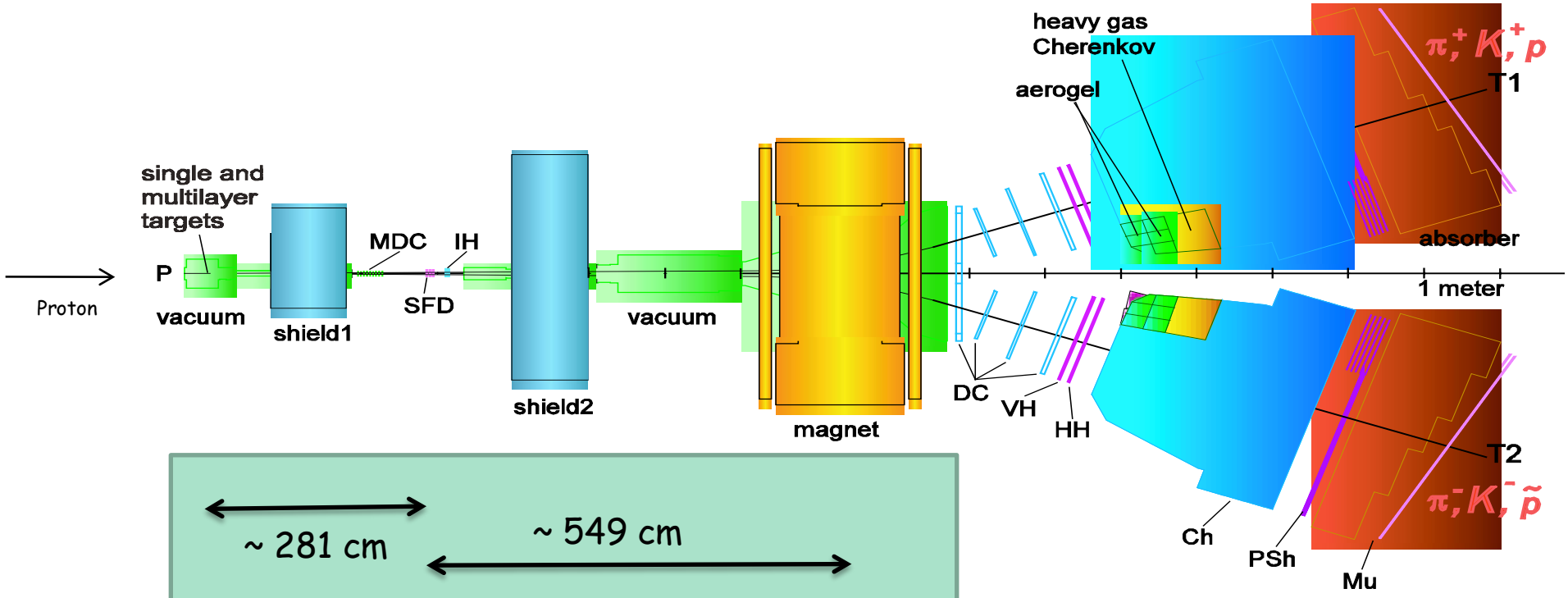
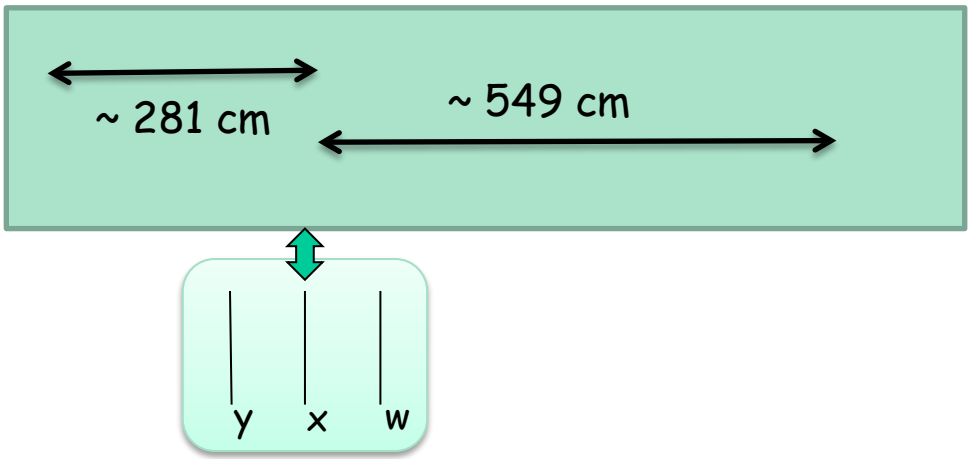
SFD study and simulation for the data 2008-2010

