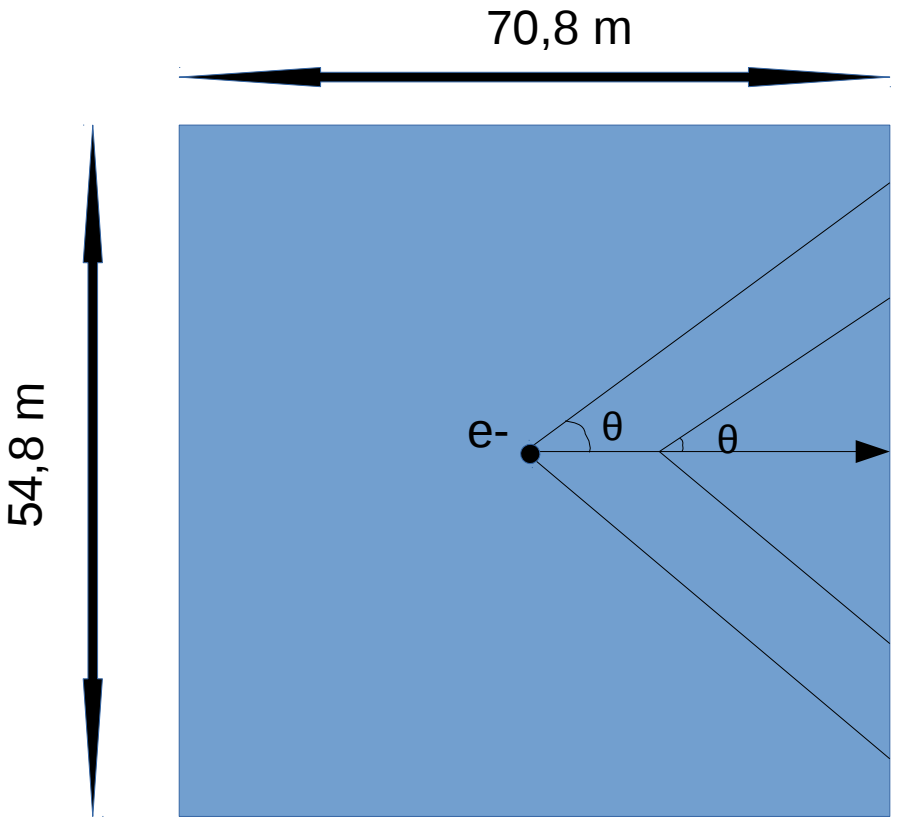
Big PMTs (20’’)
mPMT (module of 19x3’’ PMTs)

Comparison, differences

Svetlana Karpova

Inner detector



$\cos \theta = 1/(n*\beta)$

$\beta=1$ (v=c)

