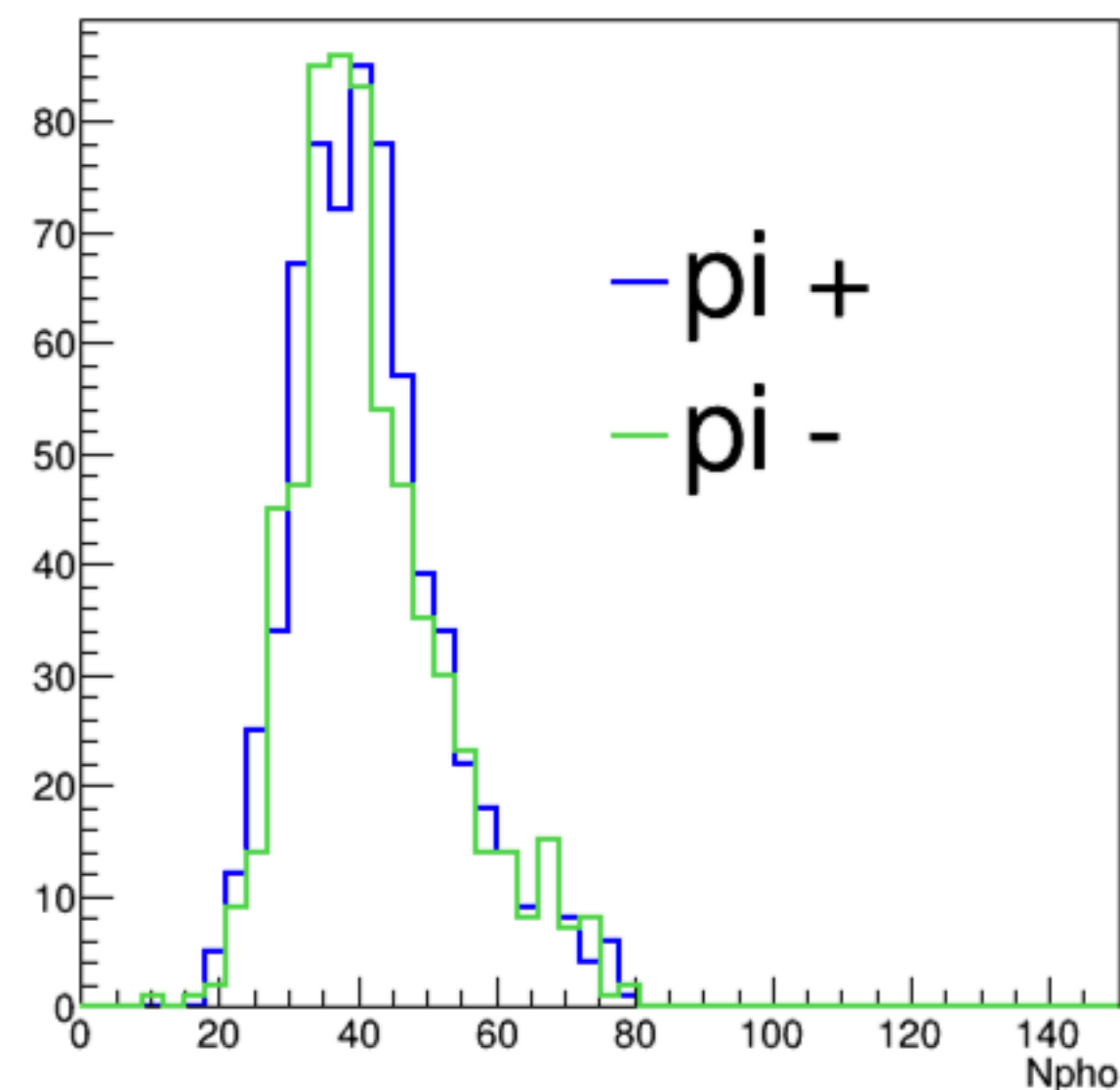
n photons for ka, pi



n photons for ka, pi



n photons for ka, pi

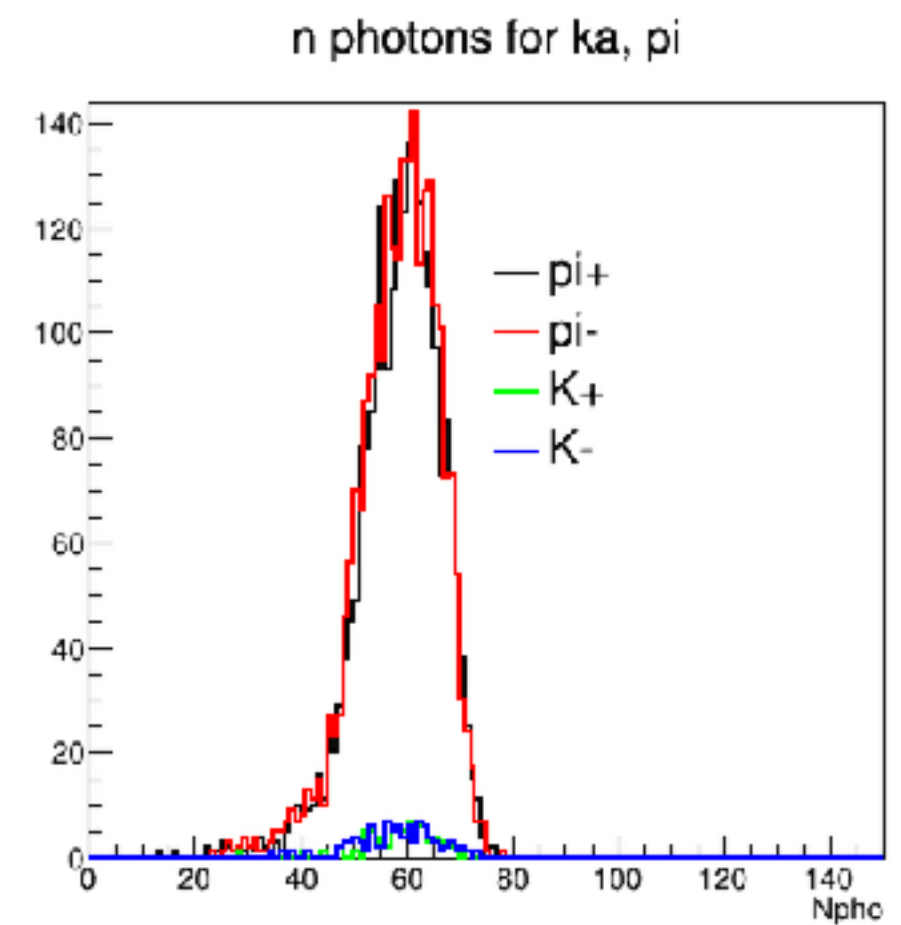
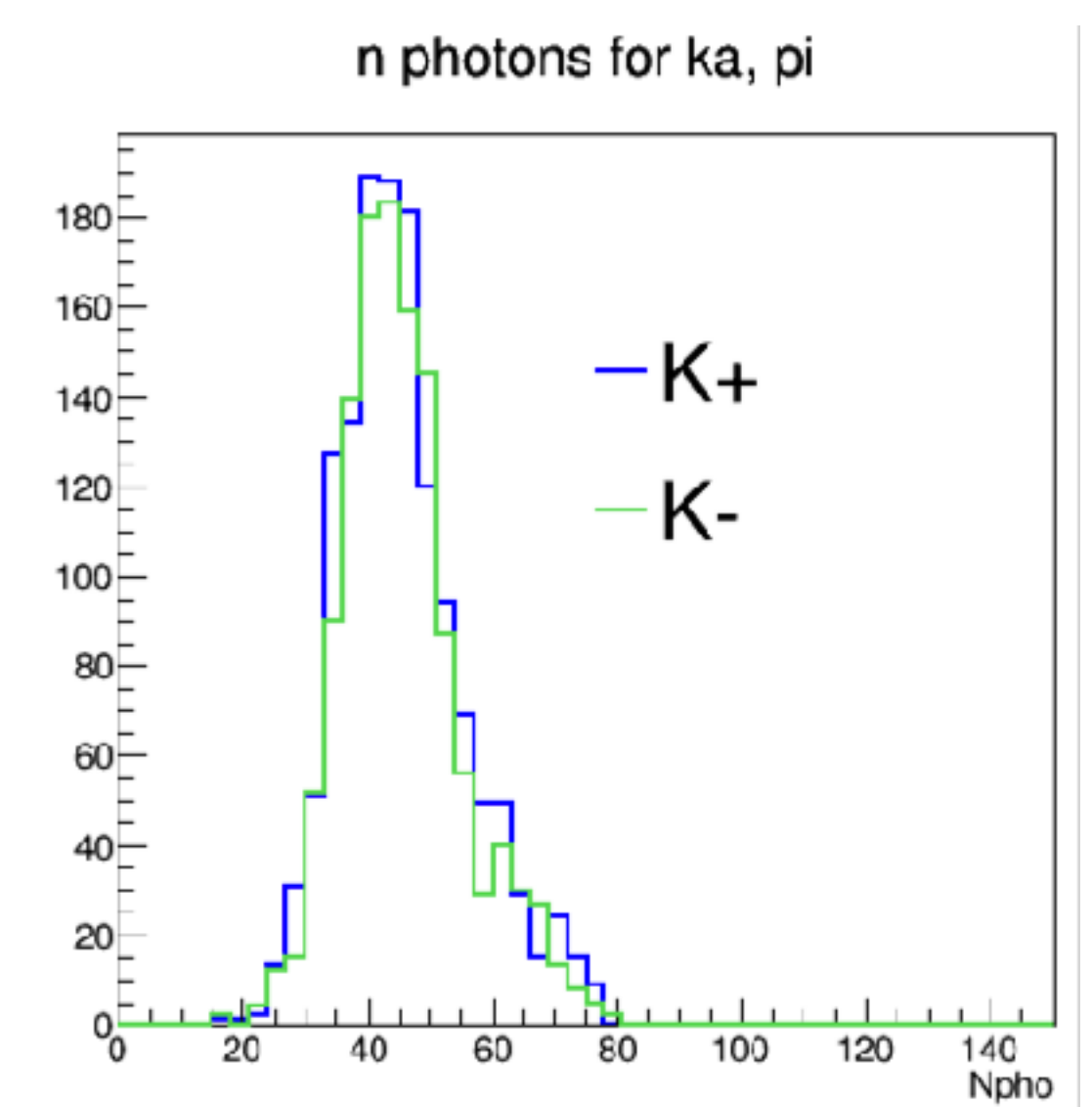
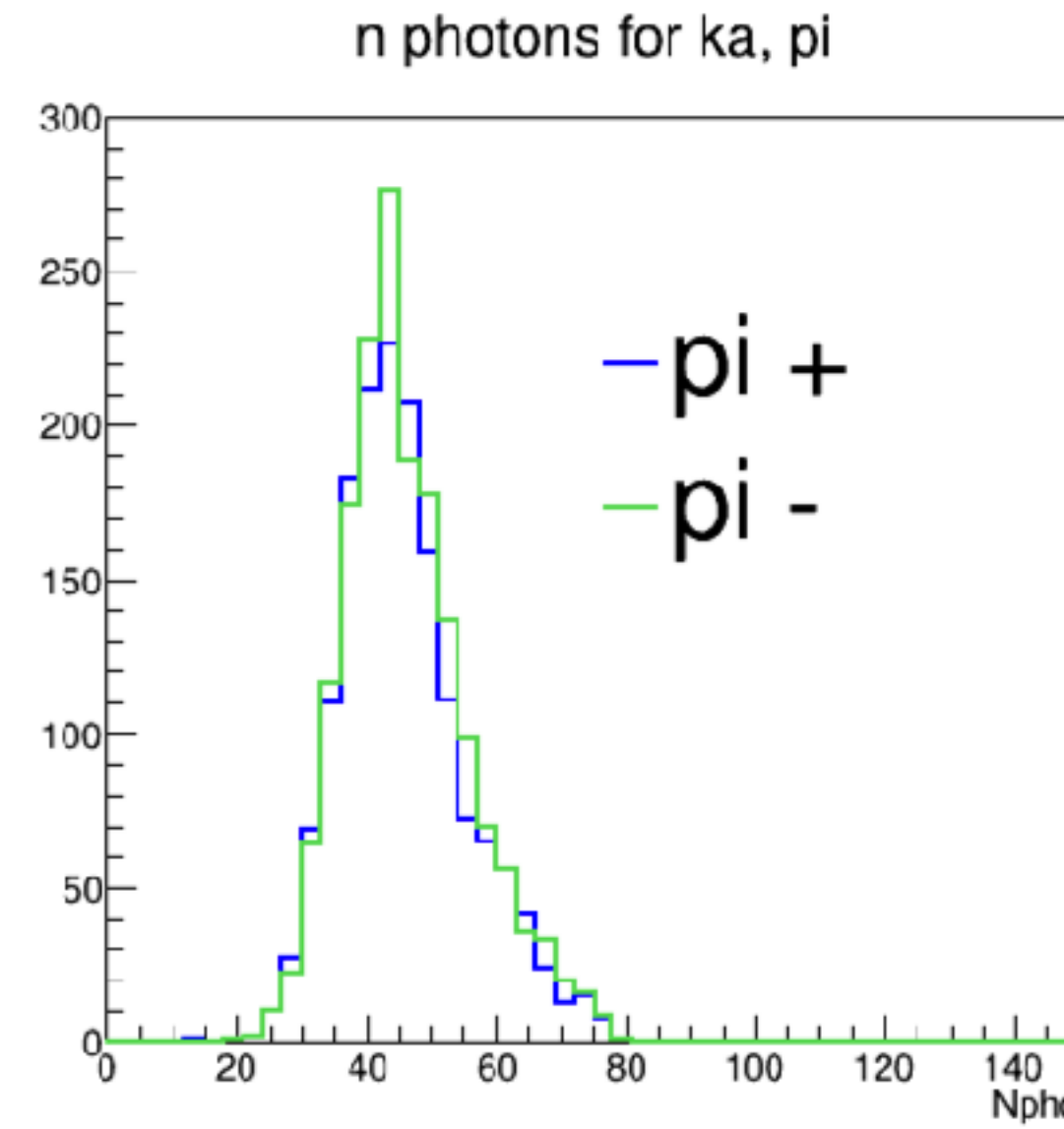
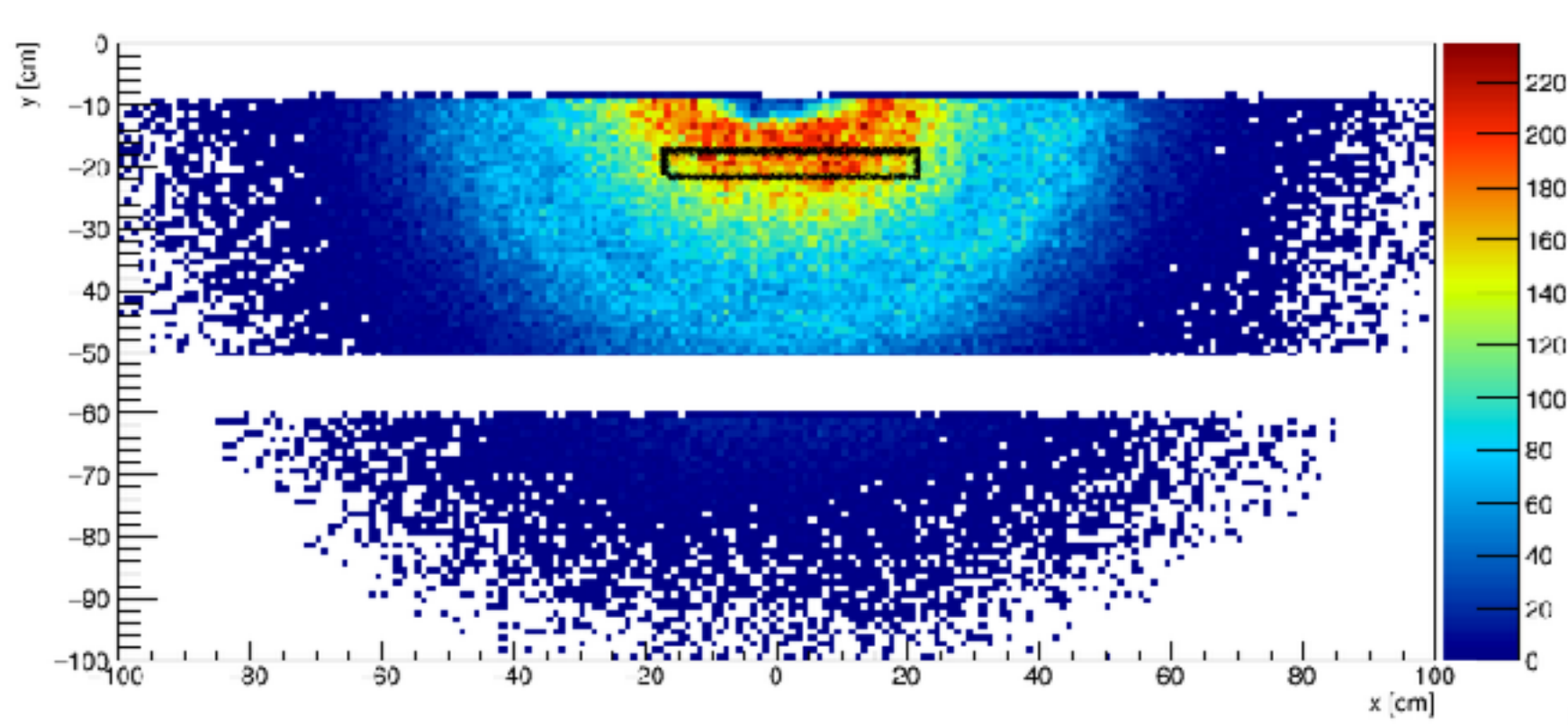


Seems that in data the
number of K^- is less than K^+

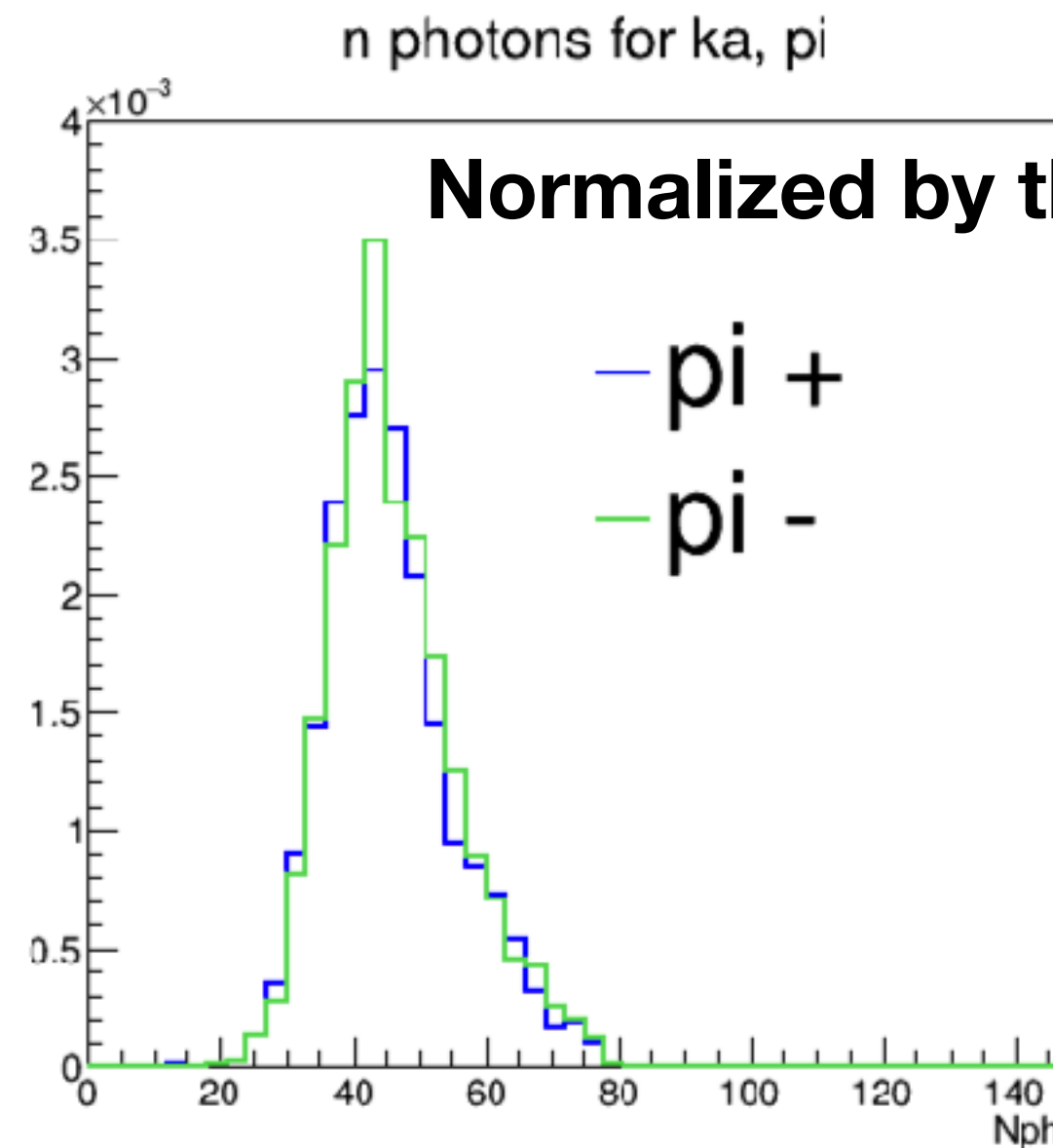
Normalized by the total
number of K^- and K^+