A. Benelli

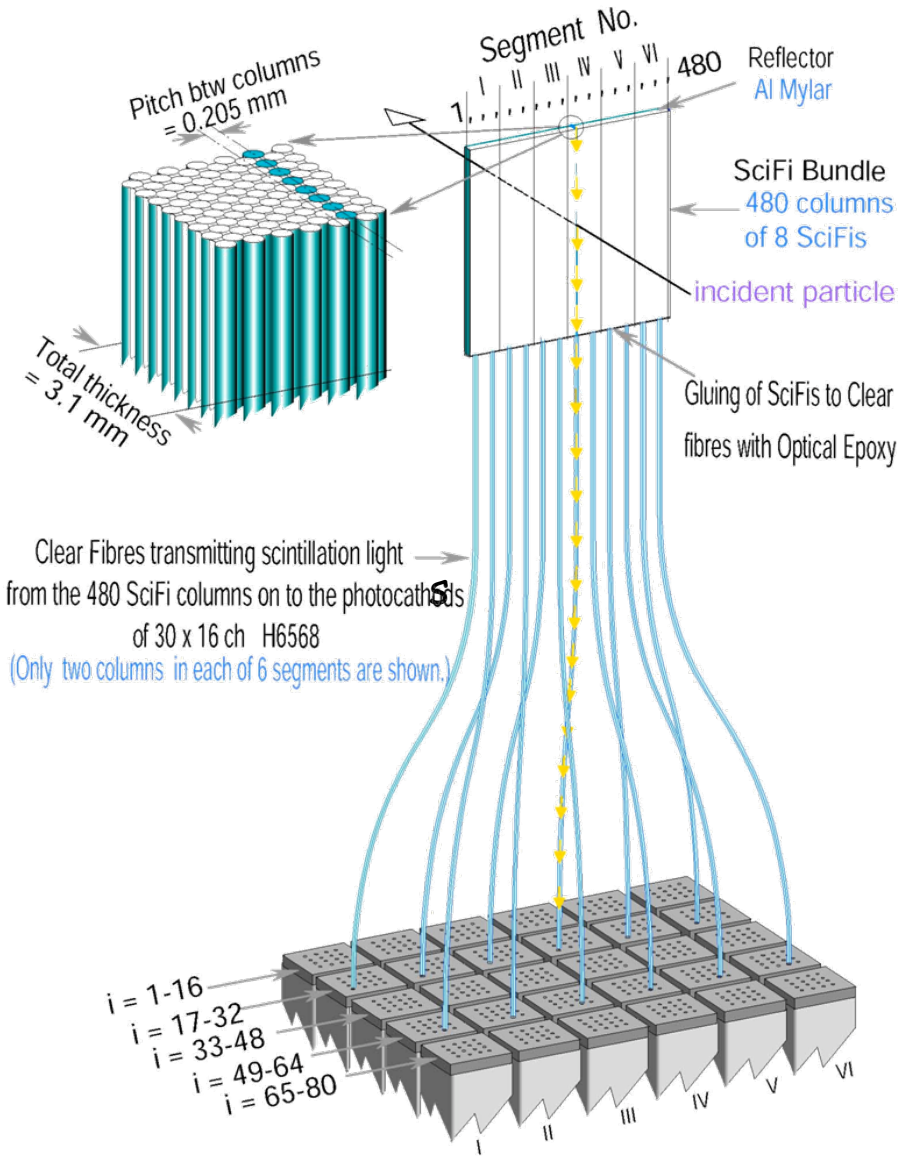
With the HUGE collaboration of V.Yazkov and D. Drijard