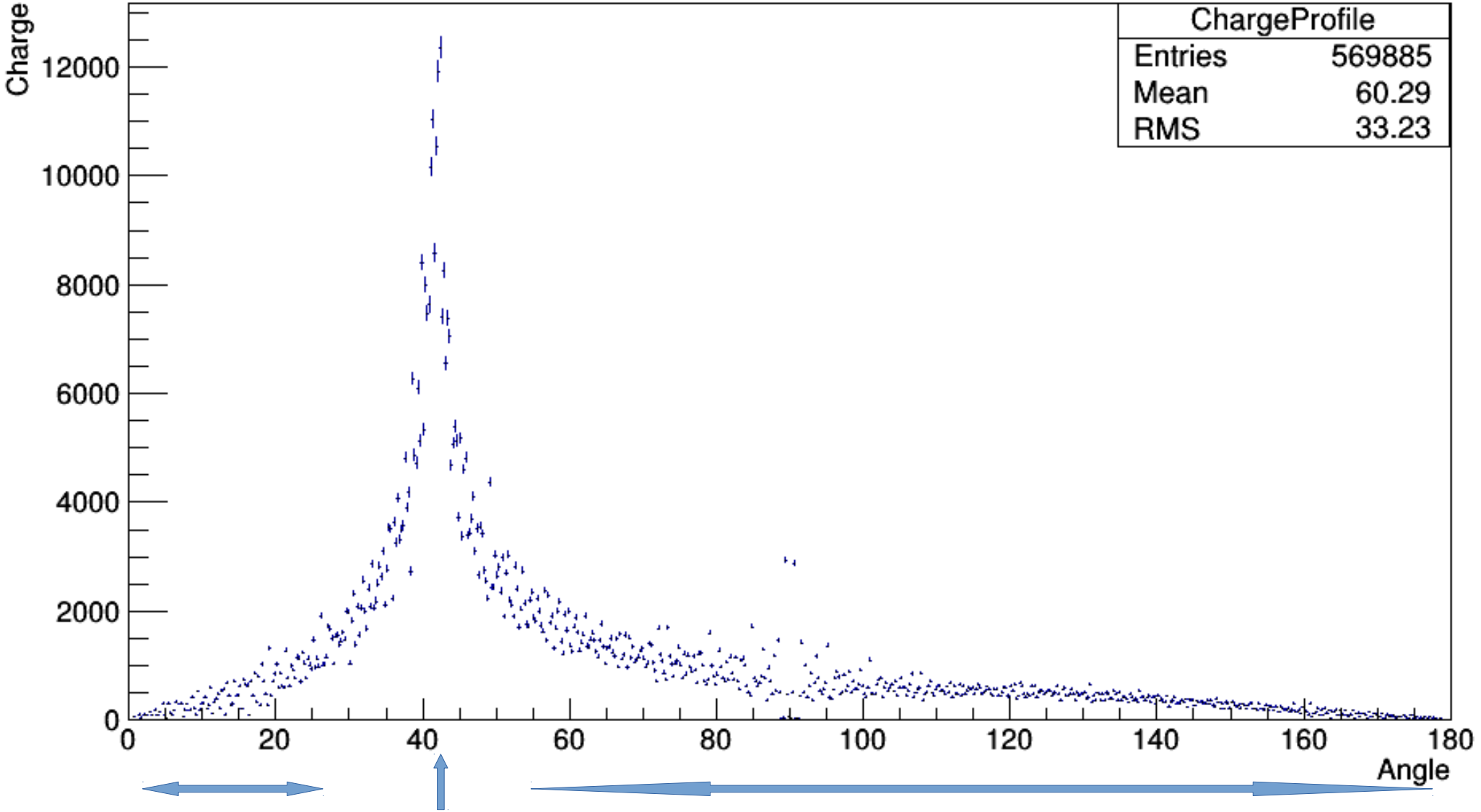
n=1,373

$\theta = 43{,}25°$

(n – refractive index of water, θ – Cherenkov angle, v- velocity of charged particle)