Npho and charge of the track for particular tracks

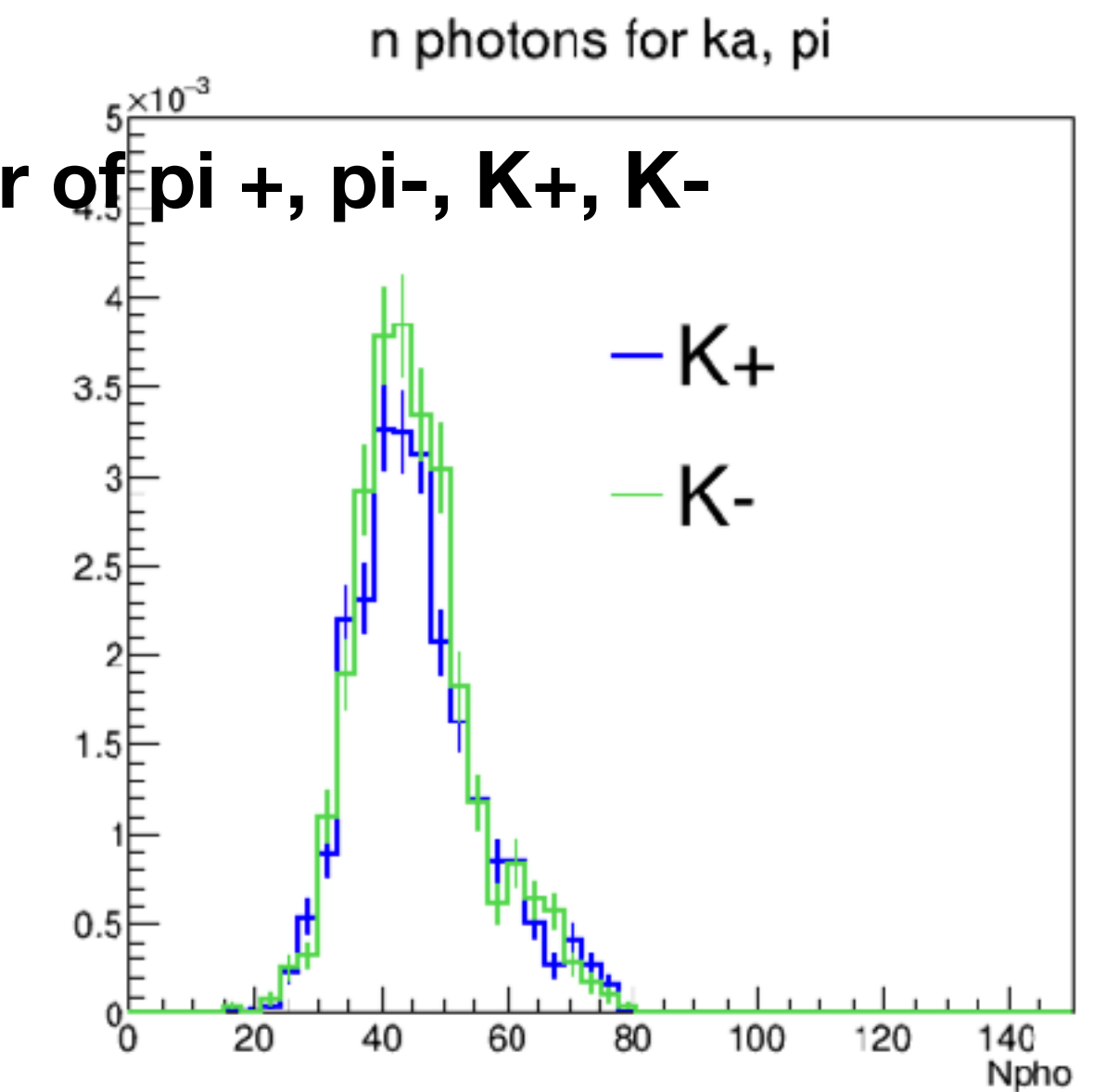
Single track events hitting the lower DIRC half
with $p > 4$ GeV/c , time cut [20; 120] ns



bggen

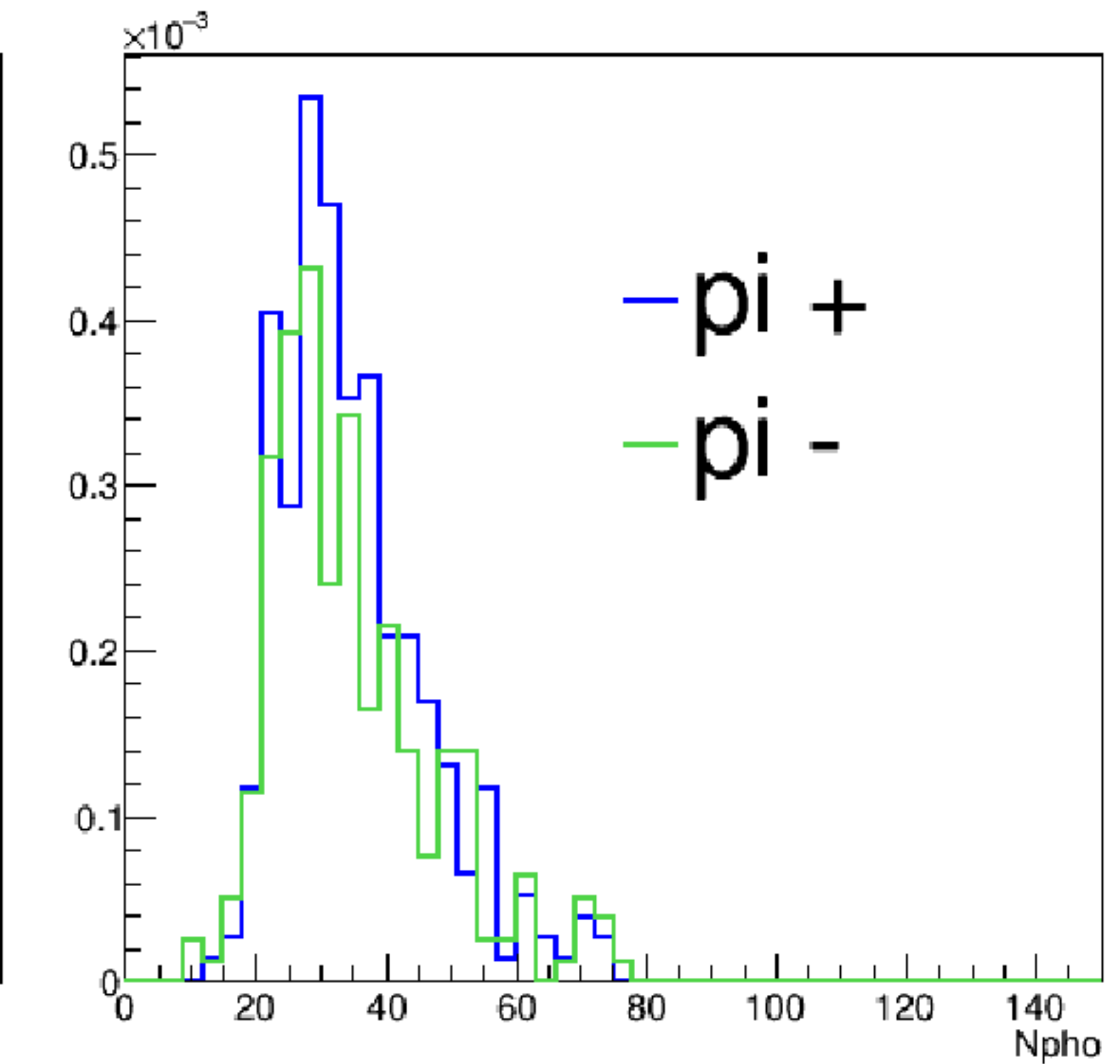
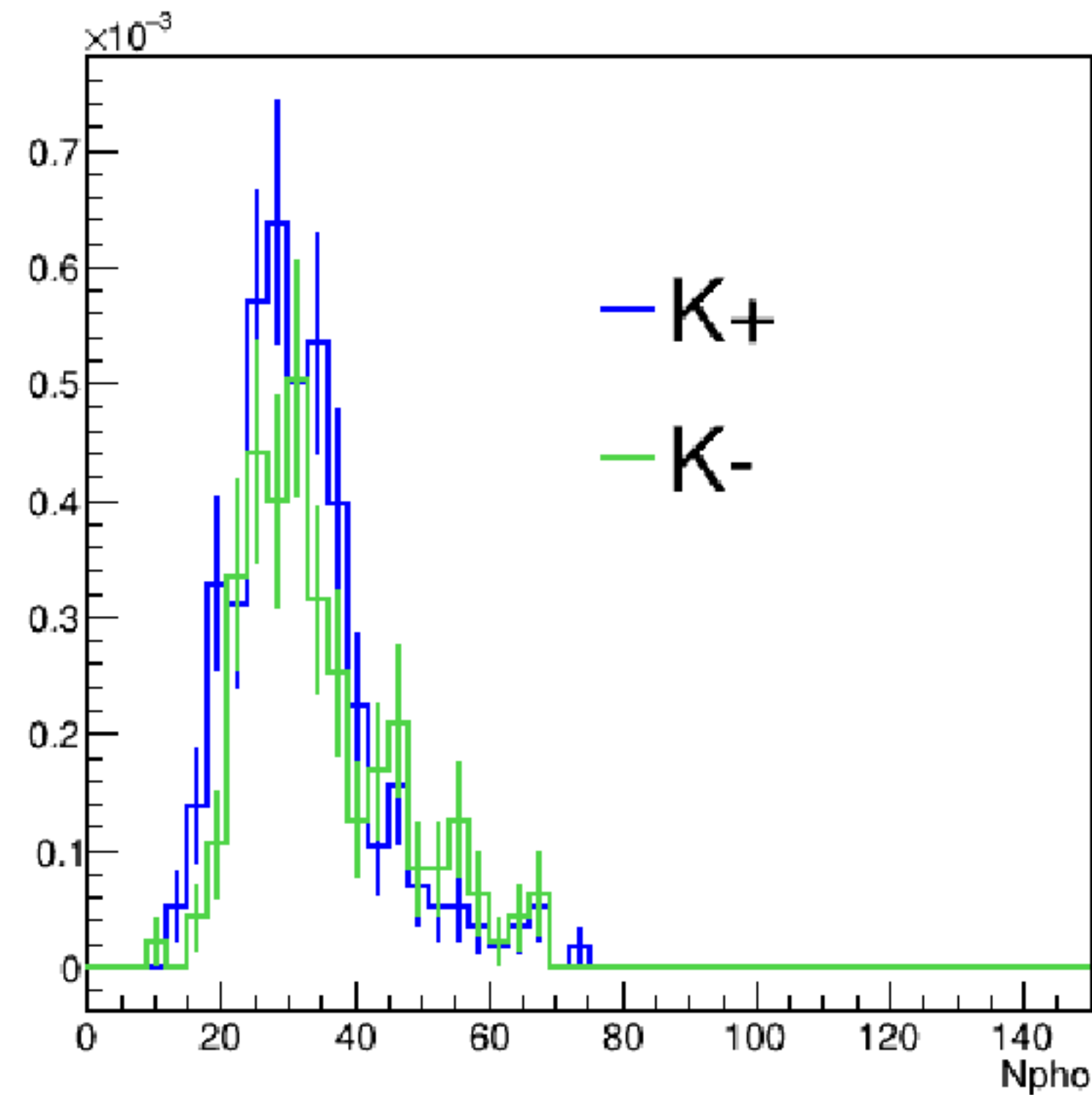
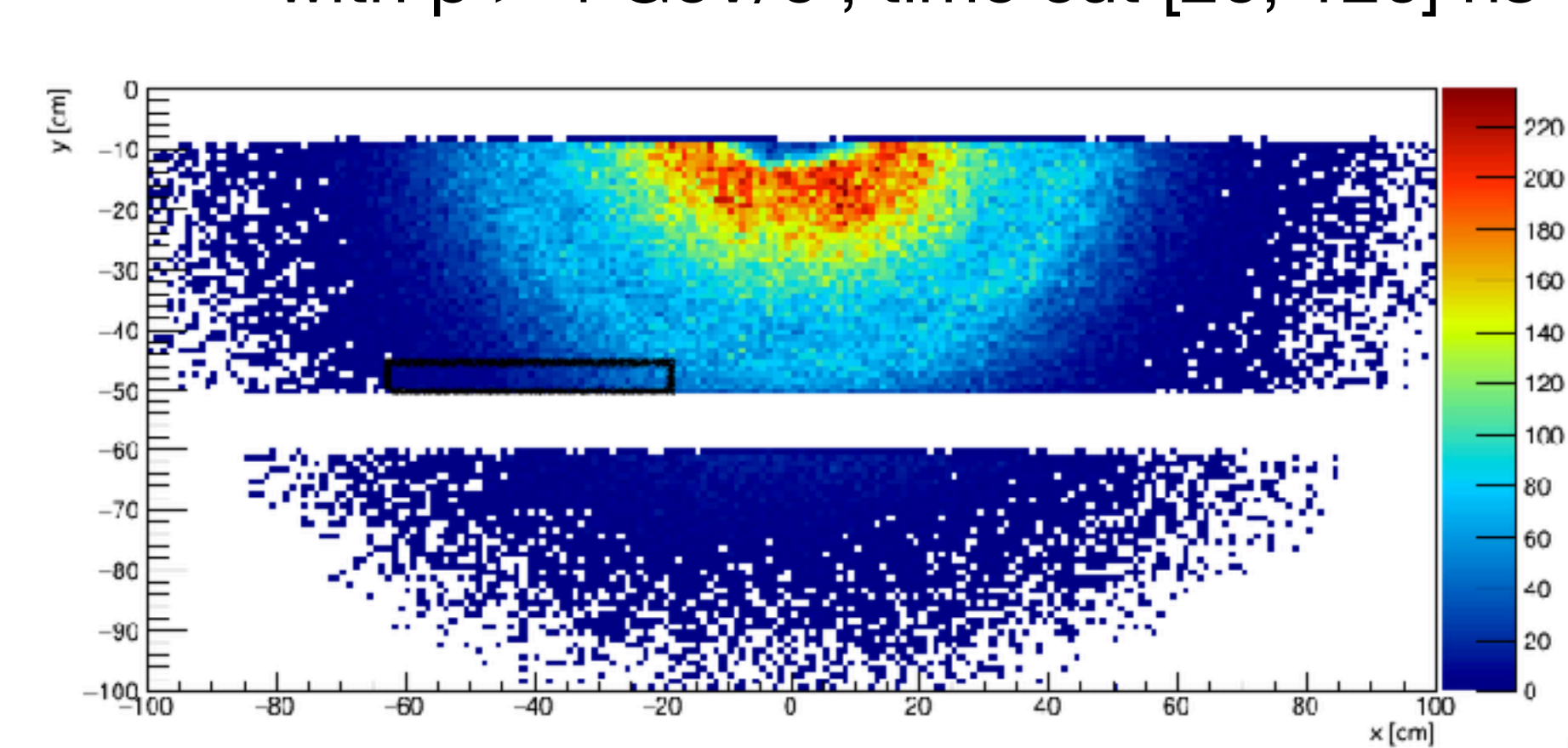


Normalized by the number of π^+ , π^- , K^+ , K^-



Npho and charge of the track for particular tracks

Single track events hitting the lower DIRC half
with $p > 4$ GeV/c , time cut [20; 120] ns