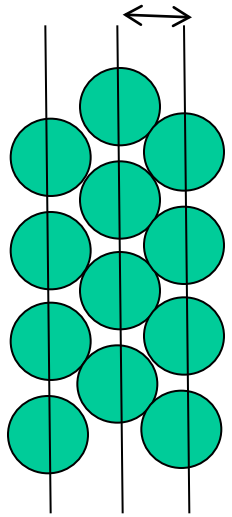
DIRAC new set-up





SFD x and y plane

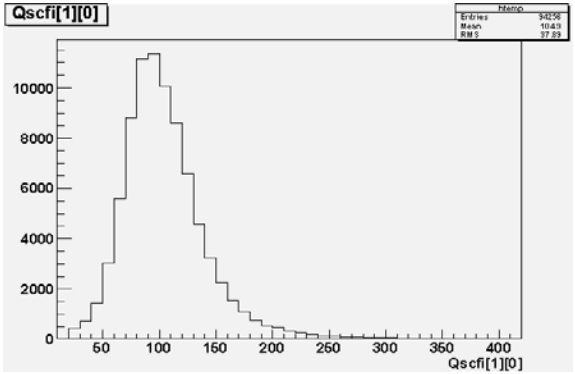




pitch

X : 480 columns pitch =0.0204 cm
ADC/TDC read out
no PSC

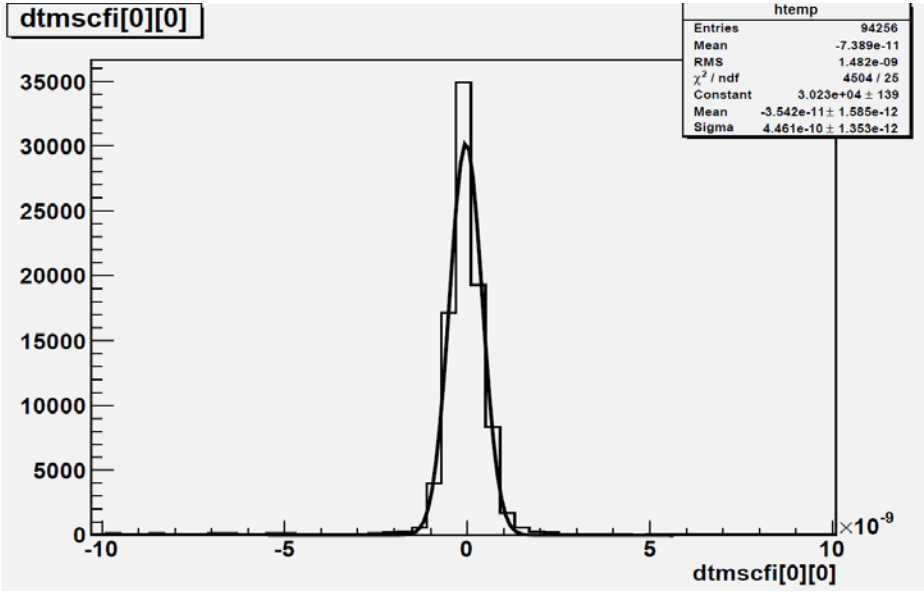
Y : 480 columns pitch =0.0203 cm
TDC read out
PSC