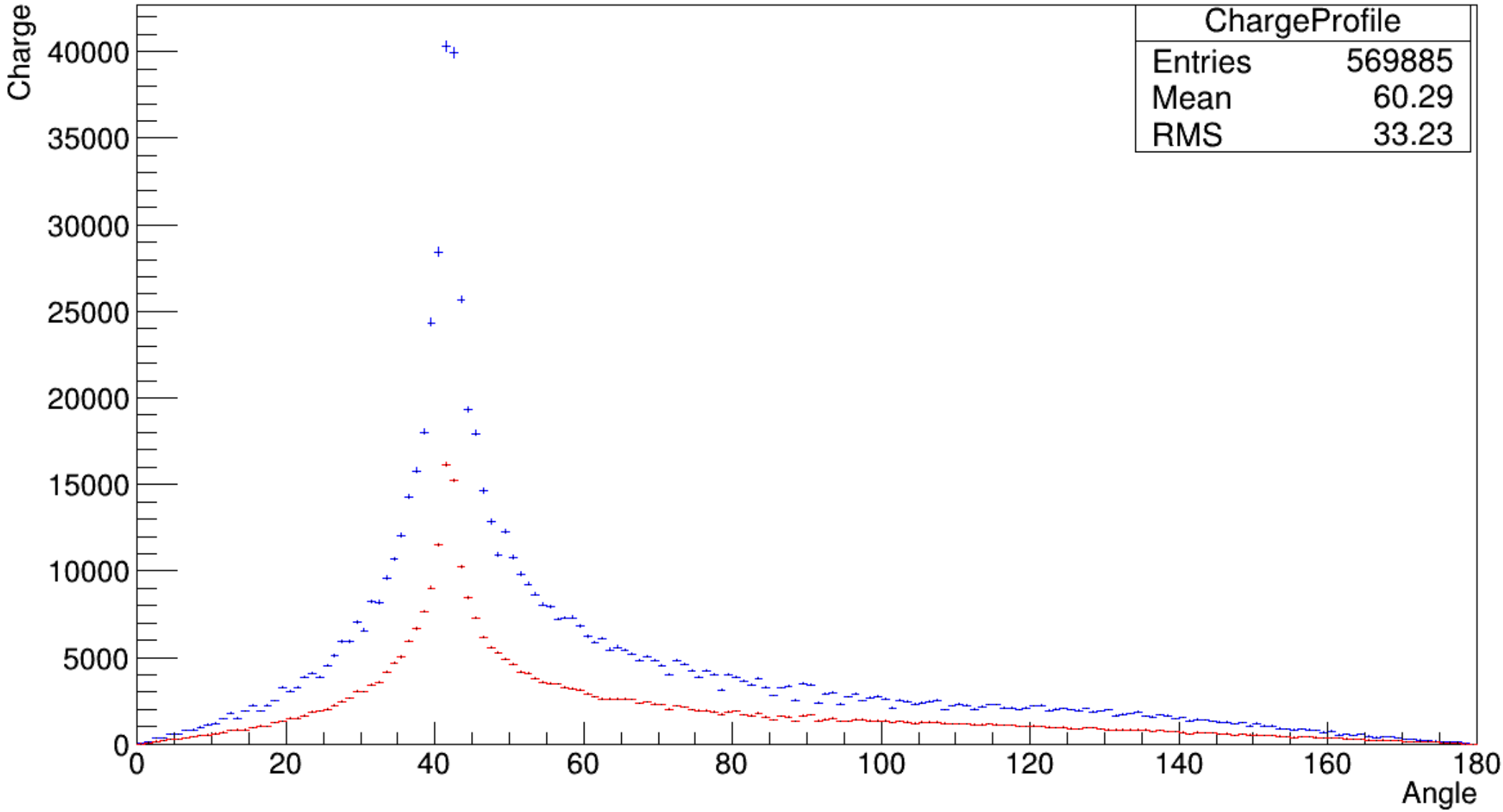
100 electrons
kinetic energy: 500 MeV

Charge Profile (20” PMTs)



Expectations for mPMT: the peak will be at the same value of angle, but it