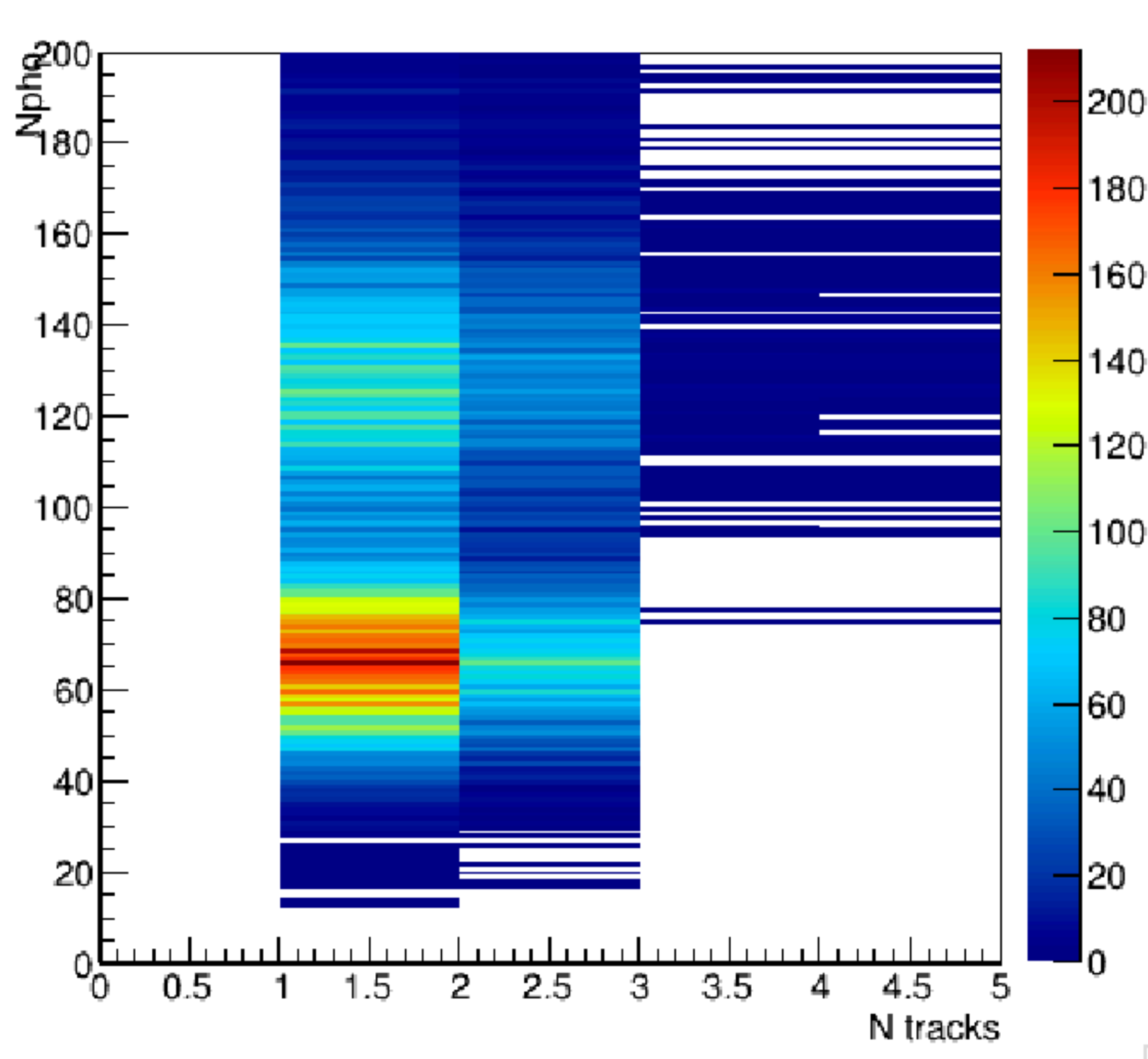


Normalized by the number of corresponding charged particles

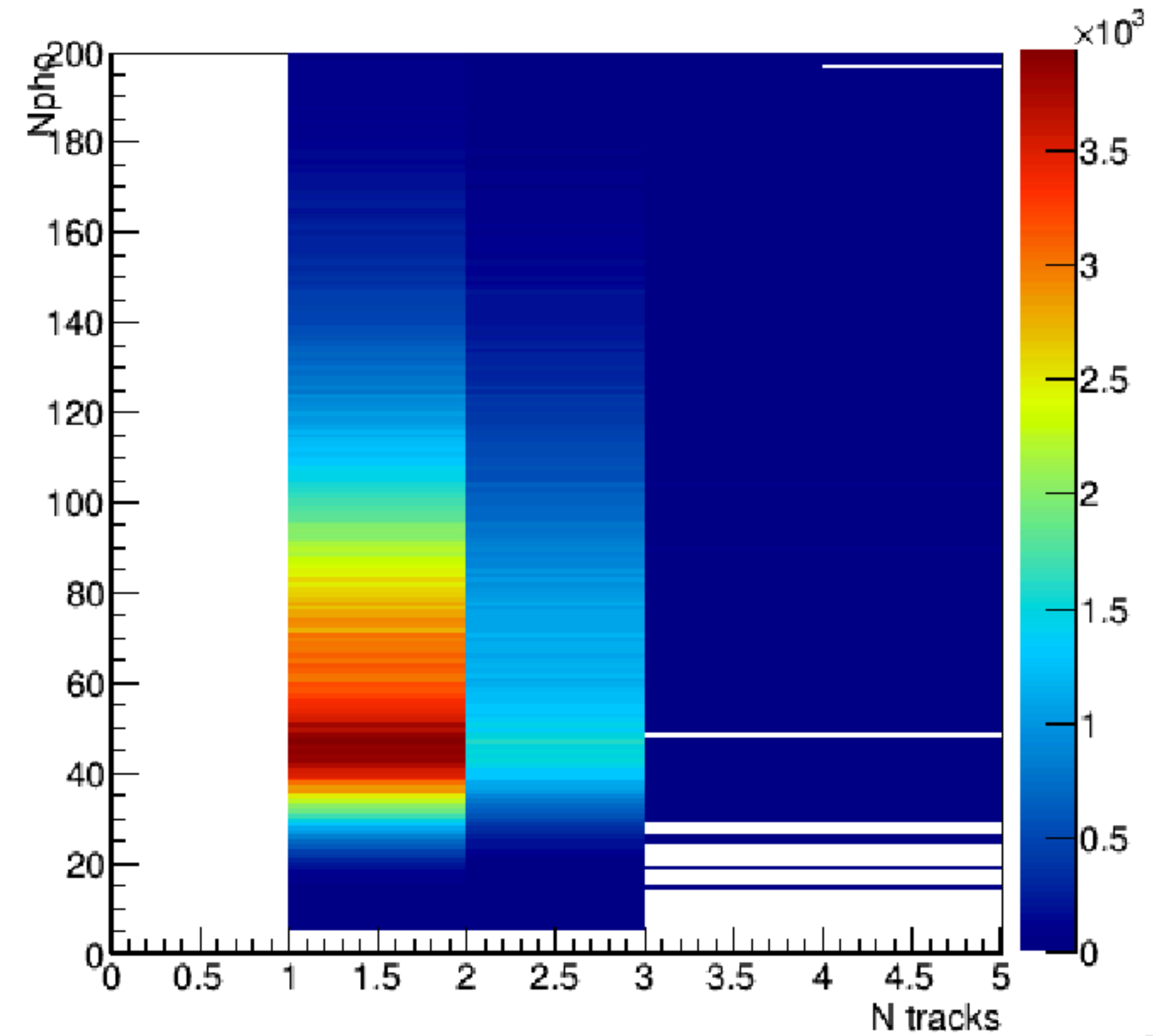
Npho in an event vs. track number

No DIRC reconstruction, tracks with $p > 4$ GeV/c hit the lower DIRC half

Here bggen file includes around the same number of kaons and pions



bggen



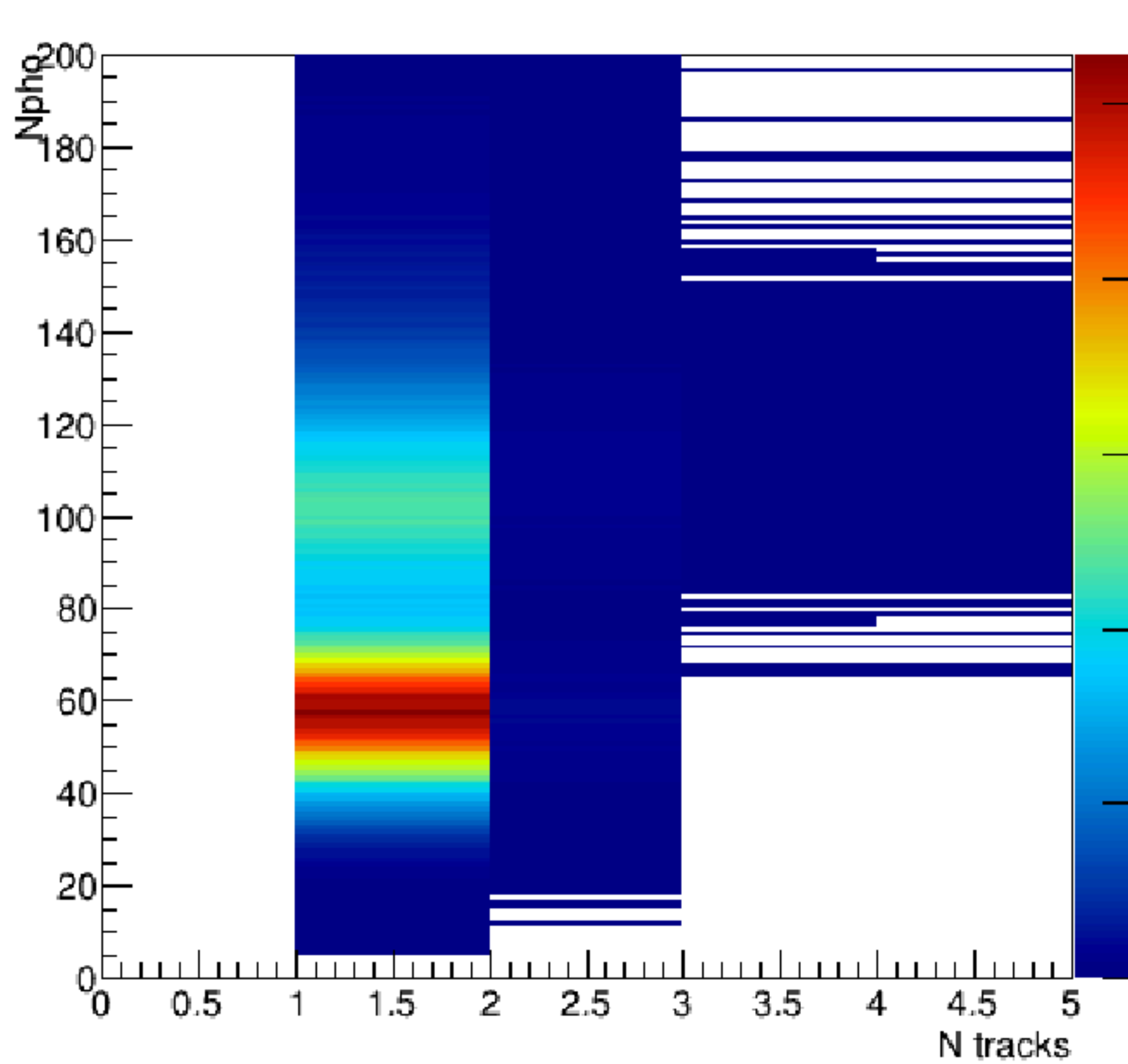
data

N pho does not grow with track number

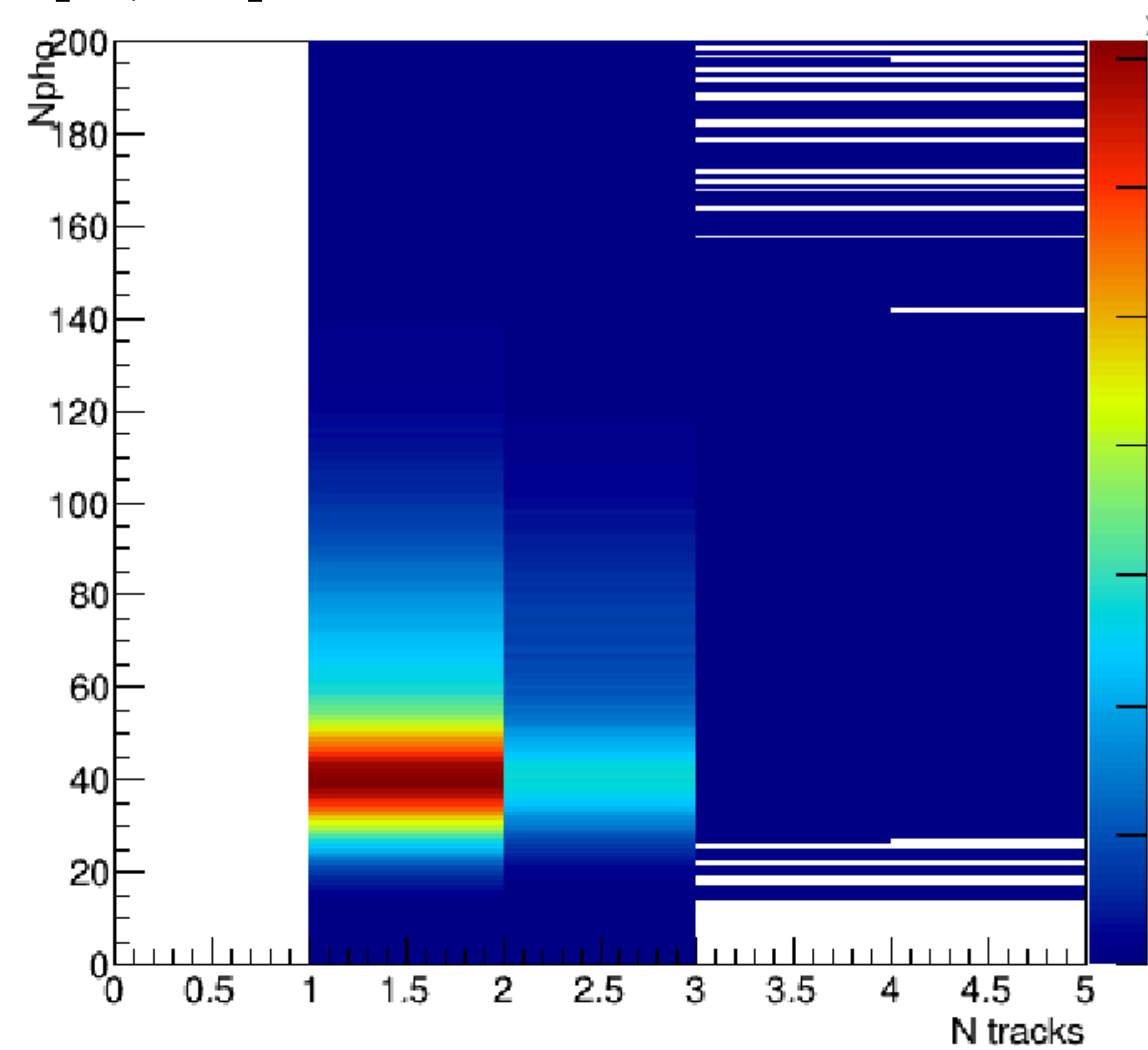
Npho in an event vs. track number

No DIRC reconstruction, tracks with $p > 4$ GeV/c hit the lower DIRC half
+ loose time cut [10; 120] ns

Here bggen
file includes
much more
pions than
kaons

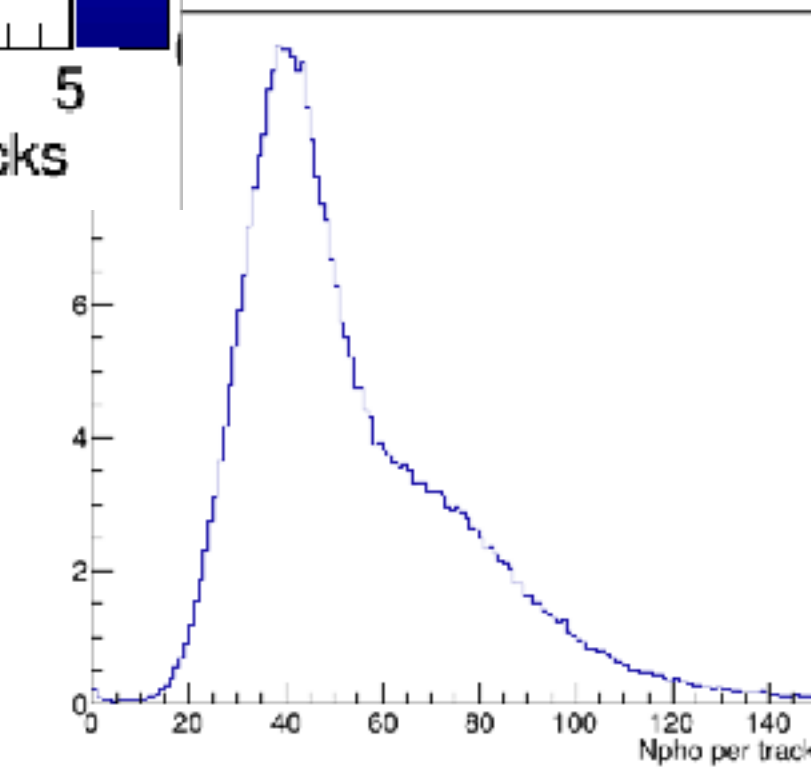
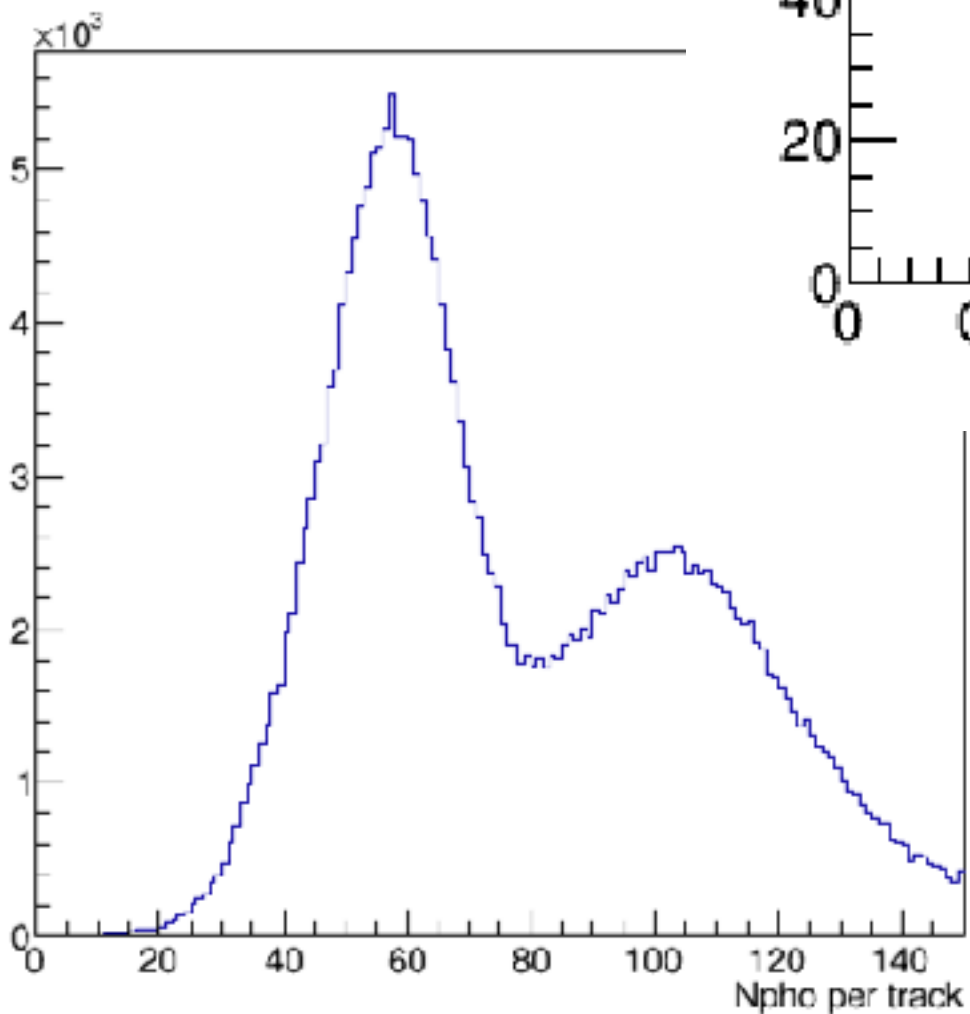


bggen



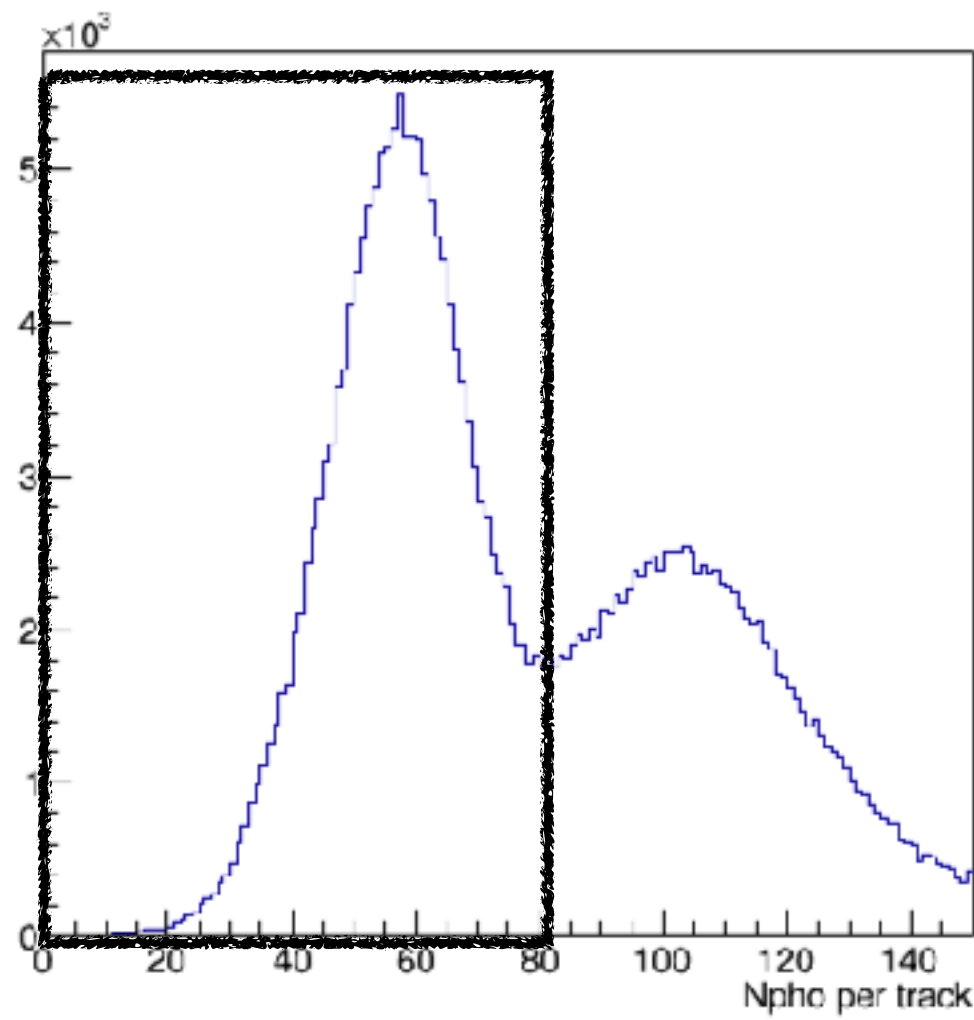
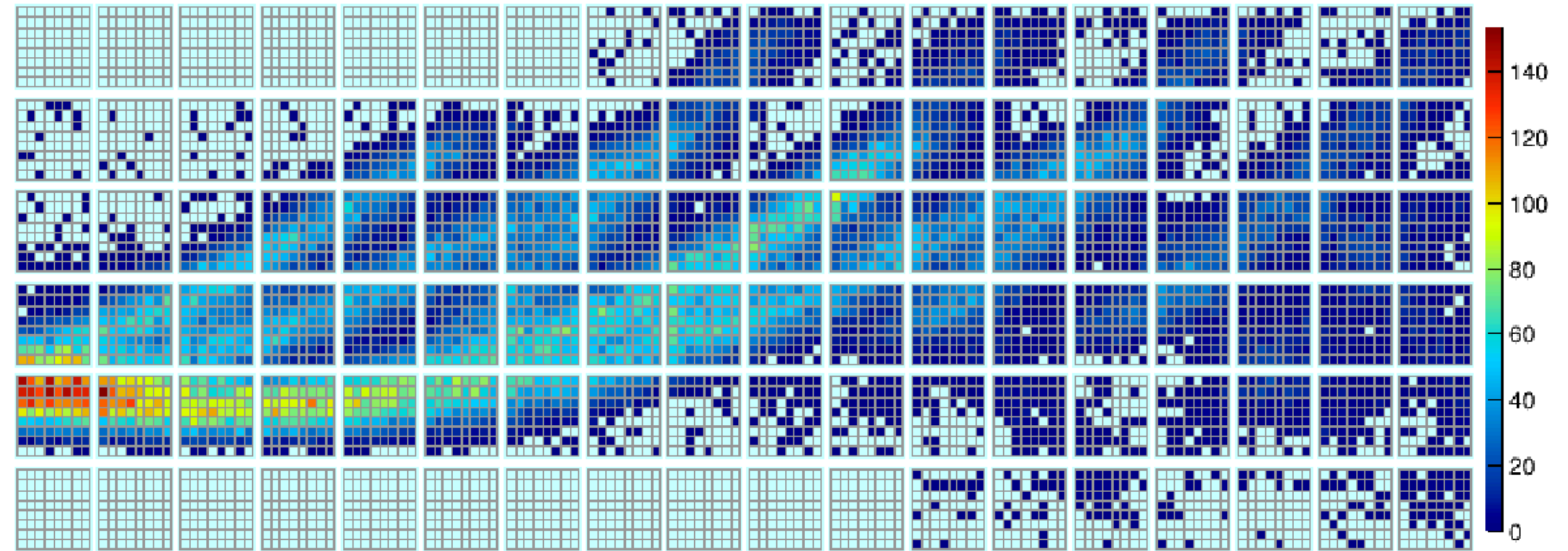
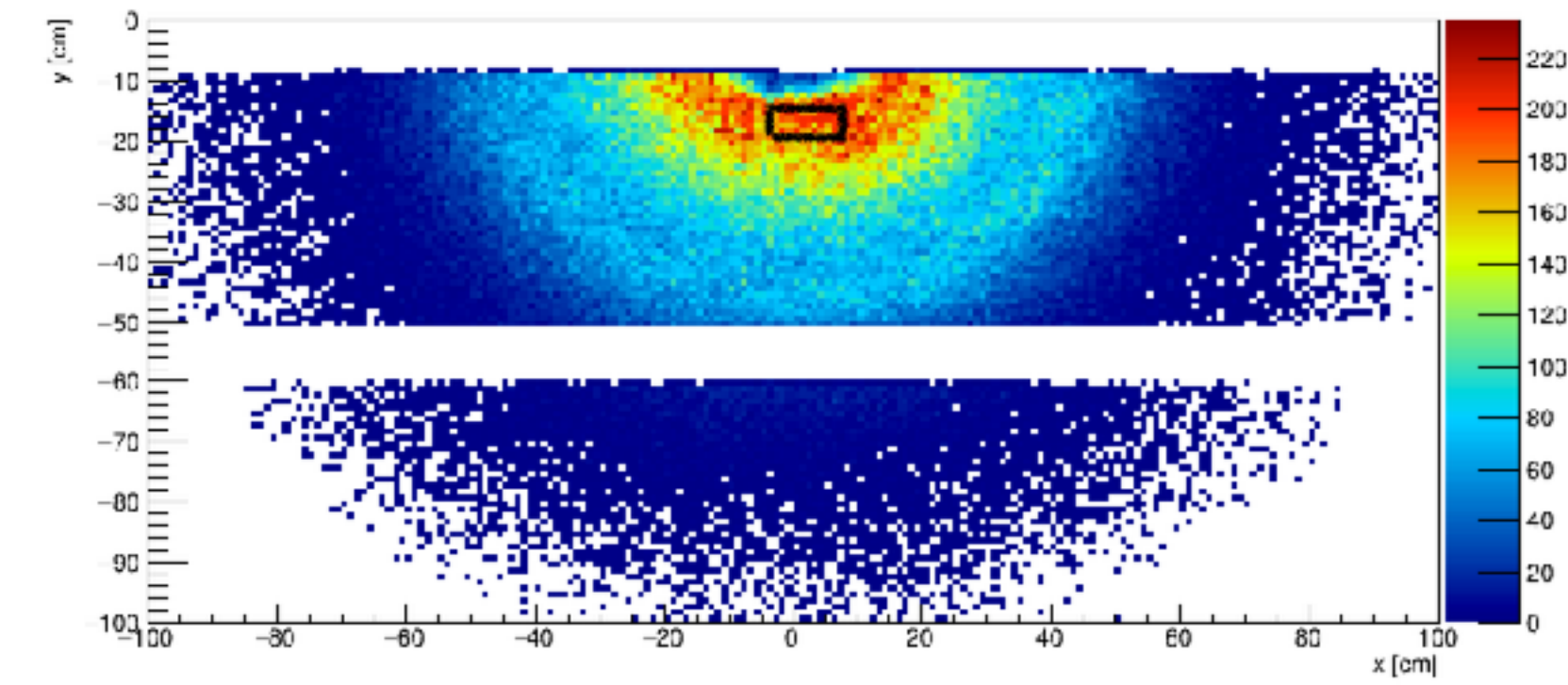
data

Second peak in N_{pho} is present in simulation, but not present in data!