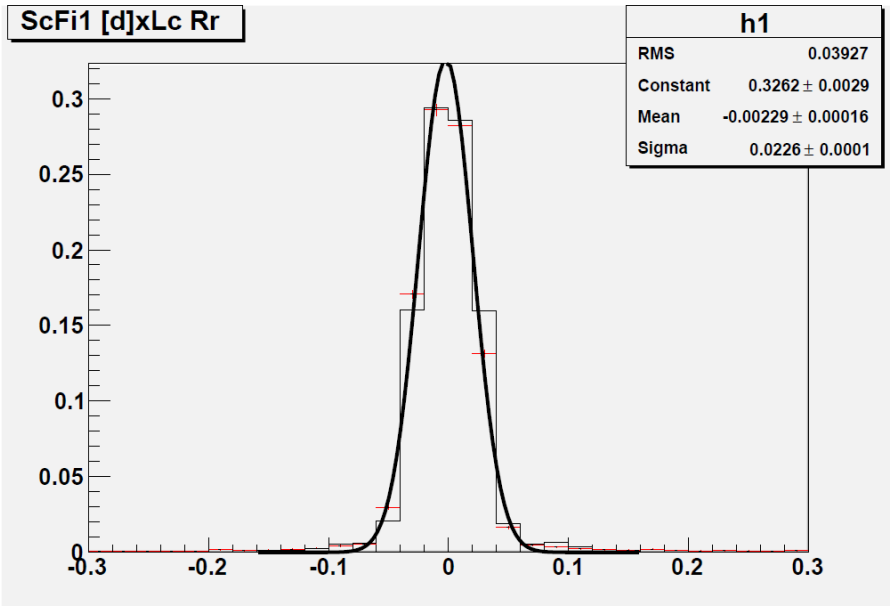
$q=100*Q/Q_{average}$

SFD resolution for isolated tracks

Dx = x meas. – x prediction from sfd Y-W tracking



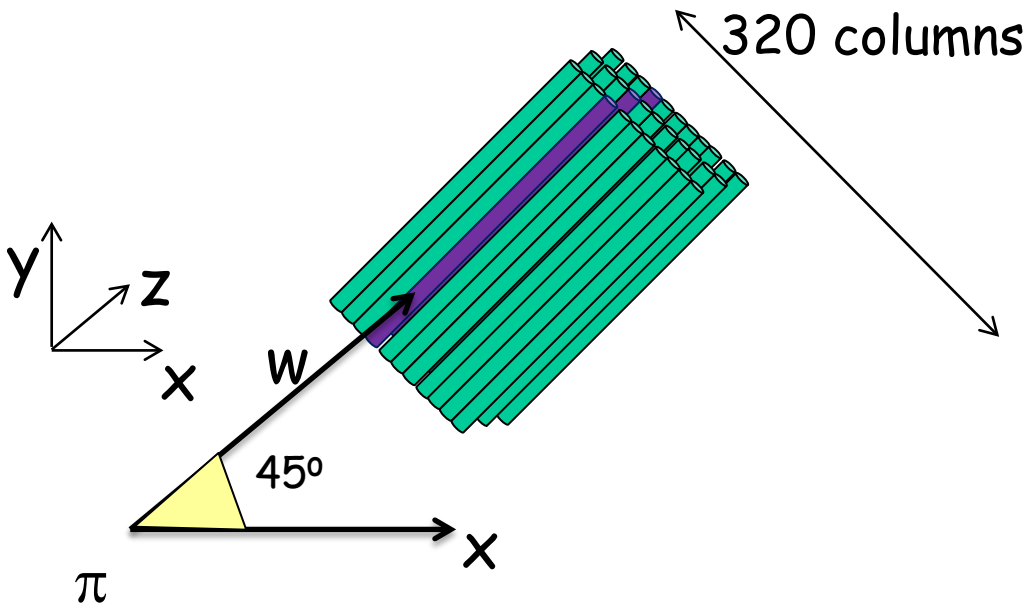
Δt = 0.44 ns



Δx = 0.022 cm

Δt Sfdx = time meas. – time expected given by the tracking from the VH to the SFD