will be lower along axis Y, because not all photons hit small PMT. A lot of photons hit gap between PMTs.

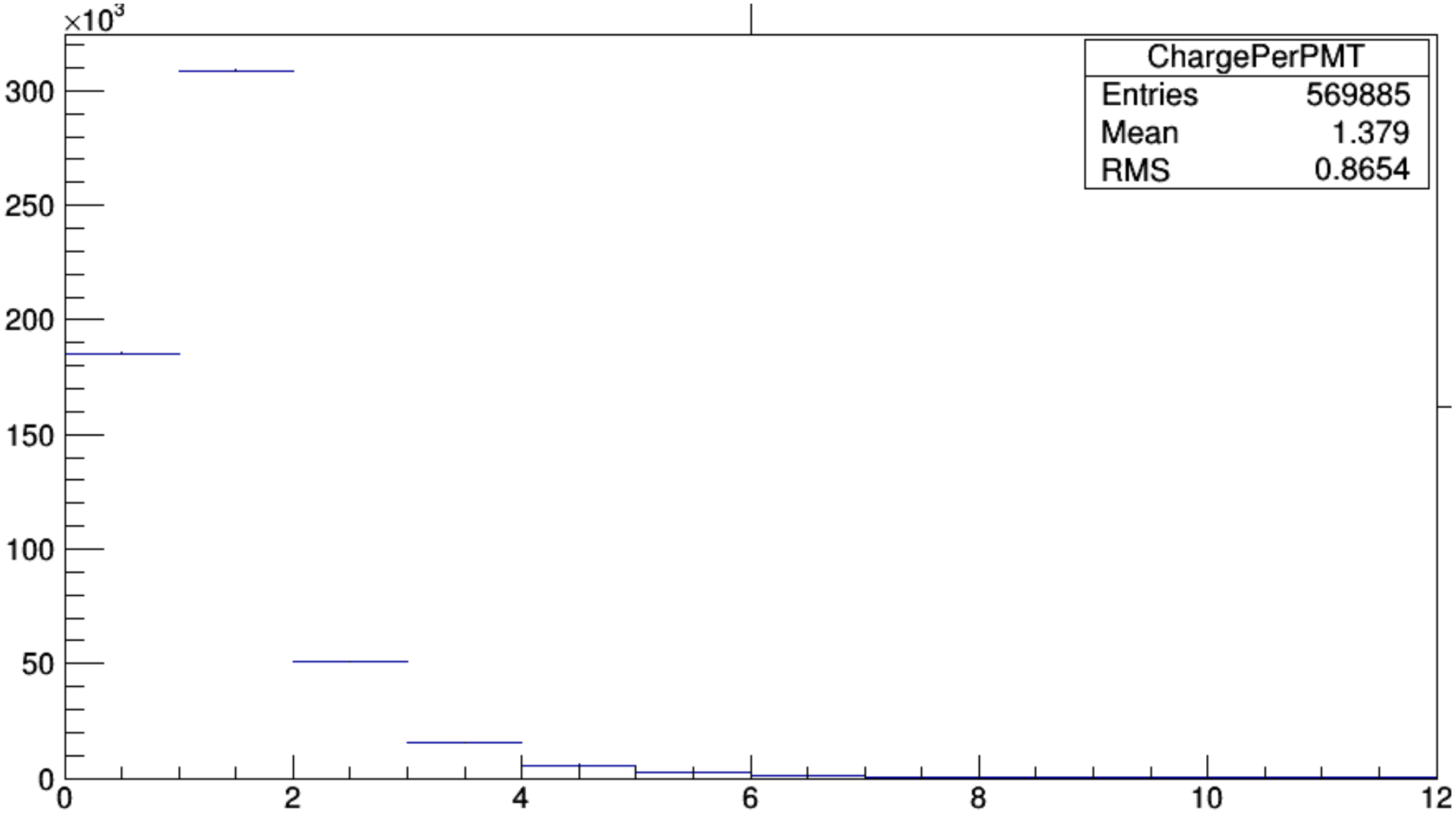
Charge Profile (20” PMTs, mPMT)