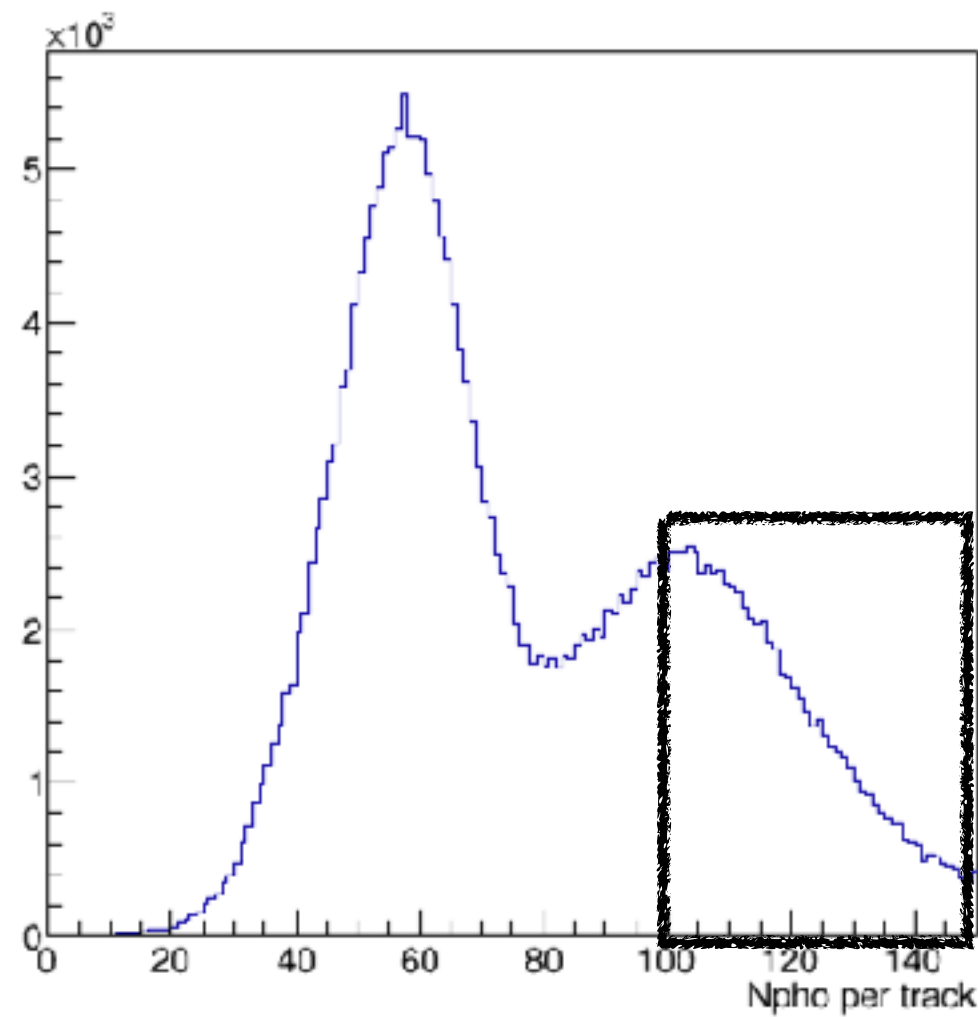
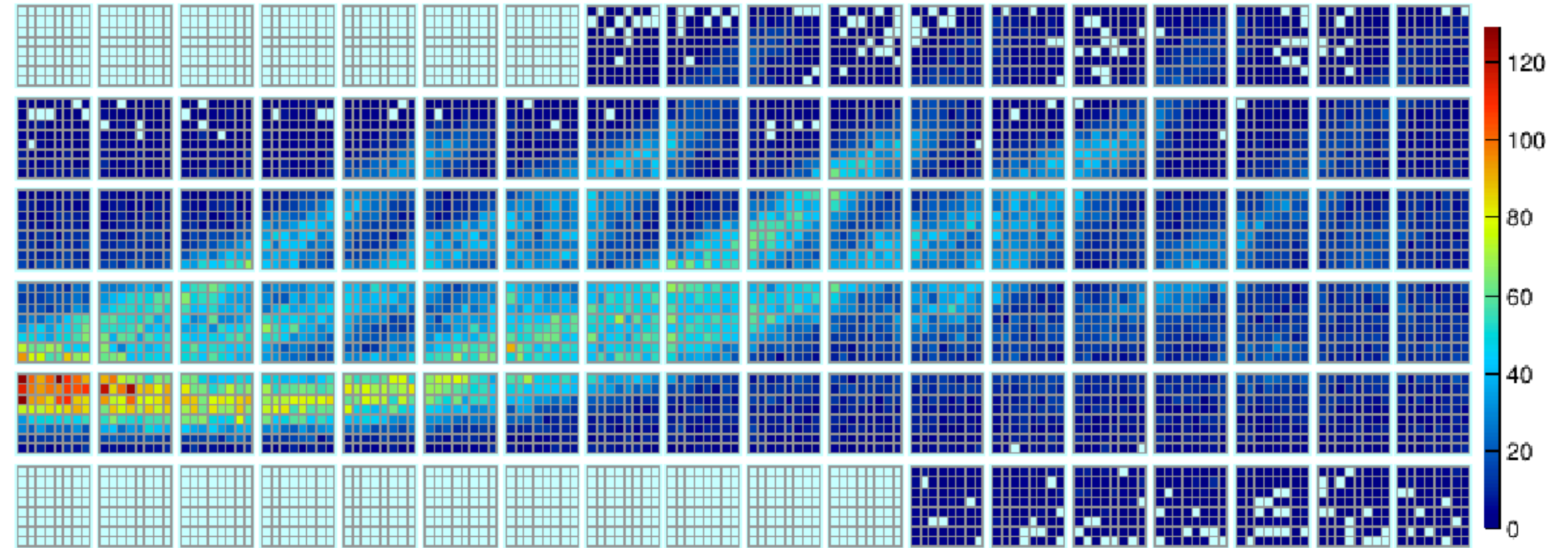
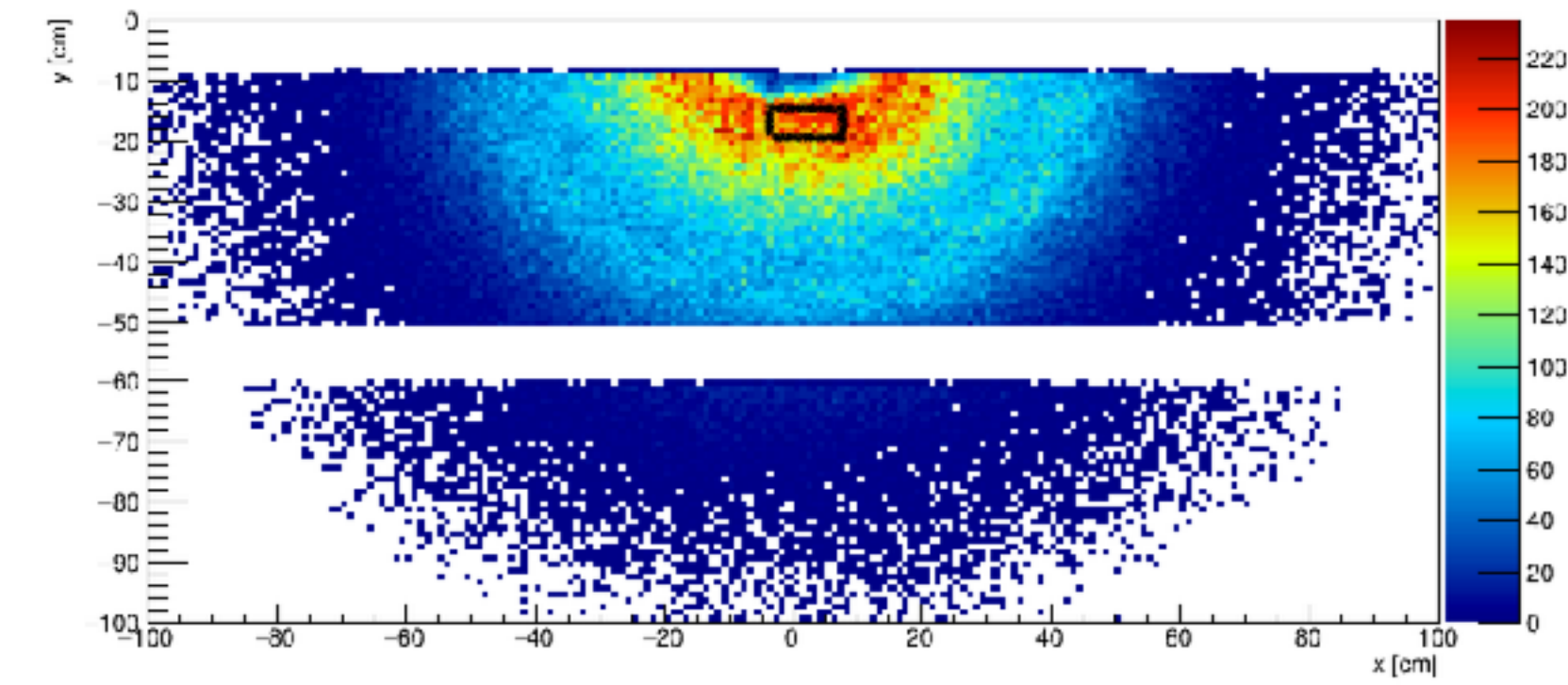
Looking into second Npho peak

Single track events hitting the lower DIRC half with $p > 4$ GeV/c , time cut [10; 120] ns



Looking into second Npho peak

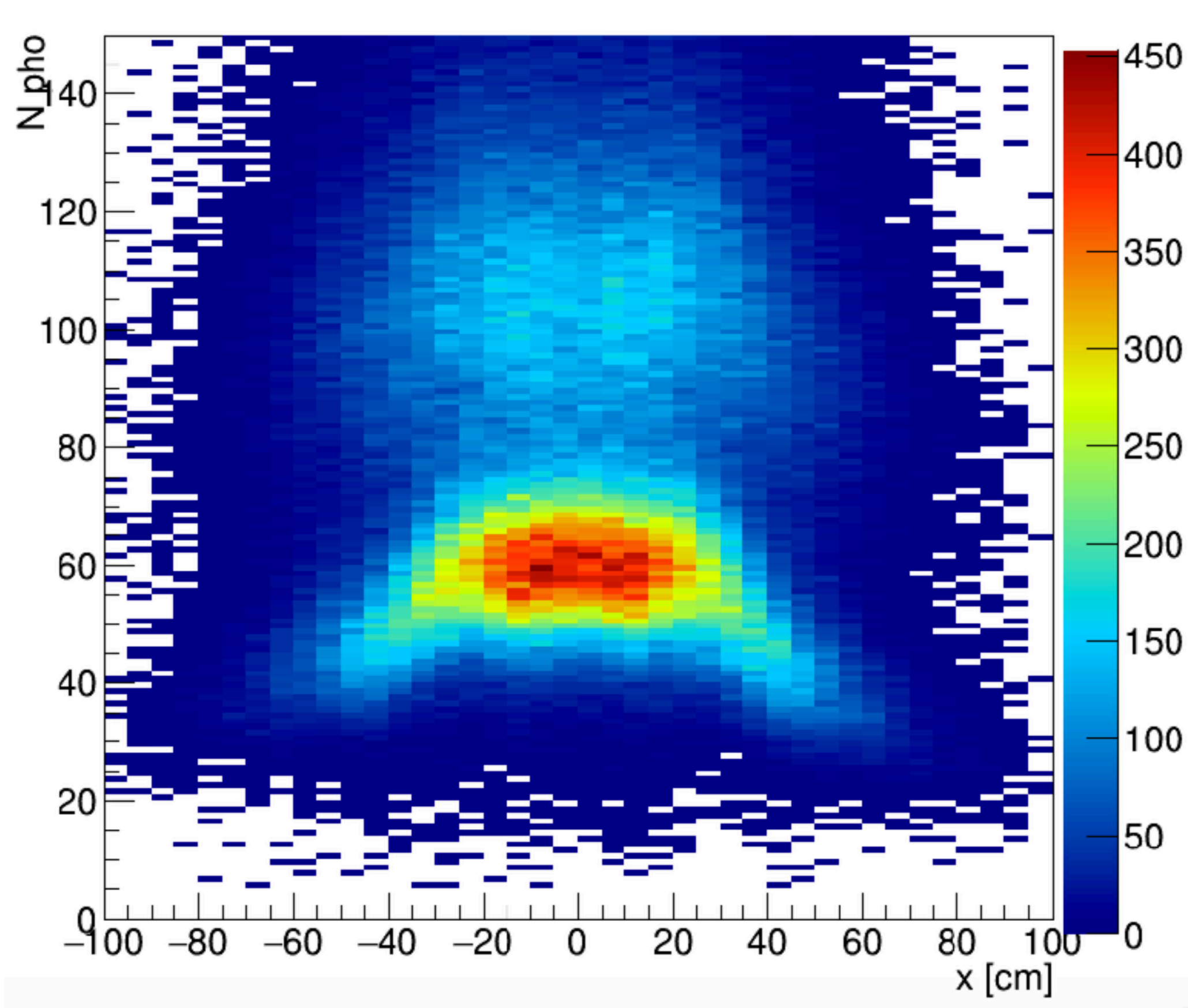
Single track events hitting the lower DIRC half with $p > 4$ GeV/c , time cut [20; 120] ns



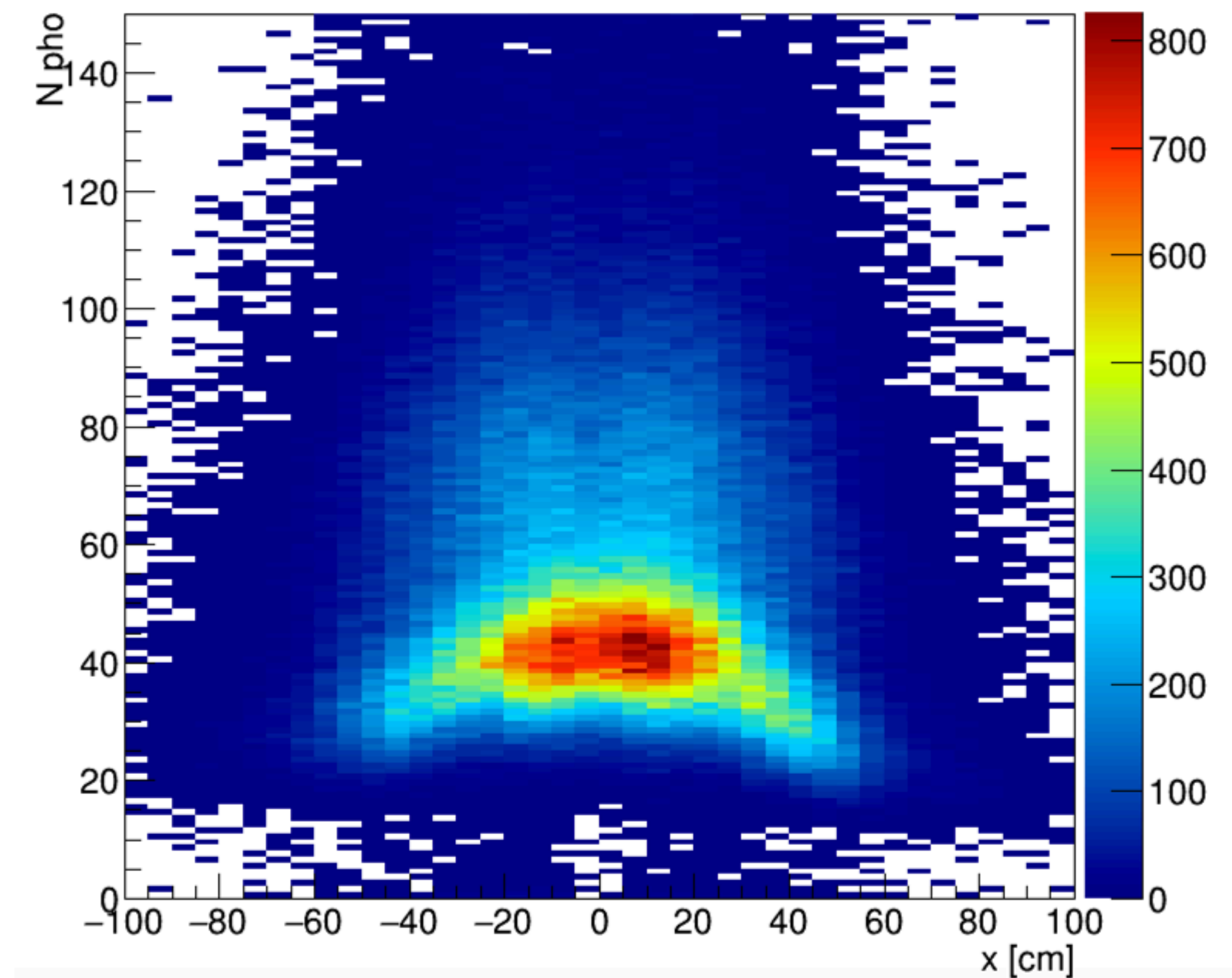
For $N_{pho} > 100$ hit pattern has more background

Npho vs. x for all events

No DIRC reconstruction, tracks with $p > 4$ GeV/c hit the lower DIRC half
+ loose time cut [10; 120] ns



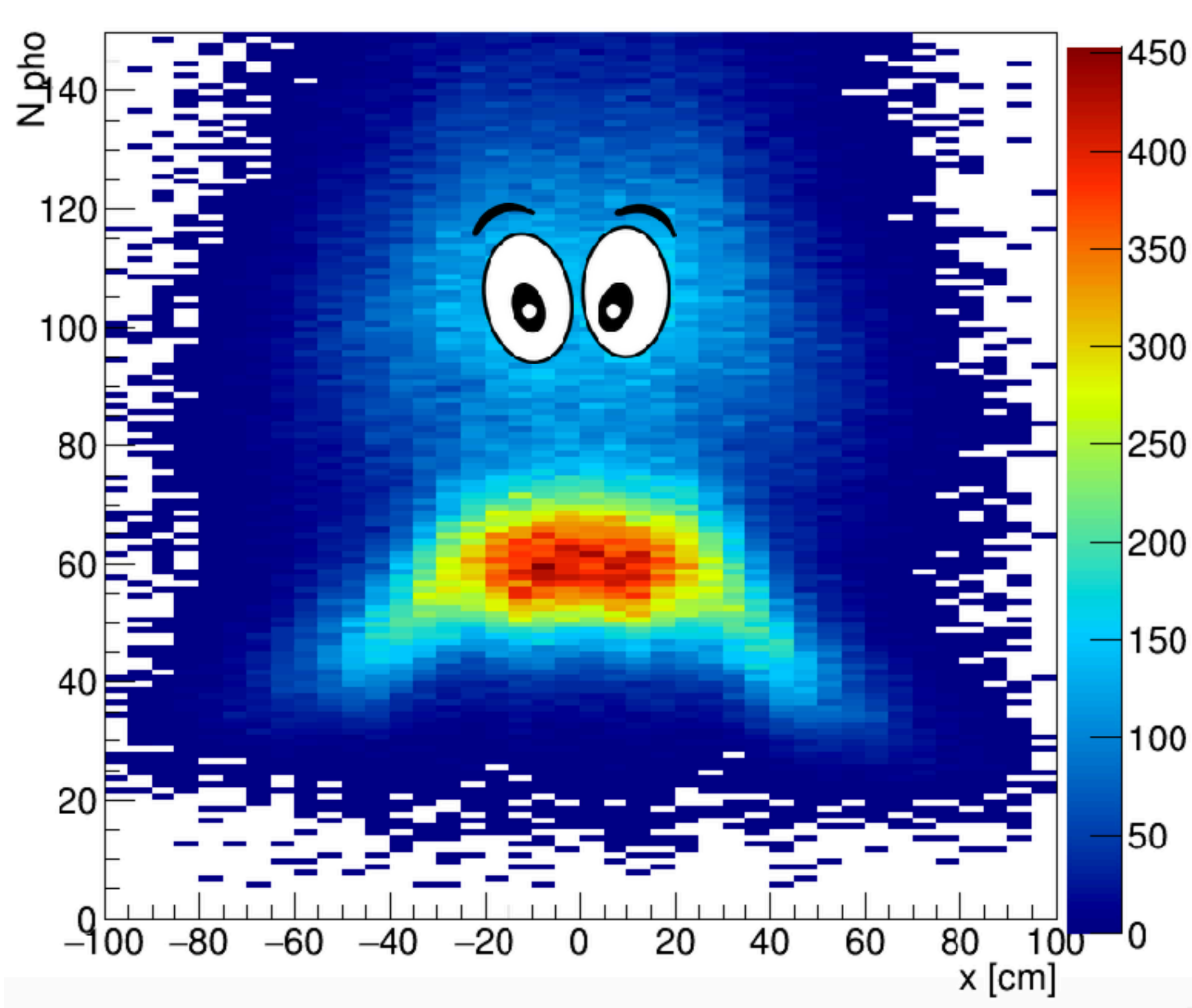
bggen



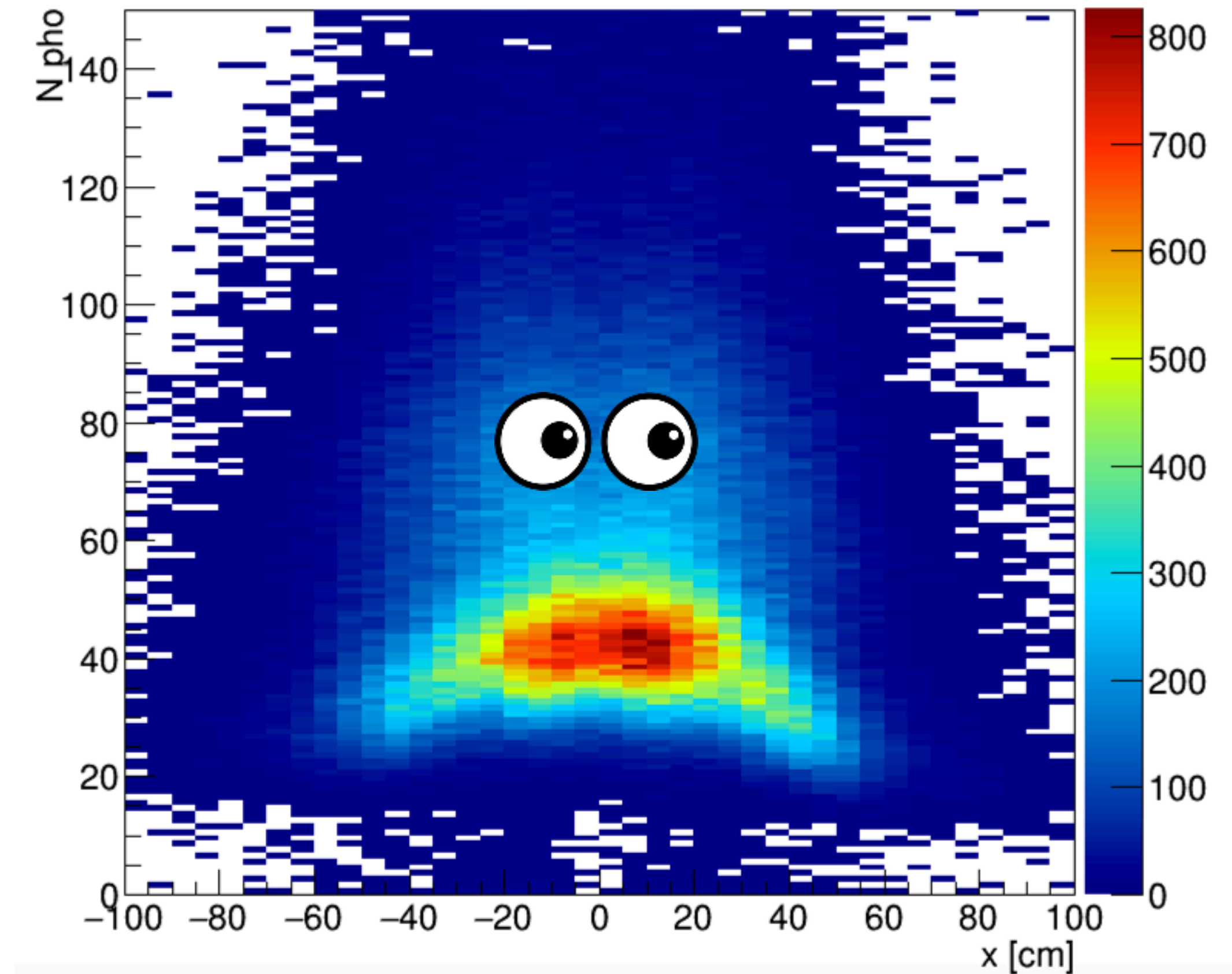
data

Npho vs. x for all events

No DIRC reconstruction, tracks with $p > 4$ GeV/c hit the lower DIRC half
+ loose time cut [10; 120] ns