Integral2/Integral1 = 0.445106

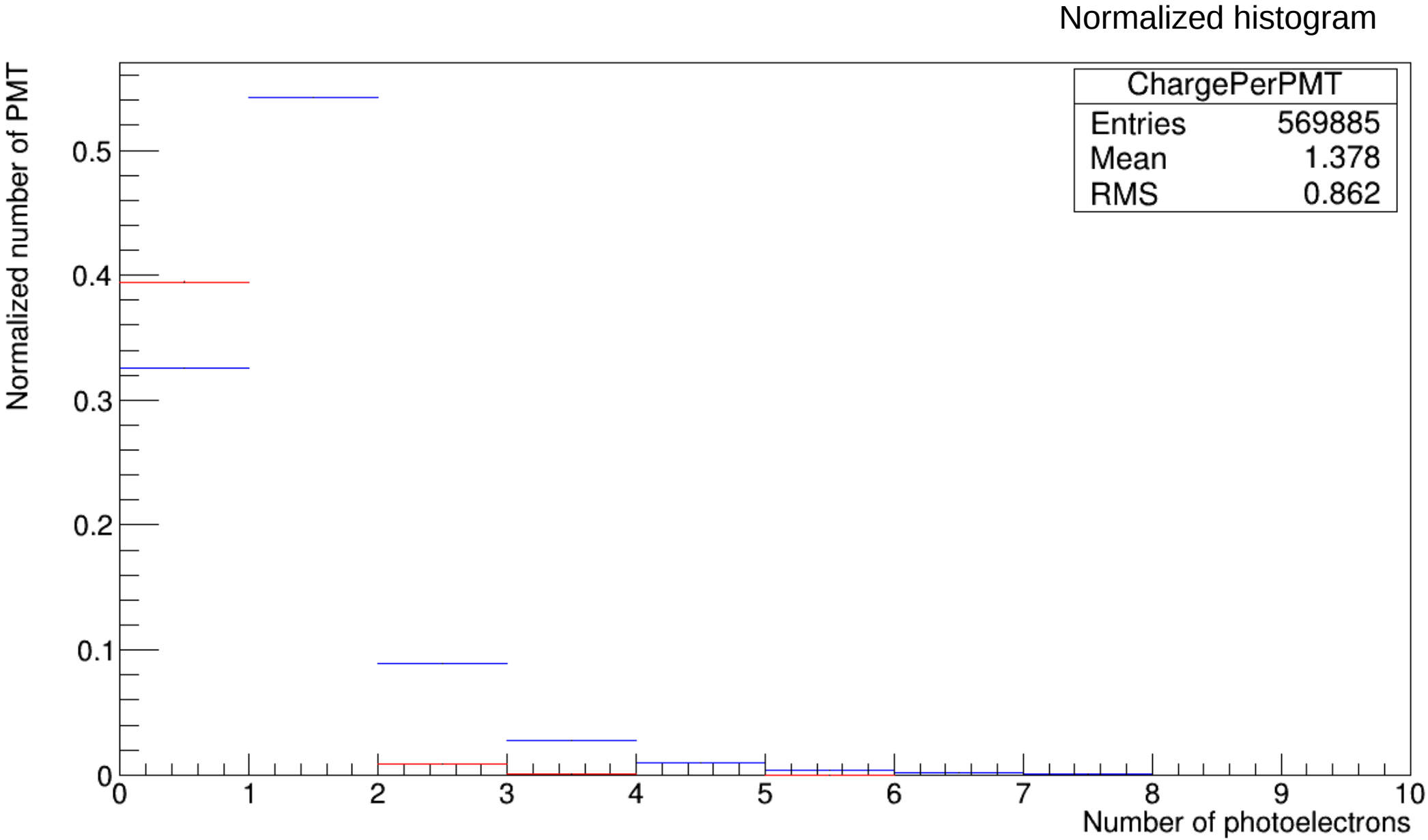
19 small PMTs covers 44 % of the module

Charge per PMT (20” PMTs)

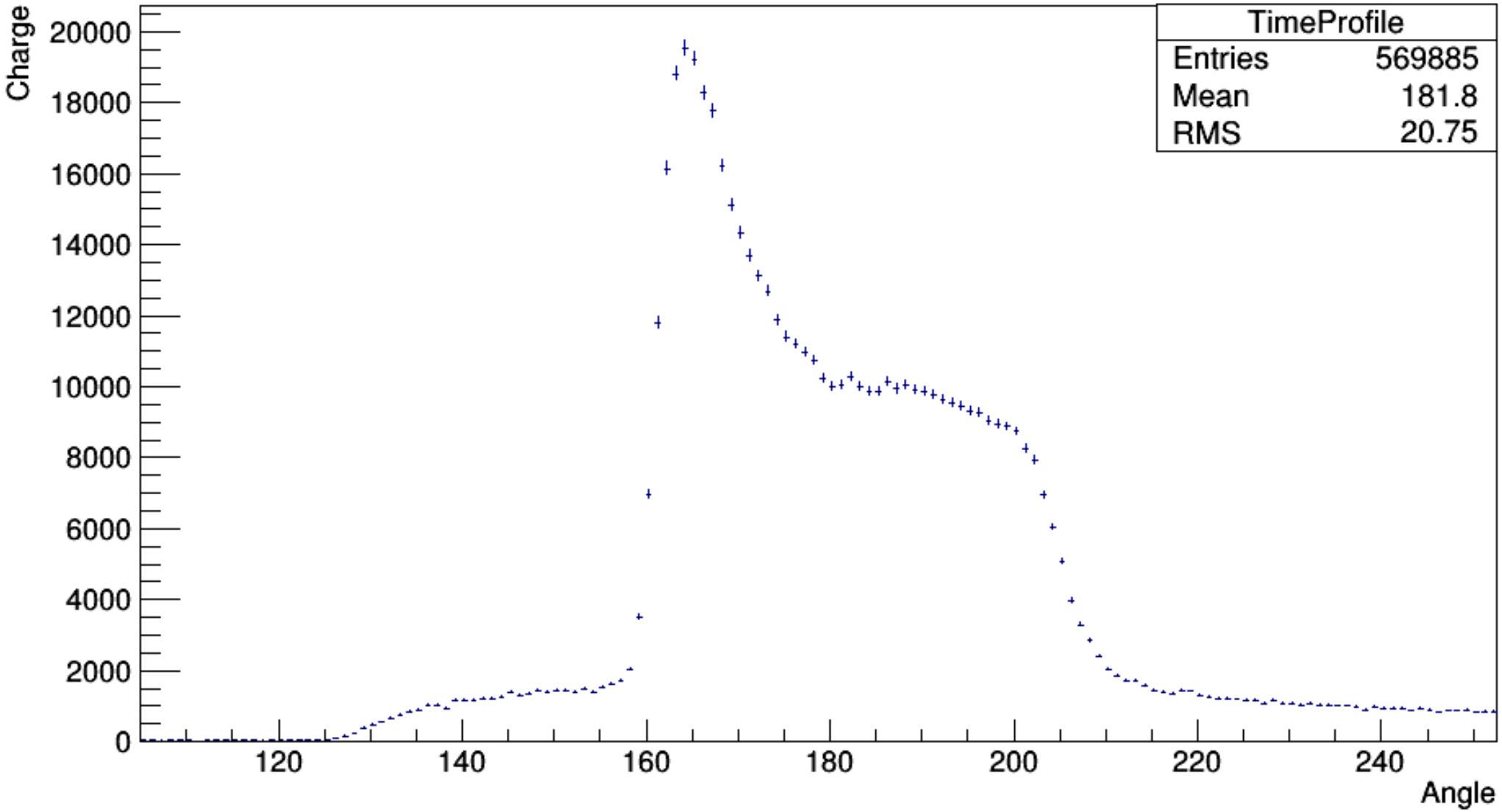


Expectations for mPMT: amount of photoelectrons per PMT will decrease. The surface of PMT is smaller, so likelihood of hitting photon also decreases.

Charge per PMT (20” PMTs, mPMT)



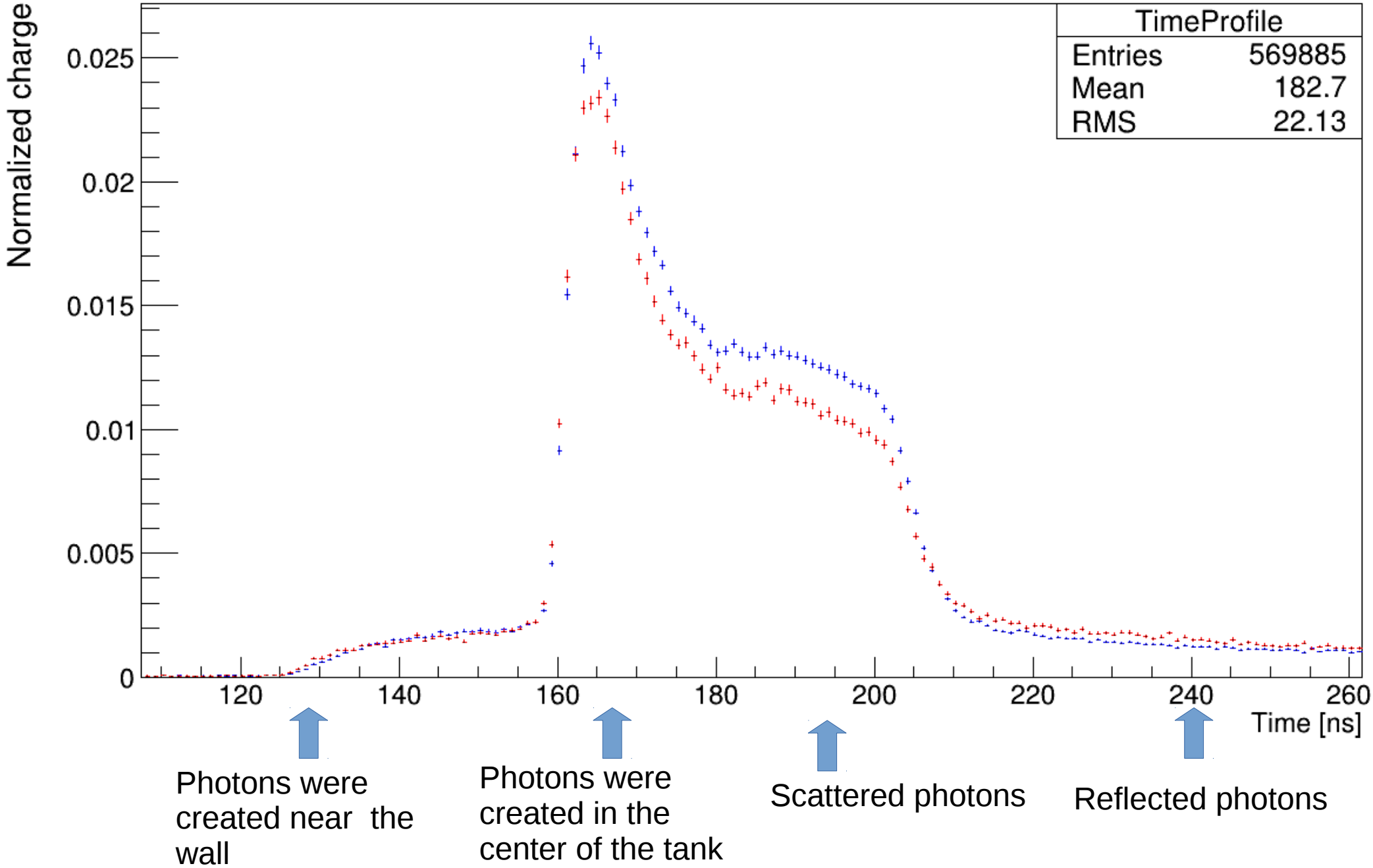
Time Profile (20” PMTs)