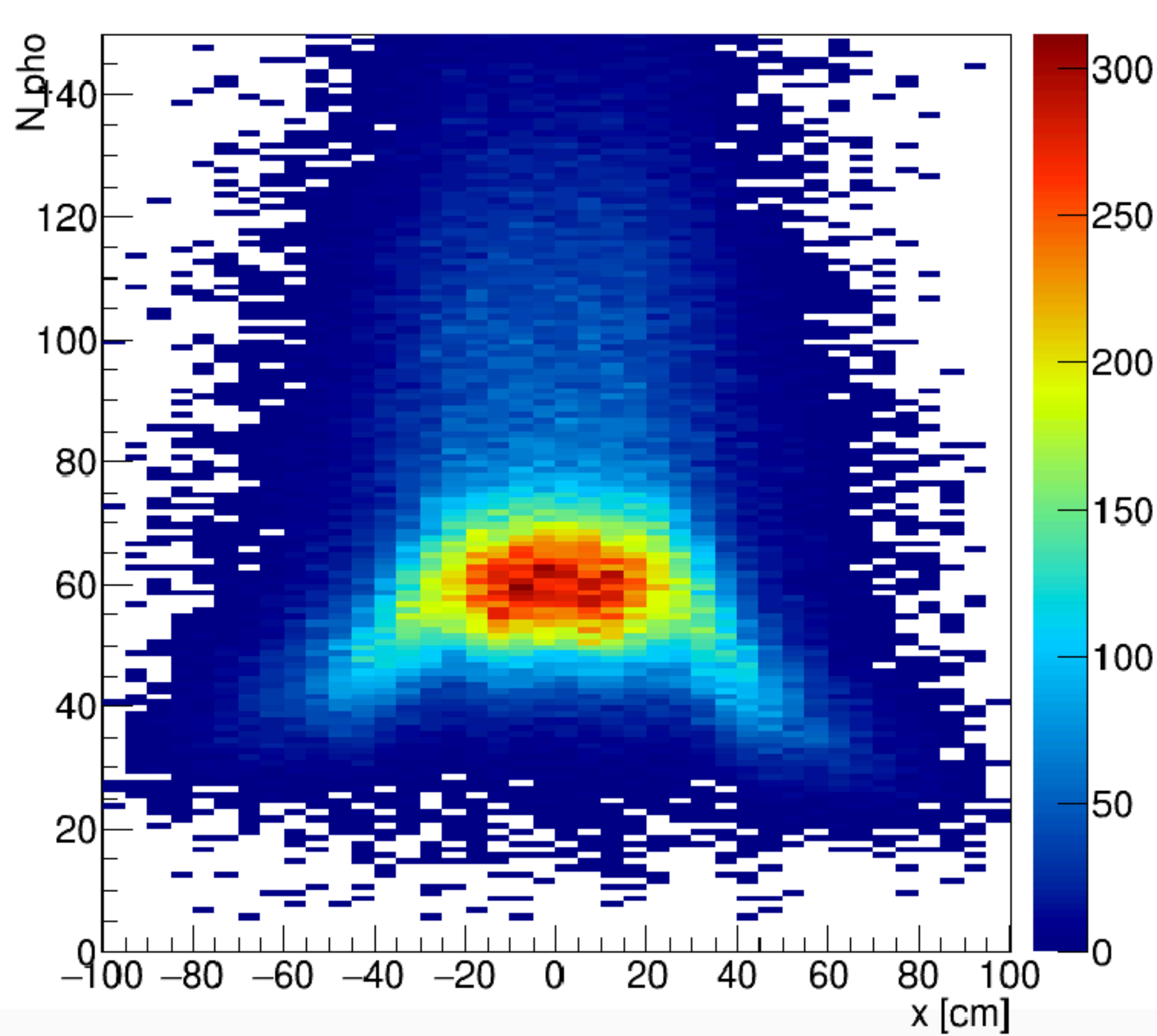
bggen



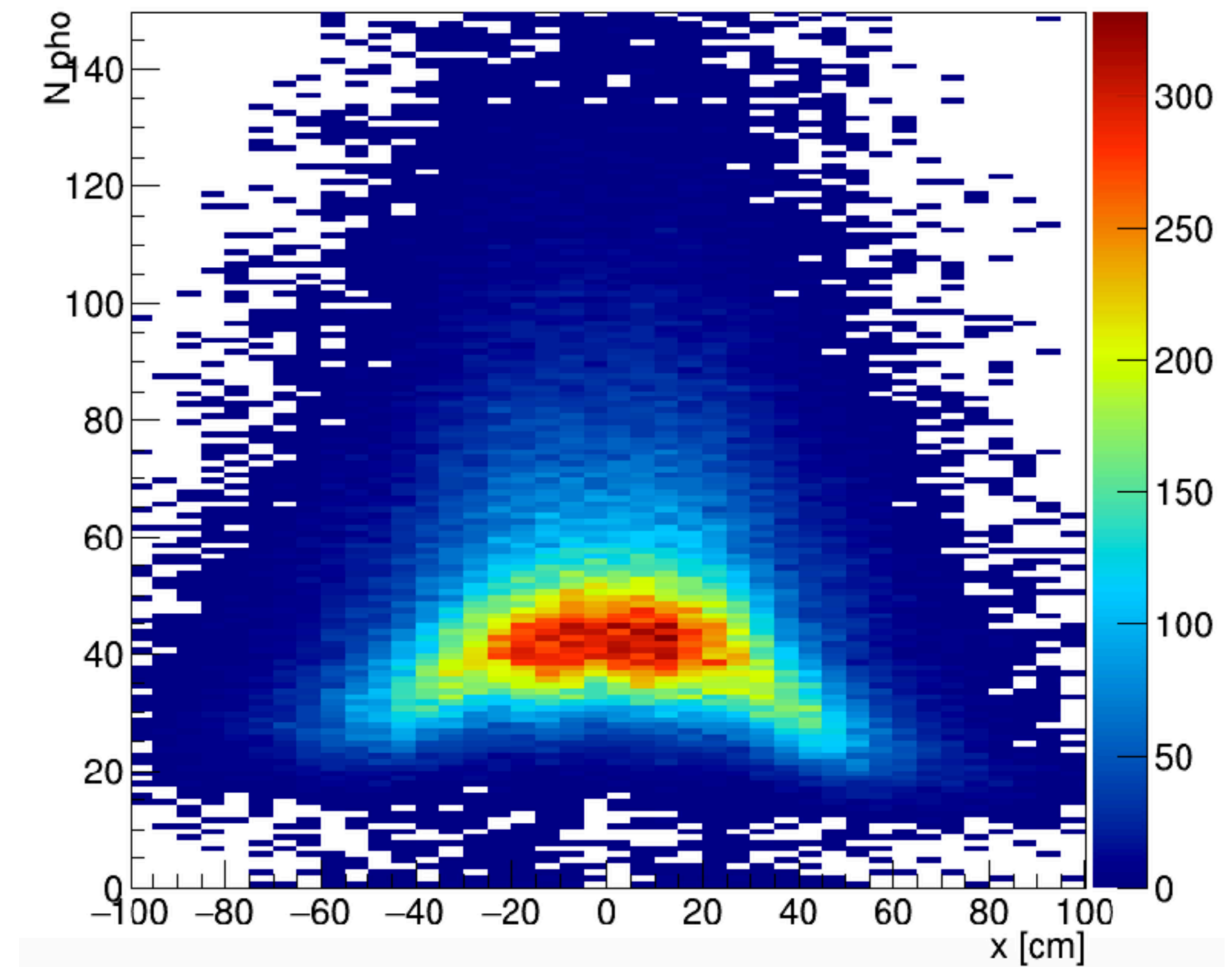
data

Npho vs. x for single track events

No DIRC reconstruction, tracks with $p > 4$ GeV/c hit the lower DIRC half
+ loose time cut [10; 120] ns



bggen

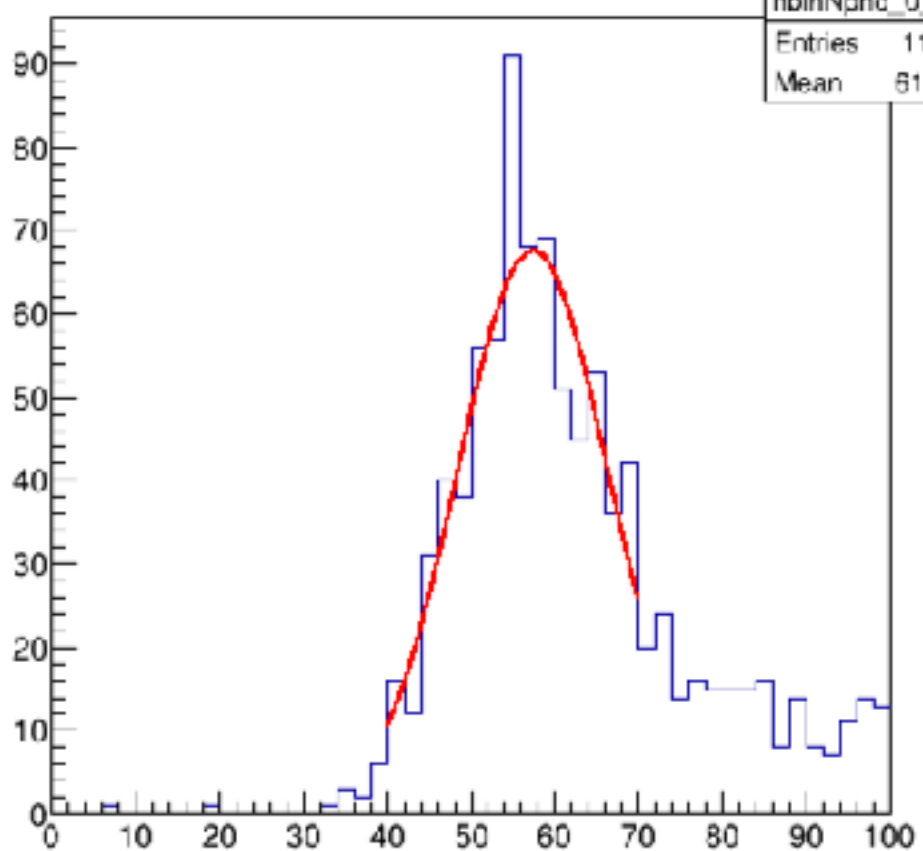


data

N pho for single tracks

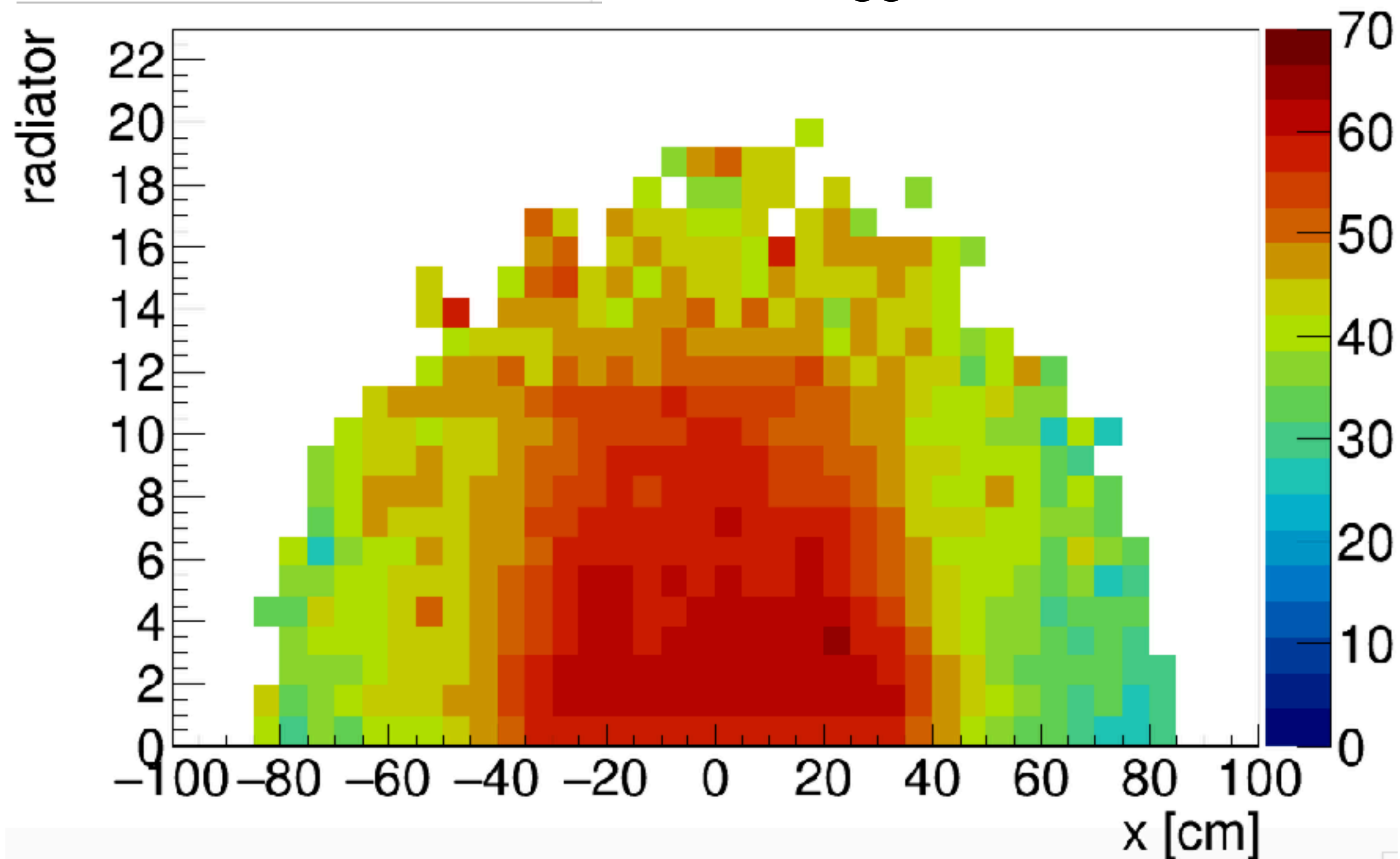
Npho for radiator 0, x bin 16

hbinNpho_0_16
Entries 1104
Mean 61.72



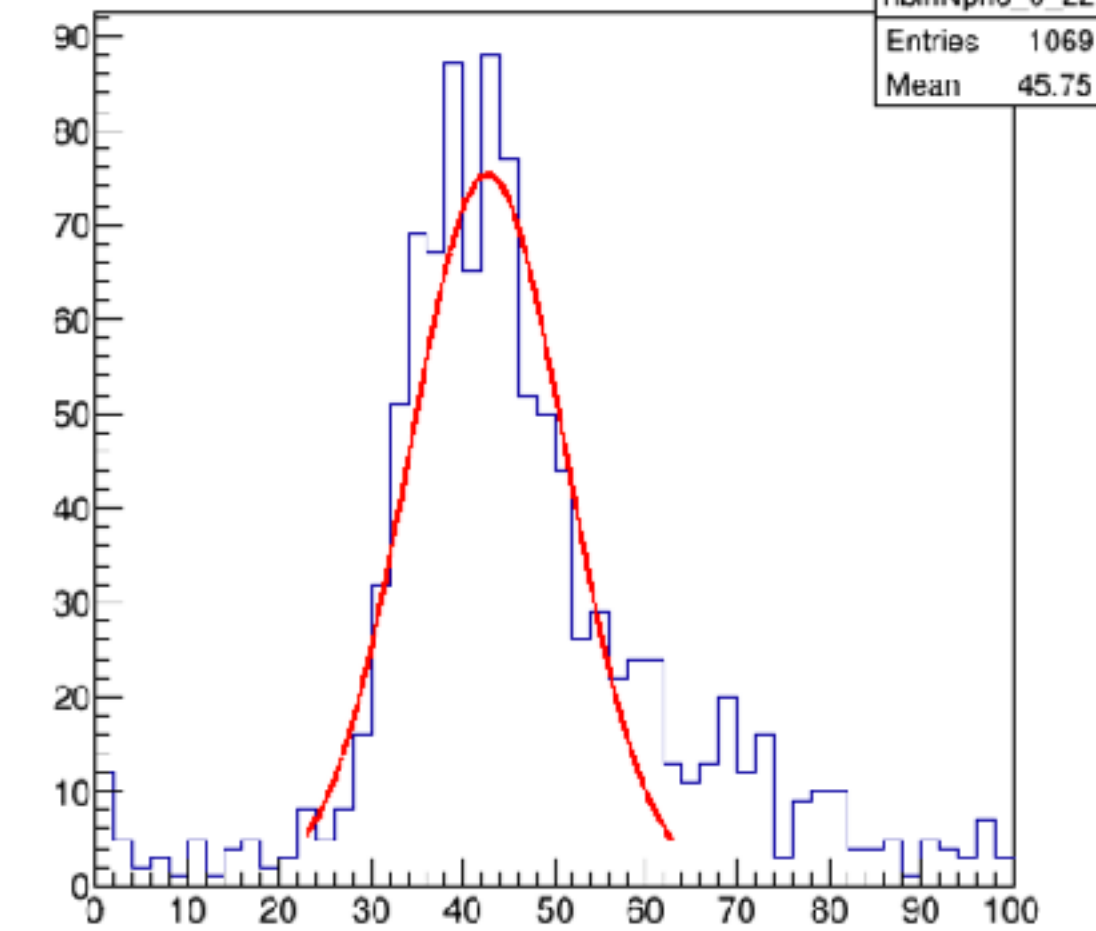
No DIRC reconstruction, single track events, tracks with $p > 4$ GeV/c hit the lower DIRC half, gaus fit the peak ± 15 , time cut [10, 120] ns

bggen

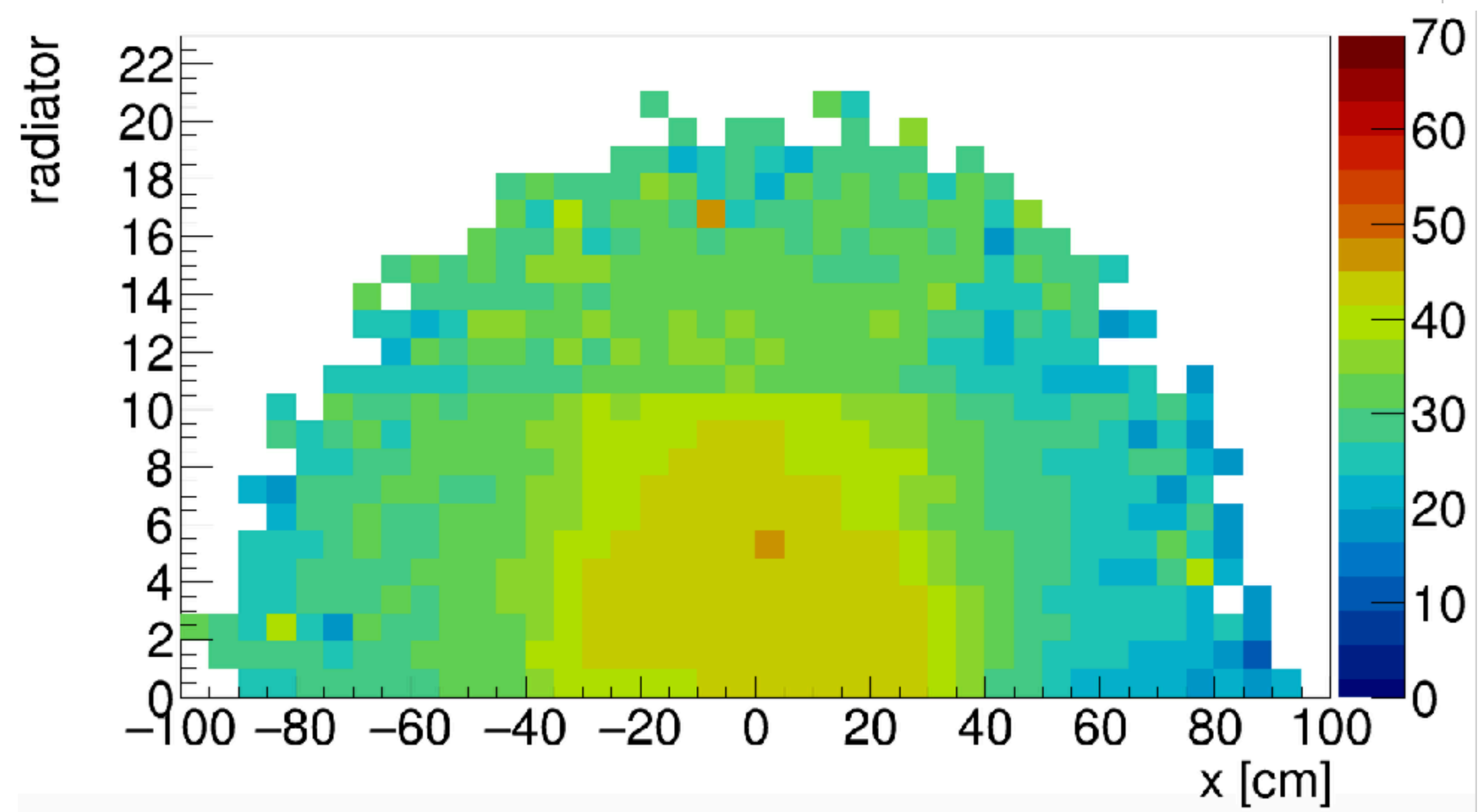


Npho for radiator 0, x bin 22

hbinNpho_0_22
Entries 1069
Mean 45.75

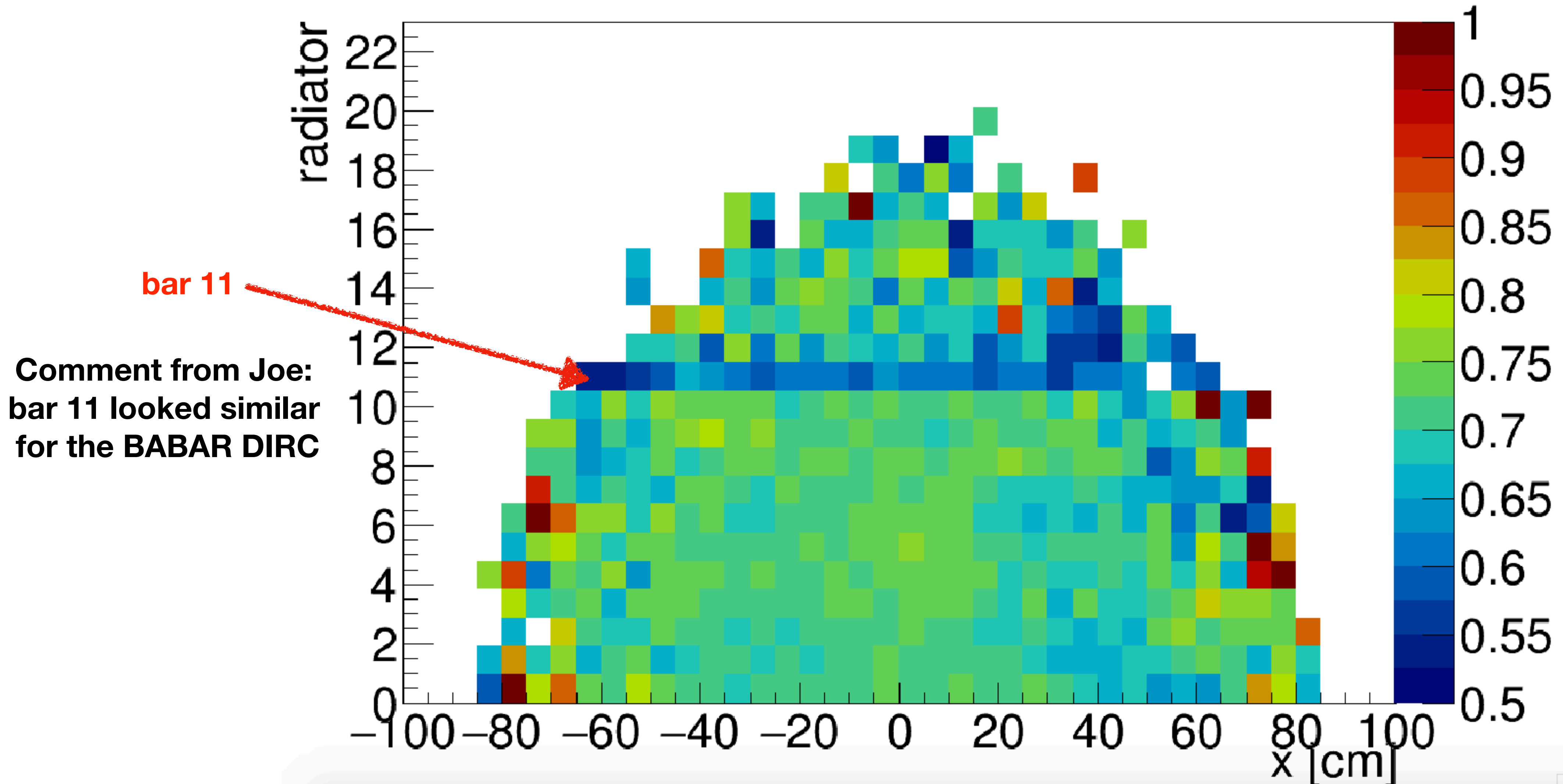


data

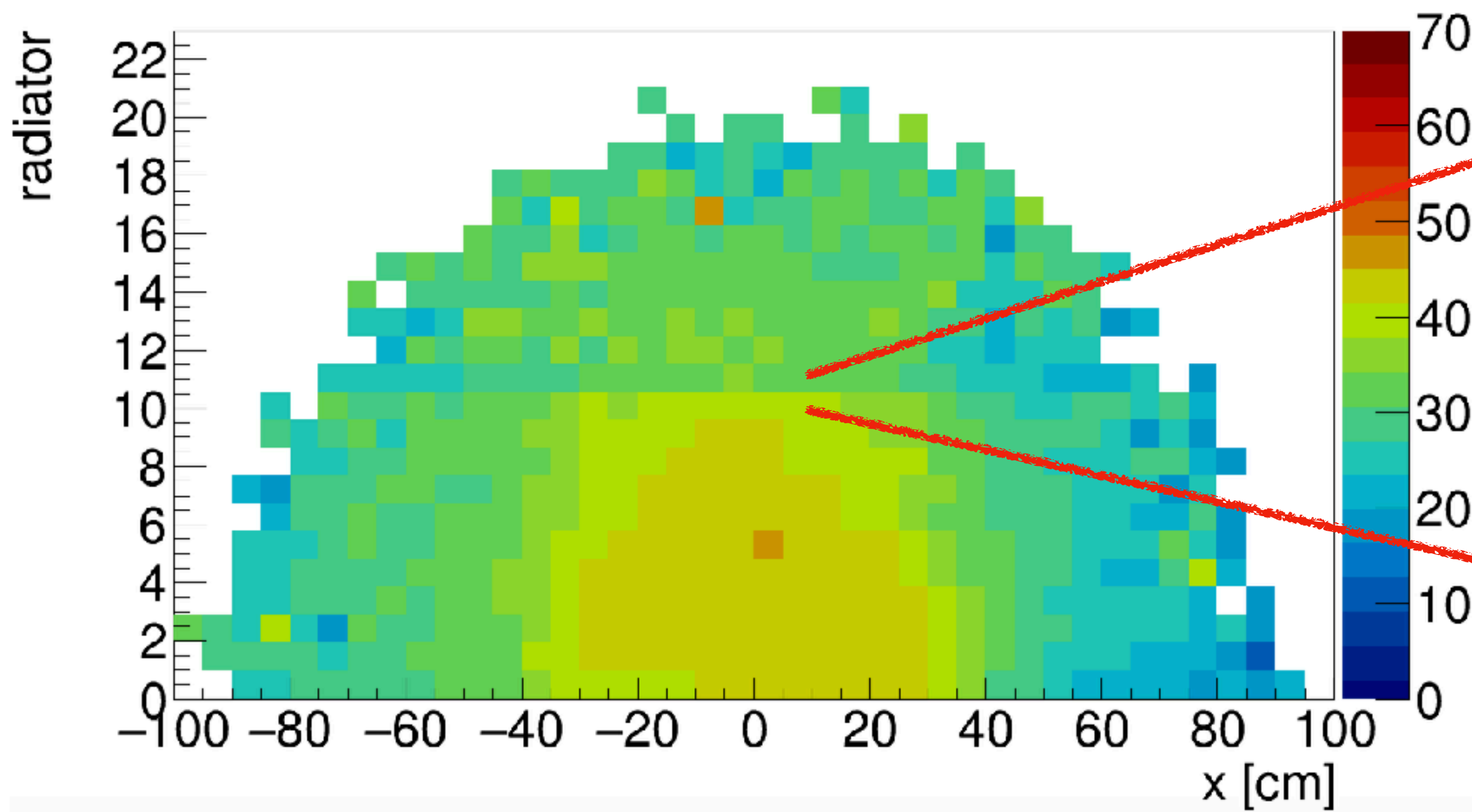


N pho data / N pho bggen

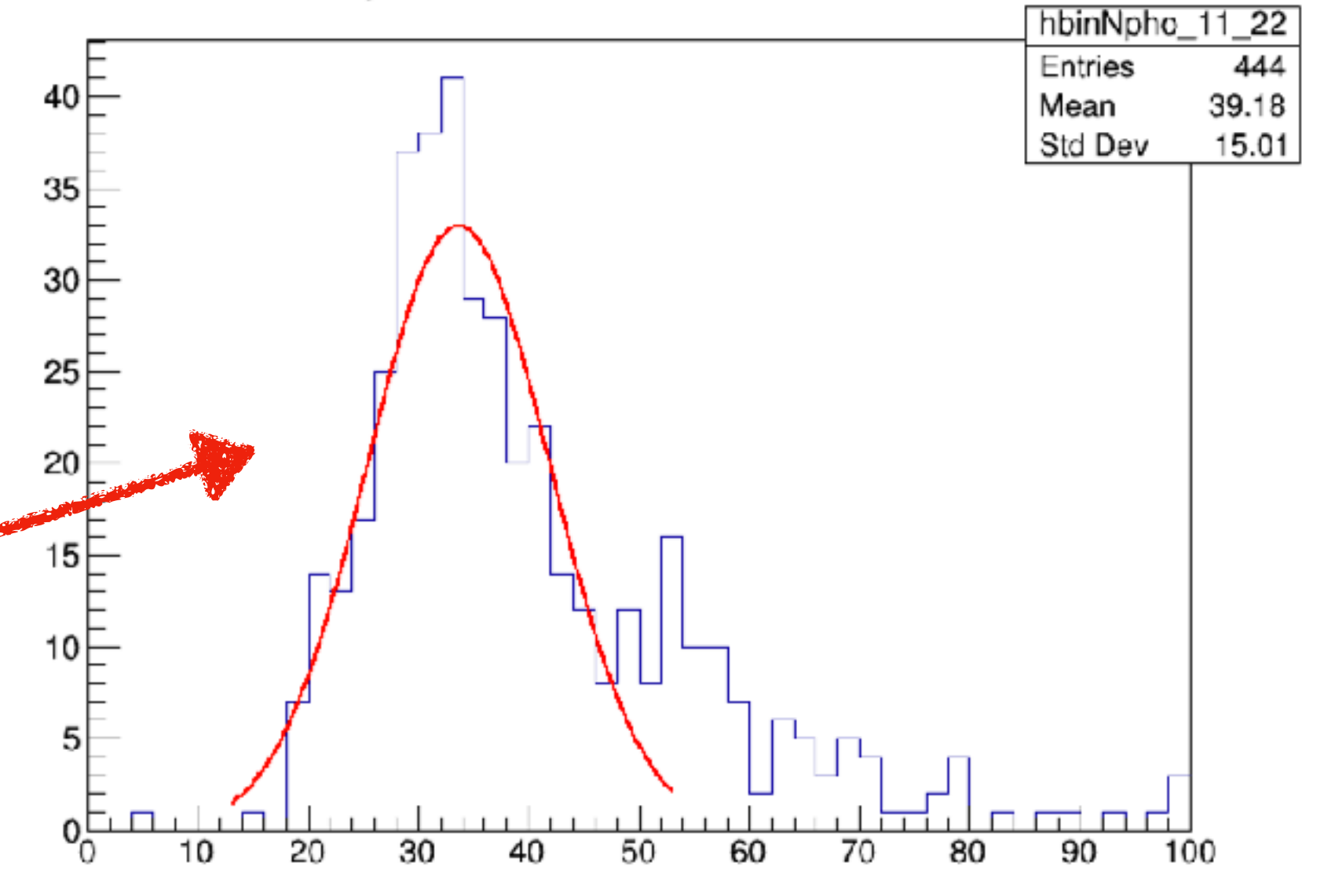
No DIRC reconstruction, tracks with $p > 4$ GeV/c hit the lower DIRC half, gaus fit the peak ± 15 , time cut [10, 120] ns



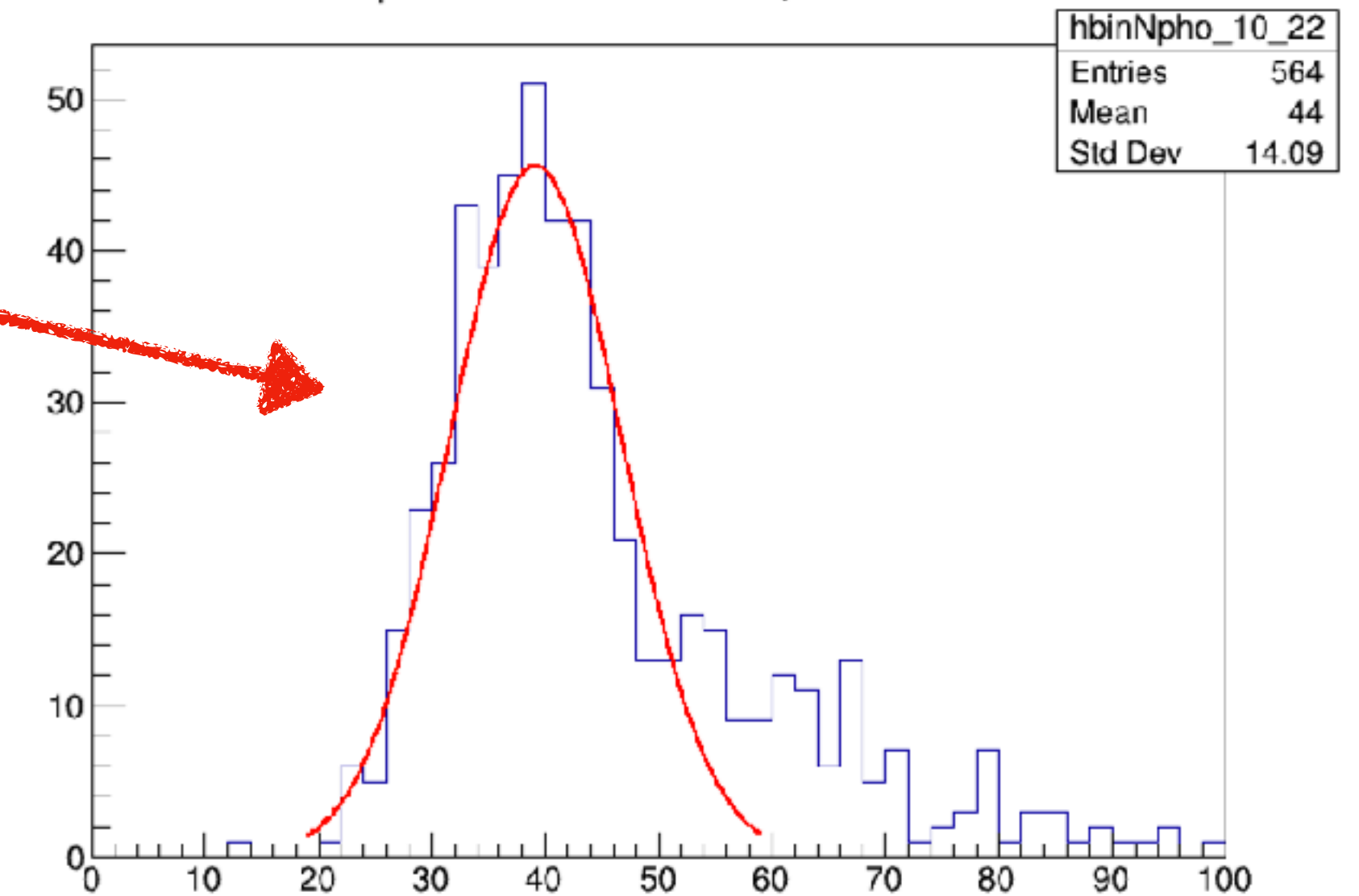
Closer look to bar 11



Npho for radiator 11, x bin 22

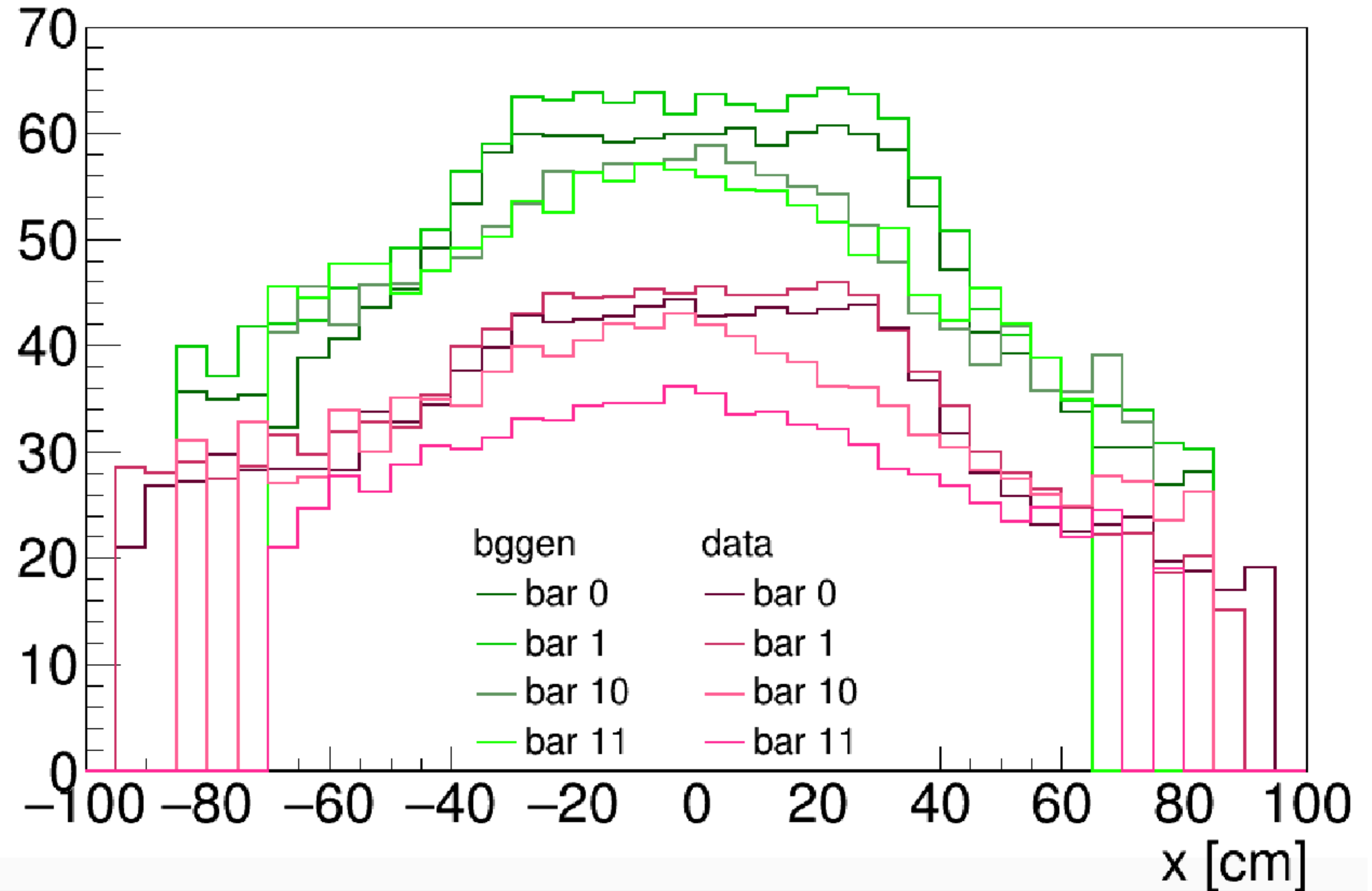


Npho for radiator 10, x bin 22



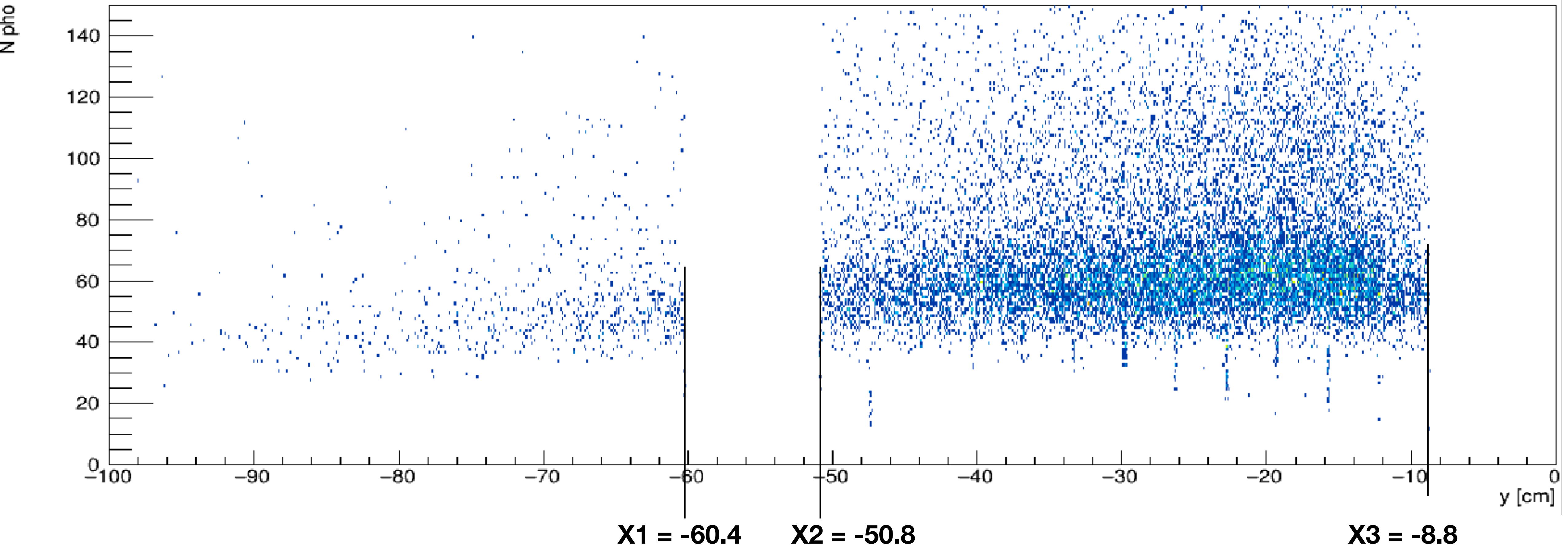
N pho along the radiator using gaus fit in each bin

No DIRC
reconstruction,
single track events,
tracks with $p > 4$
GeV/c hit the lower
DIRC half, gaus fit
the peak ± 15 , time
cut [10, 120] ns