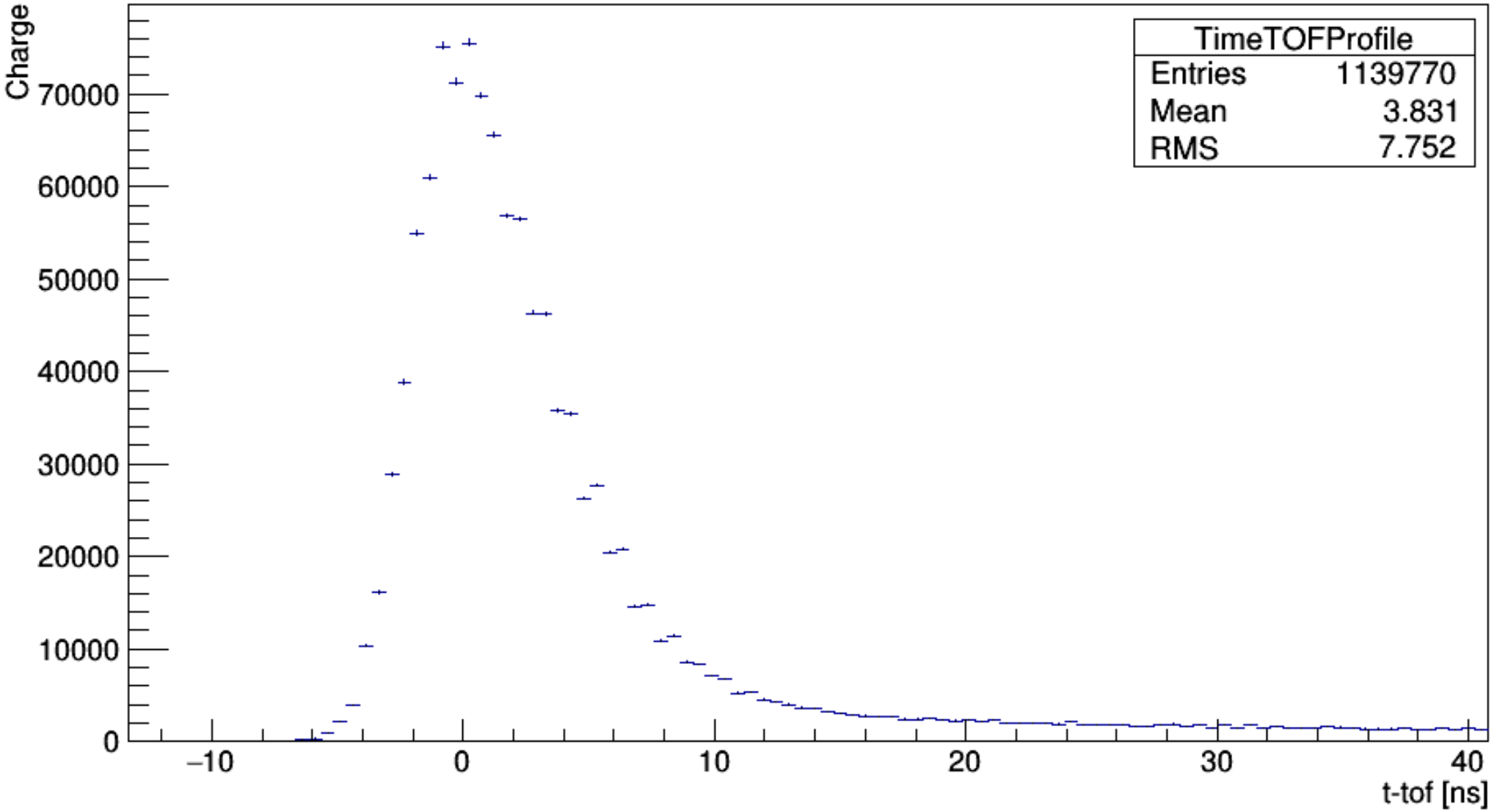
Expectations for mPMT: the peak will be lower than for big PMTs, because of gaps.