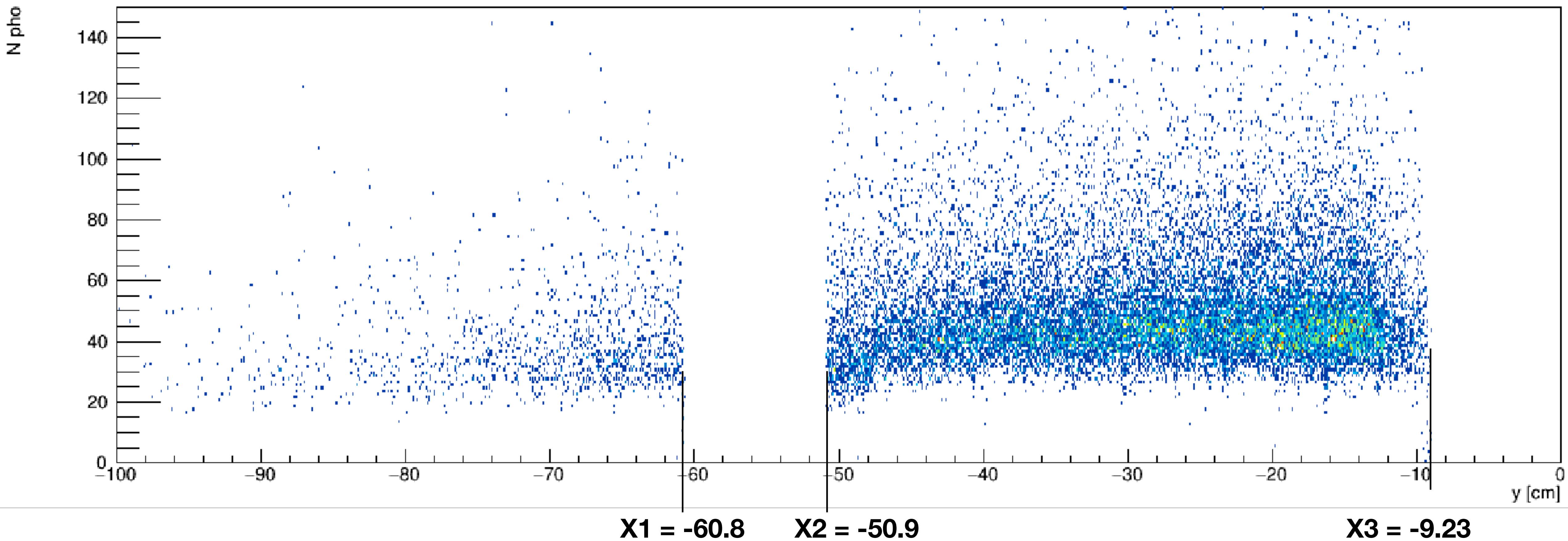
N pho for $x = 0$, bggen

No DIRC reconstruction, tracks with $p > 4$ GeV/c hit the lower DIRC half, time cut [10, 120] ns

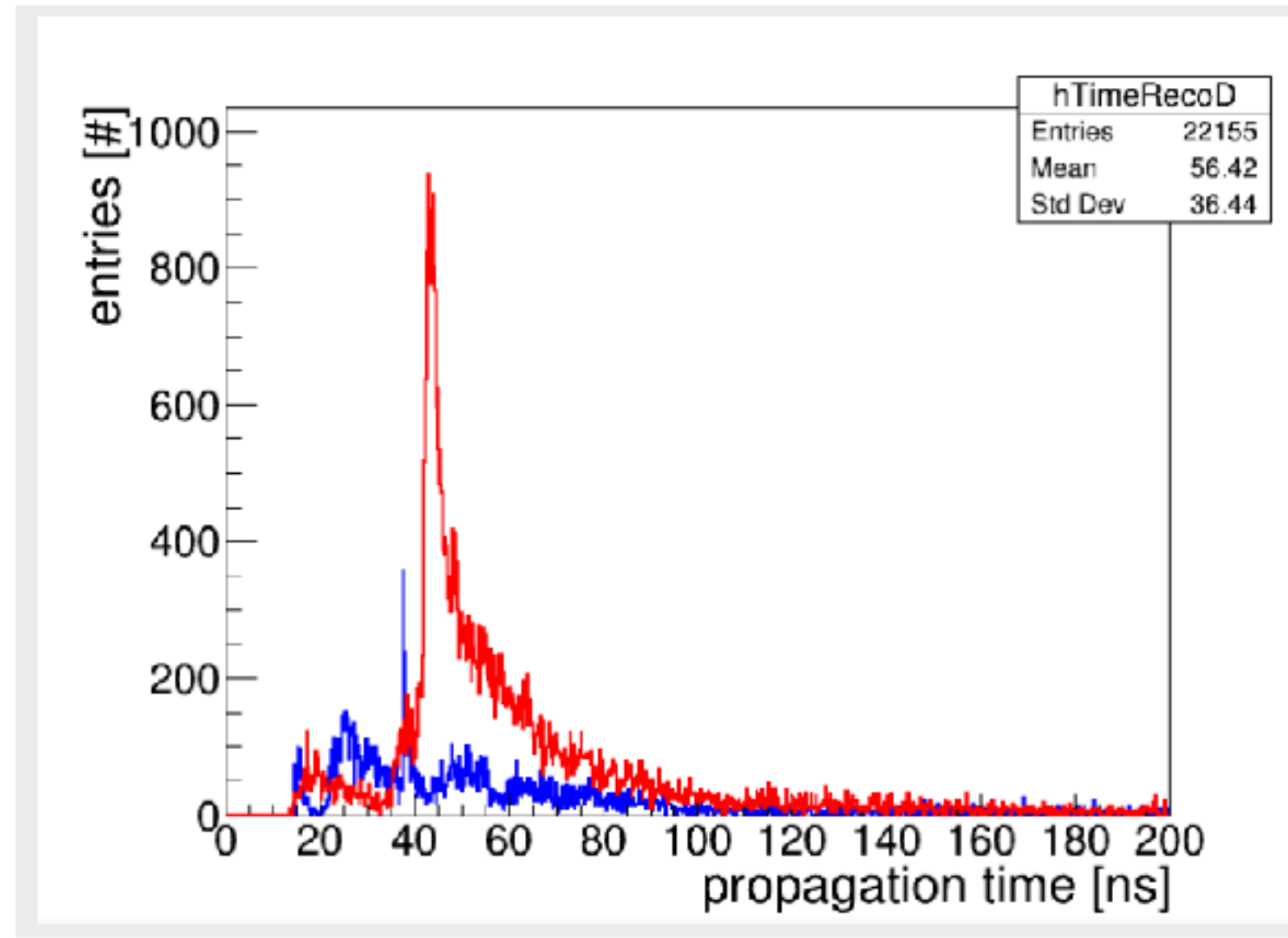


N pho for $x = 0$, data

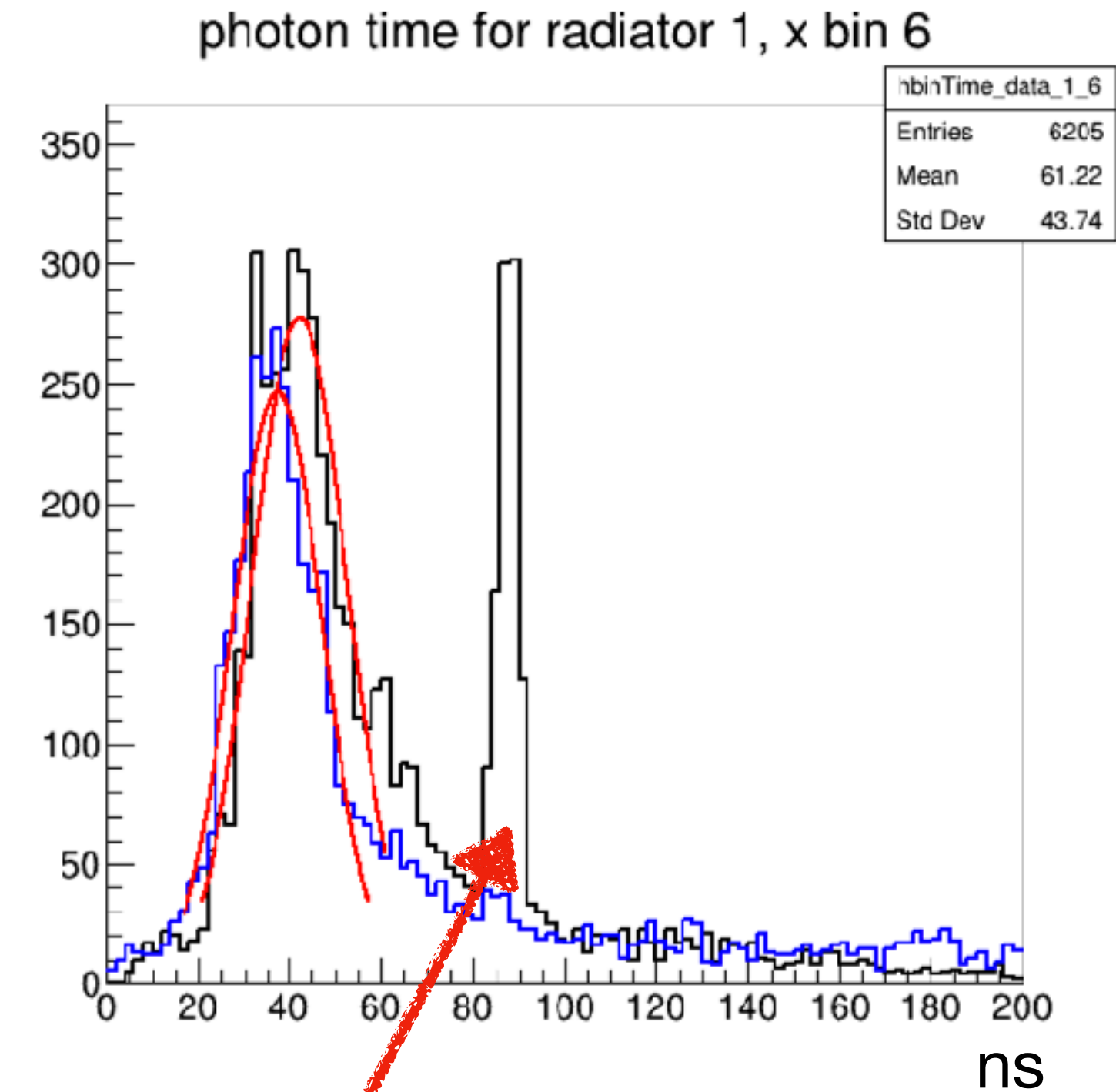
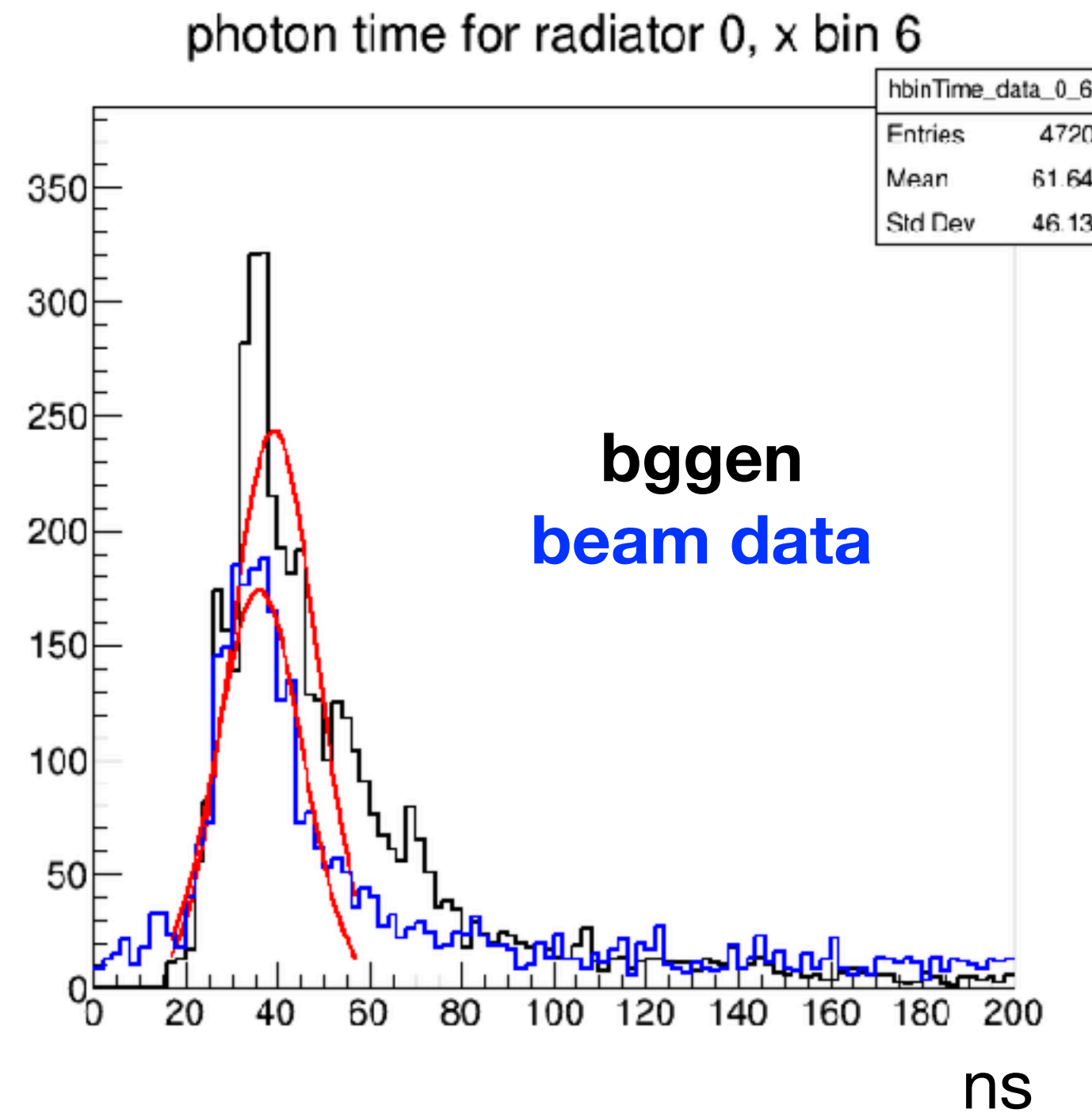
No DIRC reconstruction, tracks from rho/phi reaction with $p > 4$ GeV/c hit the lower DIRC half, time cut [10, 120] ns



Time for (x,y) bins for >4 GeV/c particles with $x \sim -75$ cm, bar 0



Simulation using particle gun

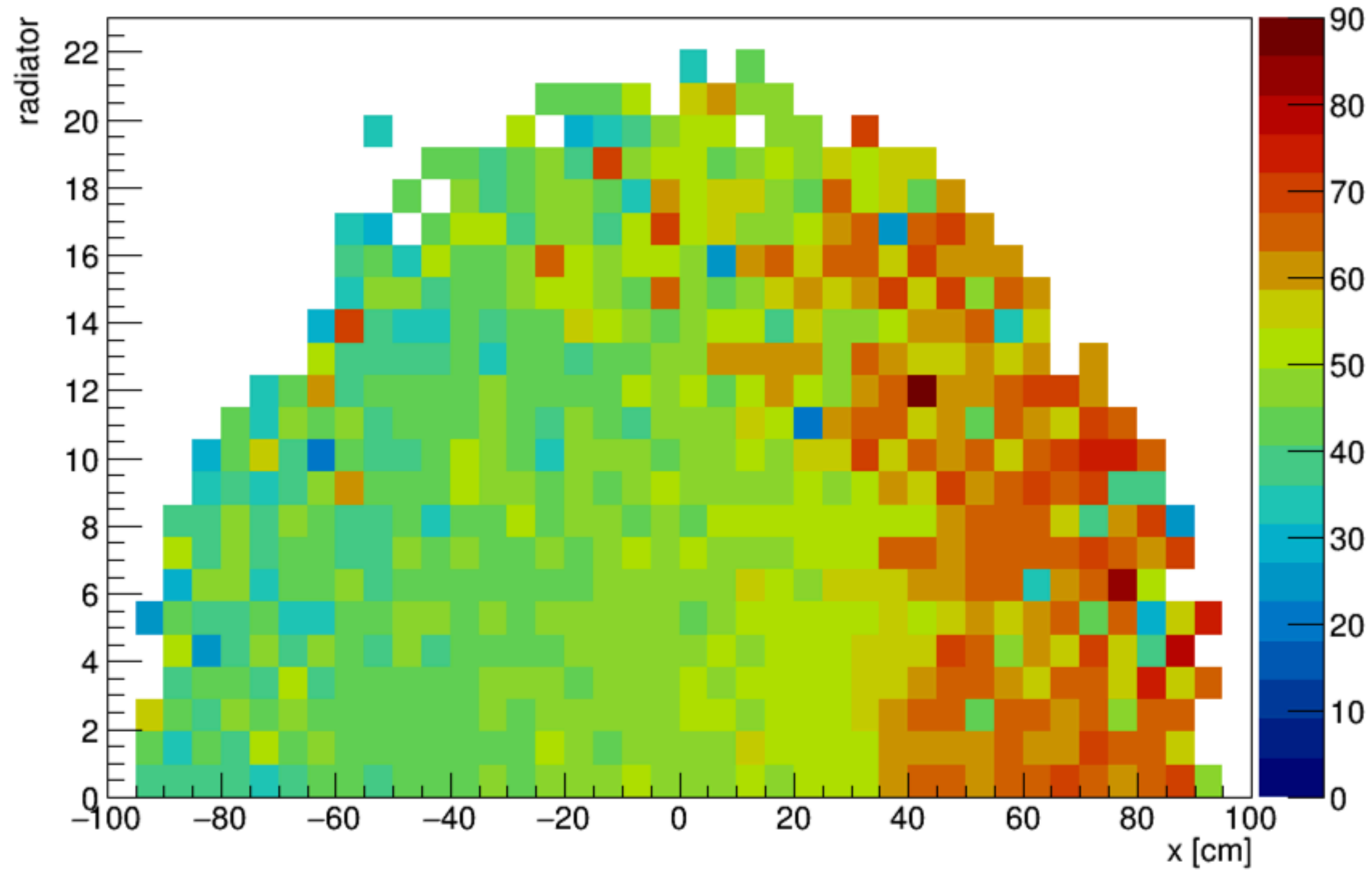


Strange narrow peaks present in the bggen (they also happen in the data)

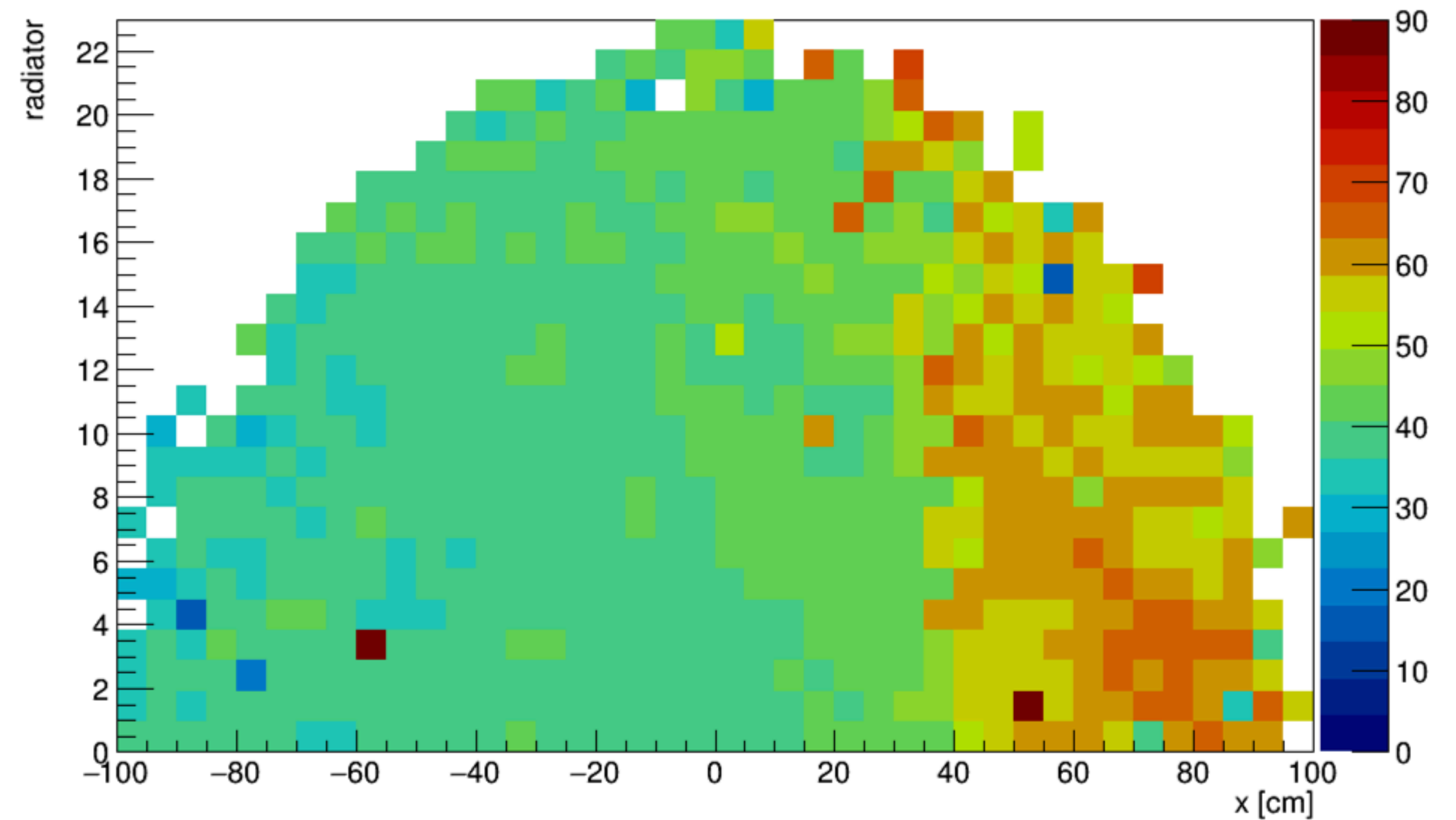
The time peak has slightly different position for the particle gun simulation and for the data/bggen

<https://gluexdirc.mit.edu/dirc-commissioning-data>

Time peak position



bggen



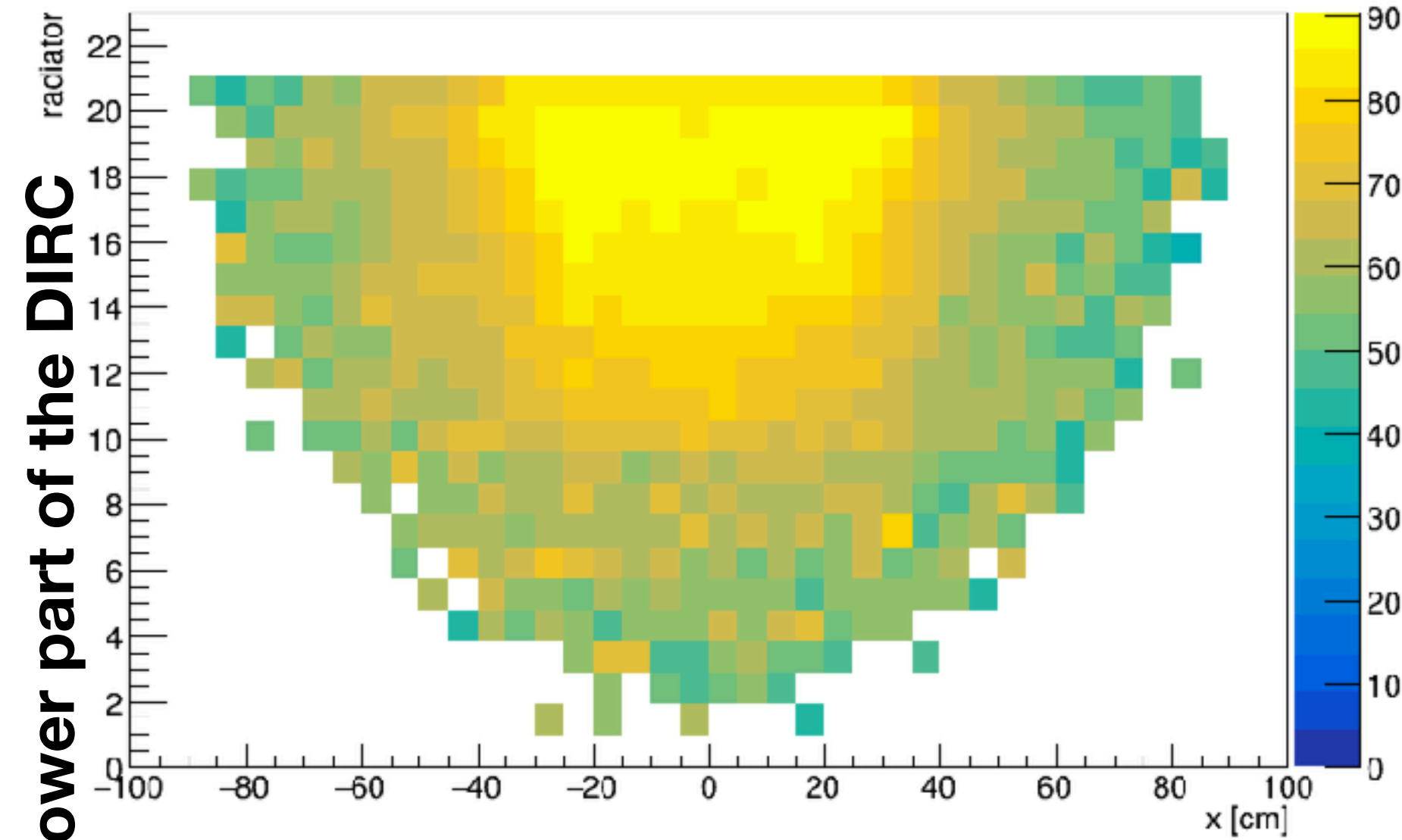
data

Position of time peak is taken the same as fitted here <https://gluexdir.mit.edu/dirc-commissioning-data>
because the reflected photons are not quite visible, especially for bggen data

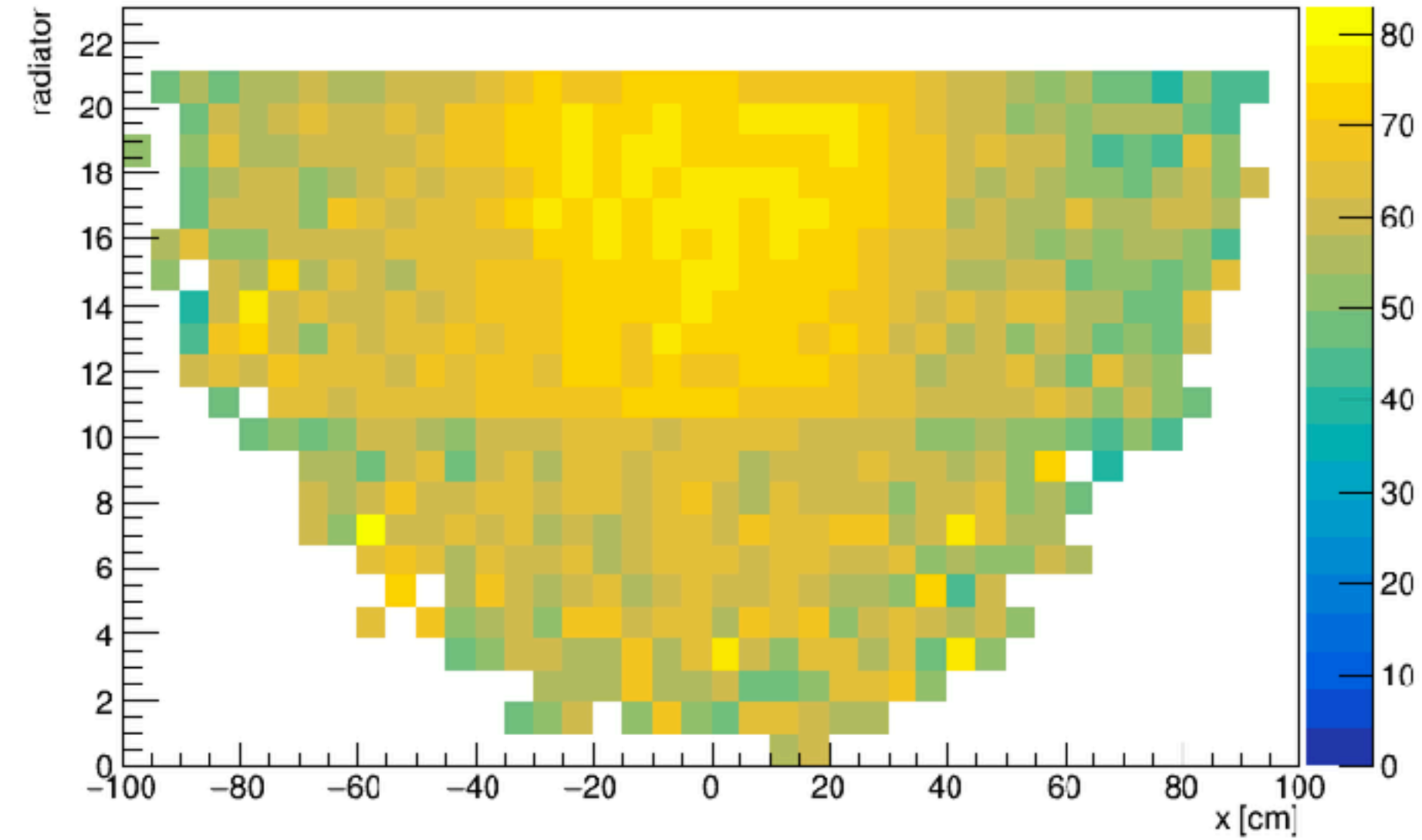
Backups

N pho for single tracks

No DIRC reconstruction, tracks with $p > 4$ GeV/c hit the lower DIRC half



bggen



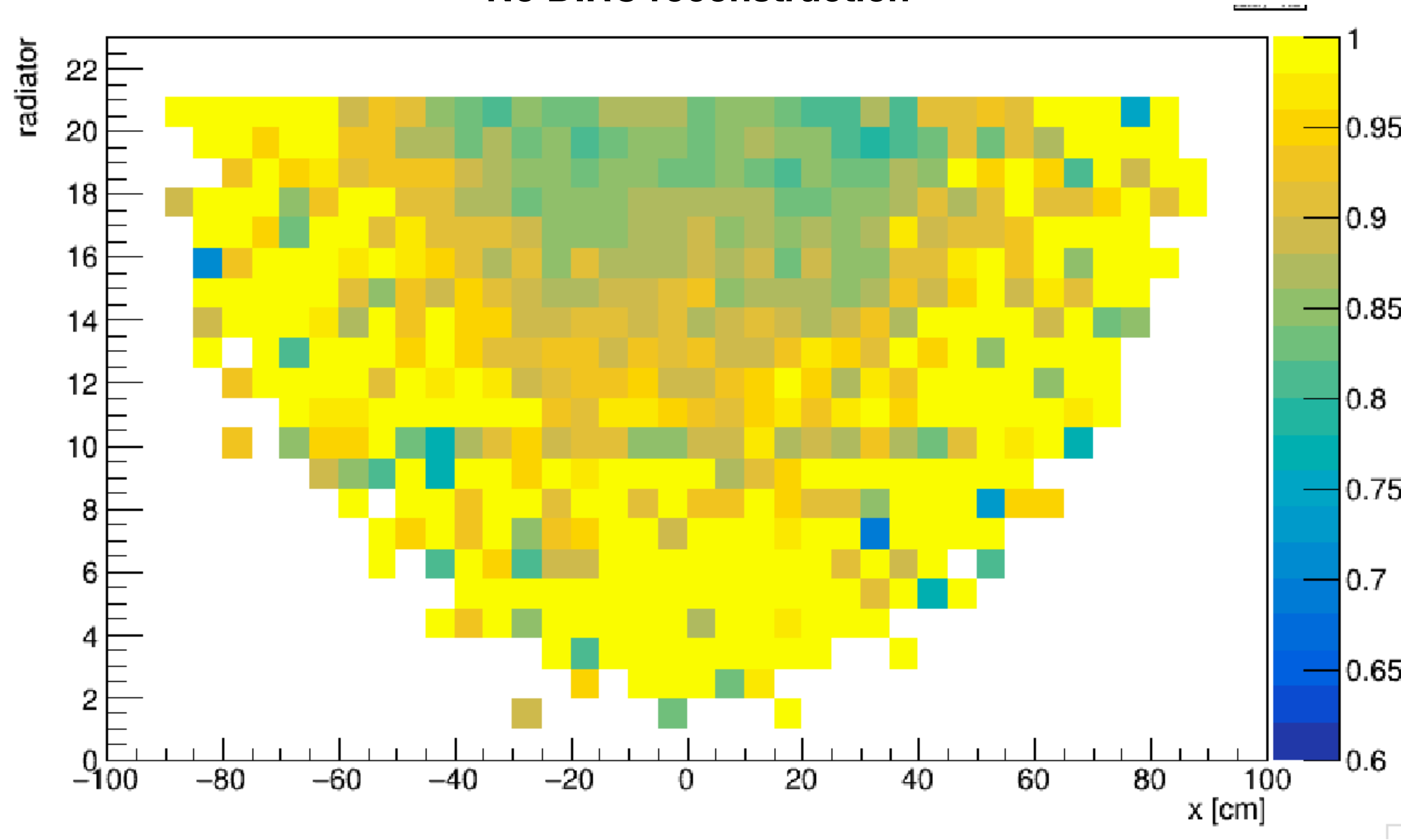
data

radiators for the lower part of the DIRC

Mean is taken for each bin - wide distributions
No time cut

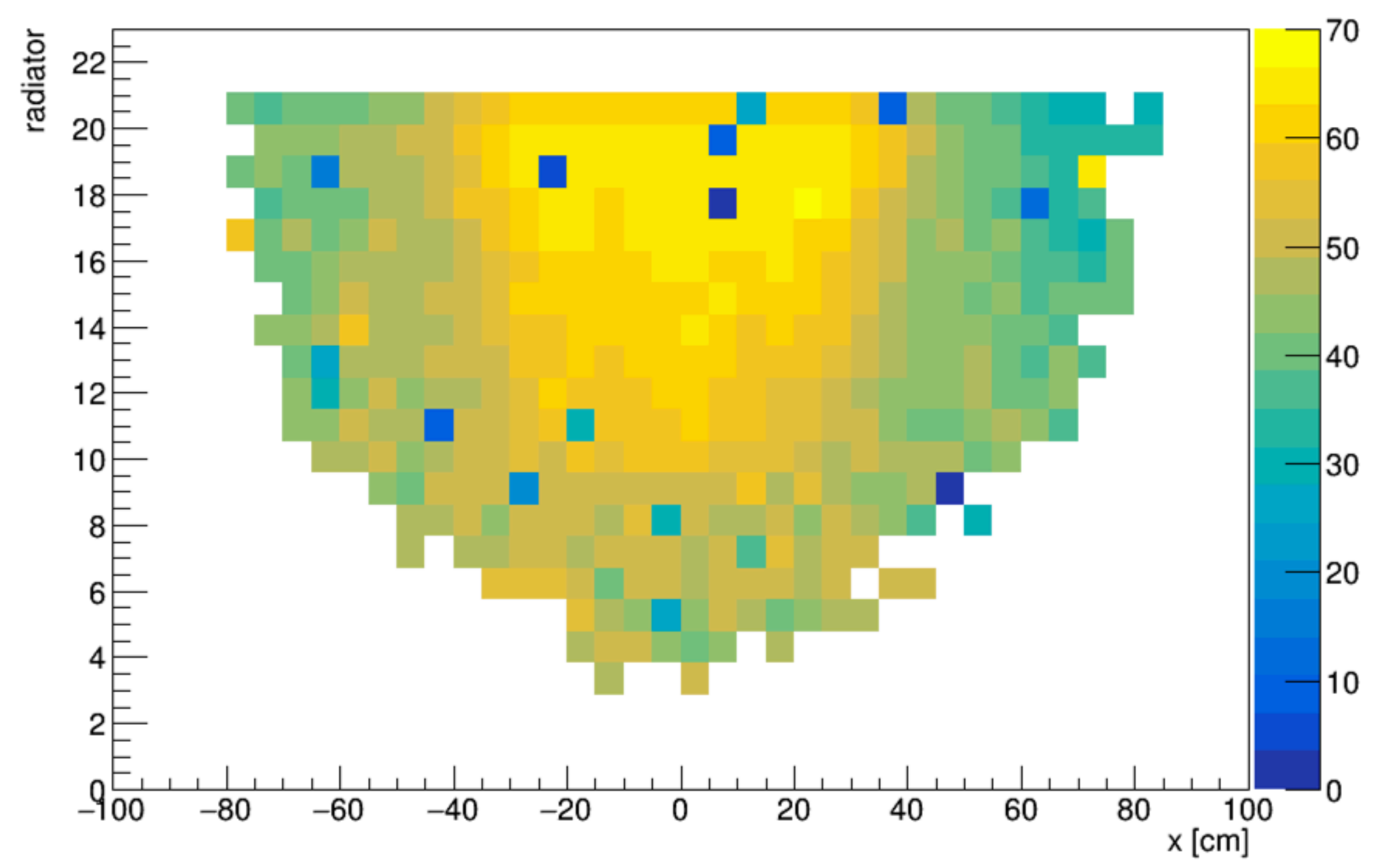
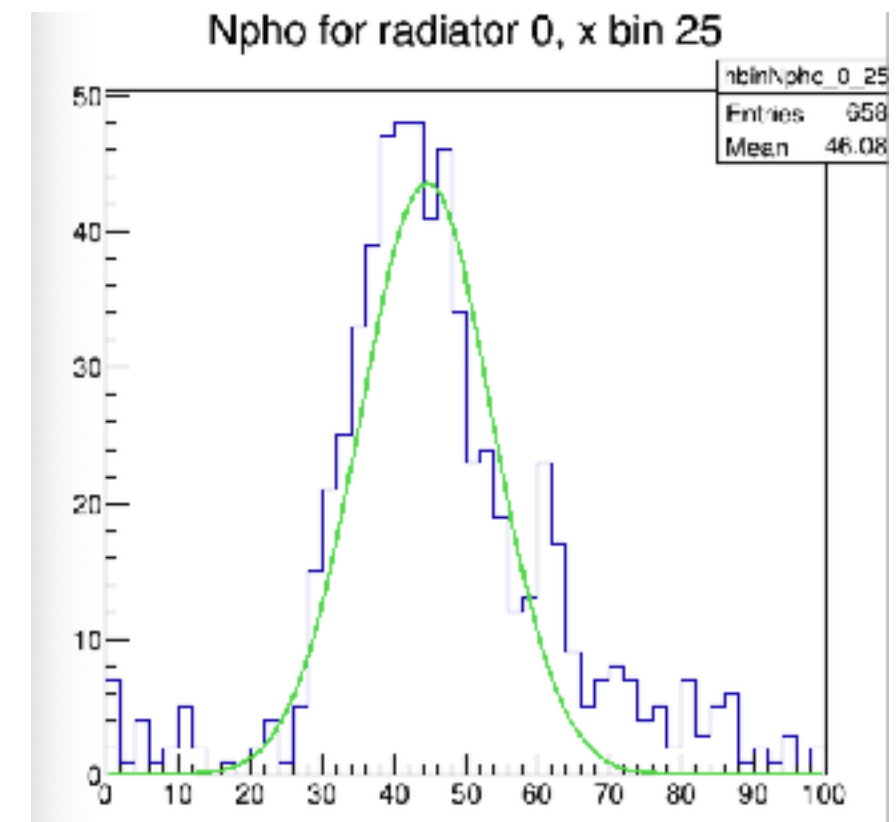
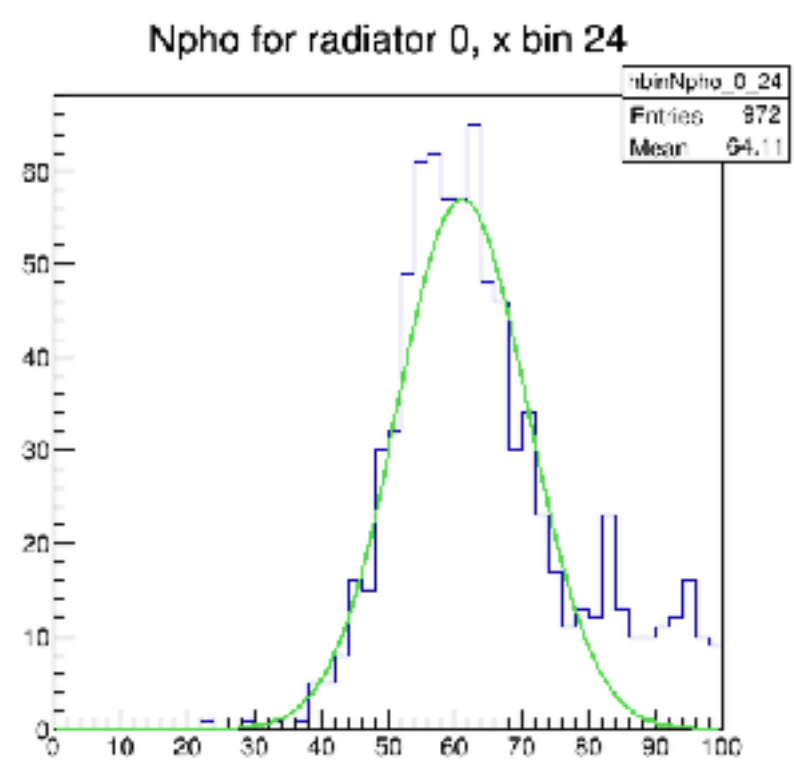
N pho data / N pho bggen

No DIRC reconstruction

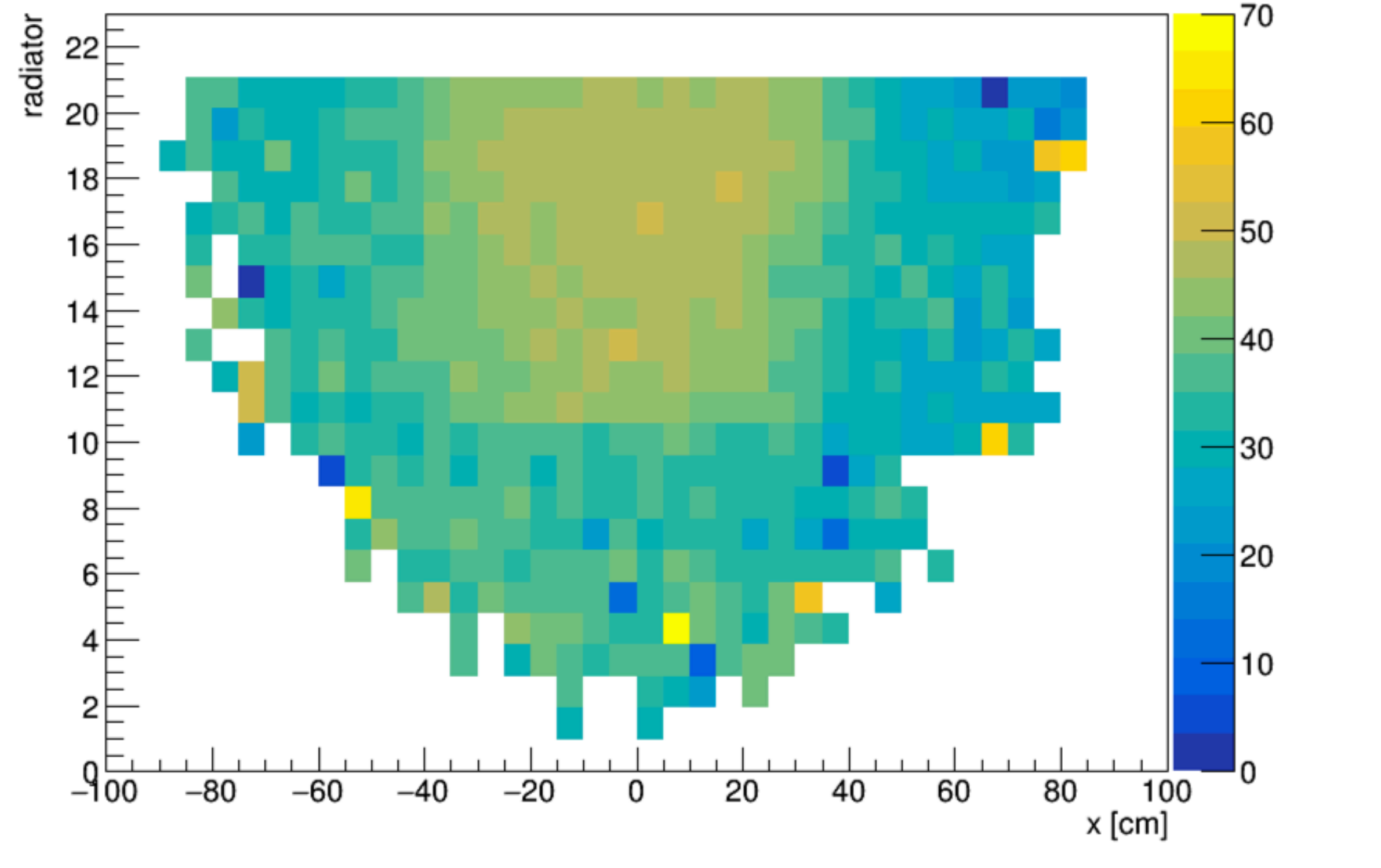


N pho for single tracks

No DIRC reconstruction, tracks with $p > 4$ GeV/c hit the lower DIRC half
single track events
time cut [10, 120] ns



bggen



data

N pho data / N pho bggen