Time Profile (20” PMTs, mPMT)

Normalized histogram

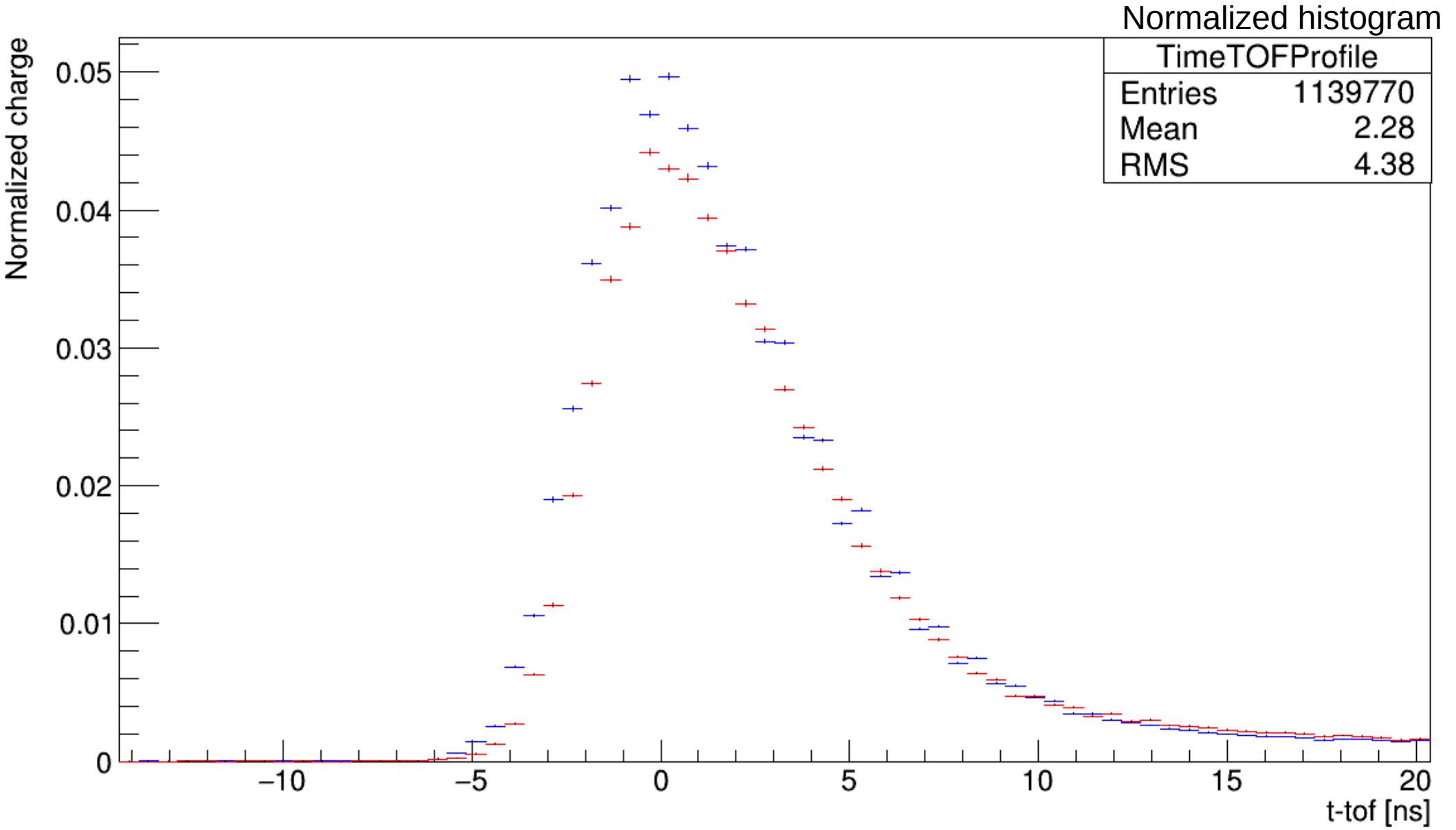


Time – Time of flight Profile (20” PMTs)



Expectations for mPMT: small PMTs have better time resolution. Width of this peak will be narrower.

Time – Time of flight Profile(20” PMTs, mPMT)



The result ≠ the expectations

FWHMBig = 5.61 ns
FWHMSmall = 5.61 ns

Property of: 3” PMT: FWHM = 2,0 ns
20” PMT: FWHM = 2,6 ns