W plane - inclined



Pitch =0.043 cm

TDC read out

PSC

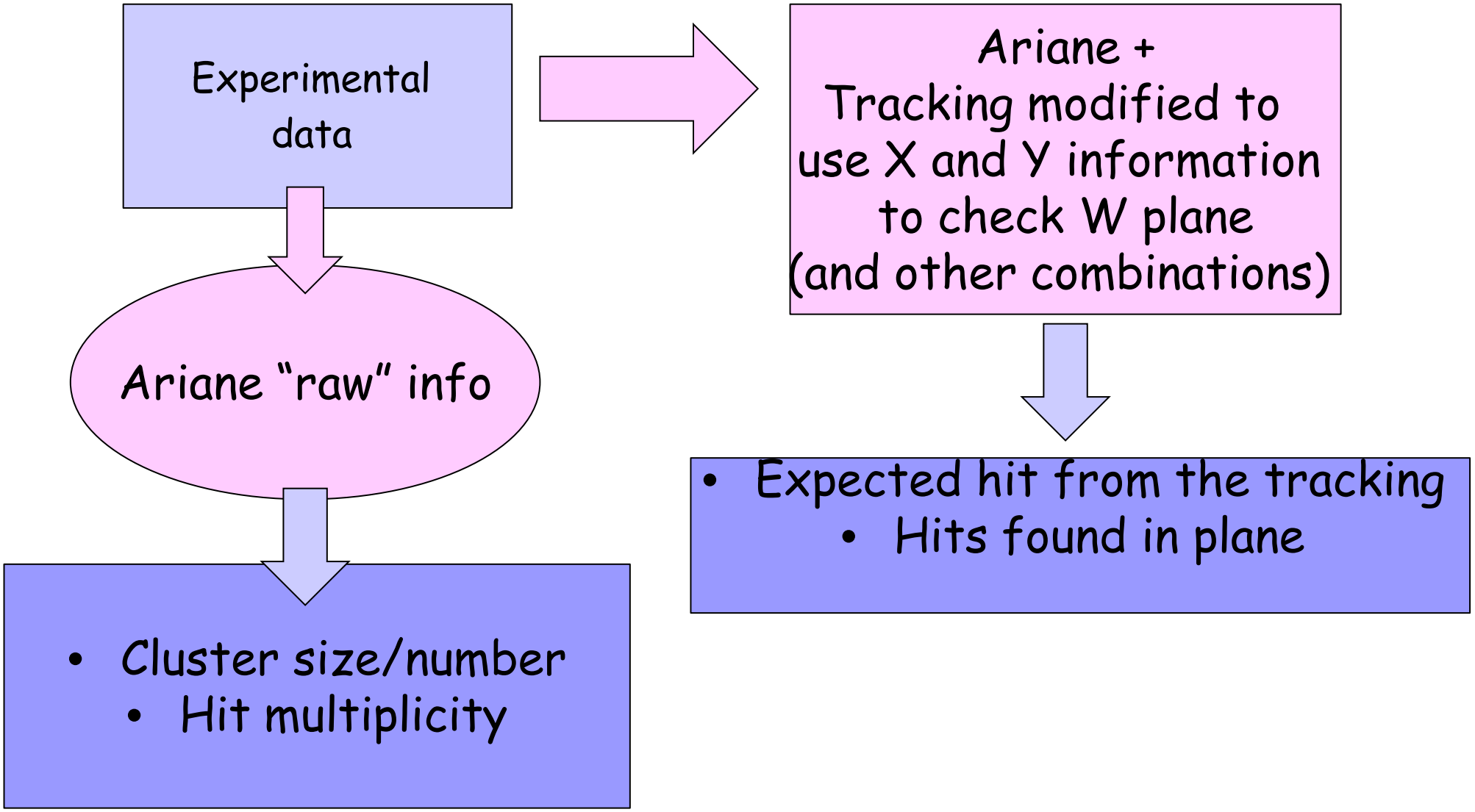
Factors to take into account in the simulation

- Detector Efficiency ~95% per plane
- Fibre Cross talk (for every "true hit" add 20-28% prob)
- Random Noise (only W plane for every "true" hit add 15%)
- PM Cross Talk (2-3 % add at +_4 dn from "true" hit)
- Background tracks (Oleg G.)

X plane has ADC /TDC information and PSC software

Y and W planes have PSC electronic and no knowledge of ADC

Extraction of information from Experimental data



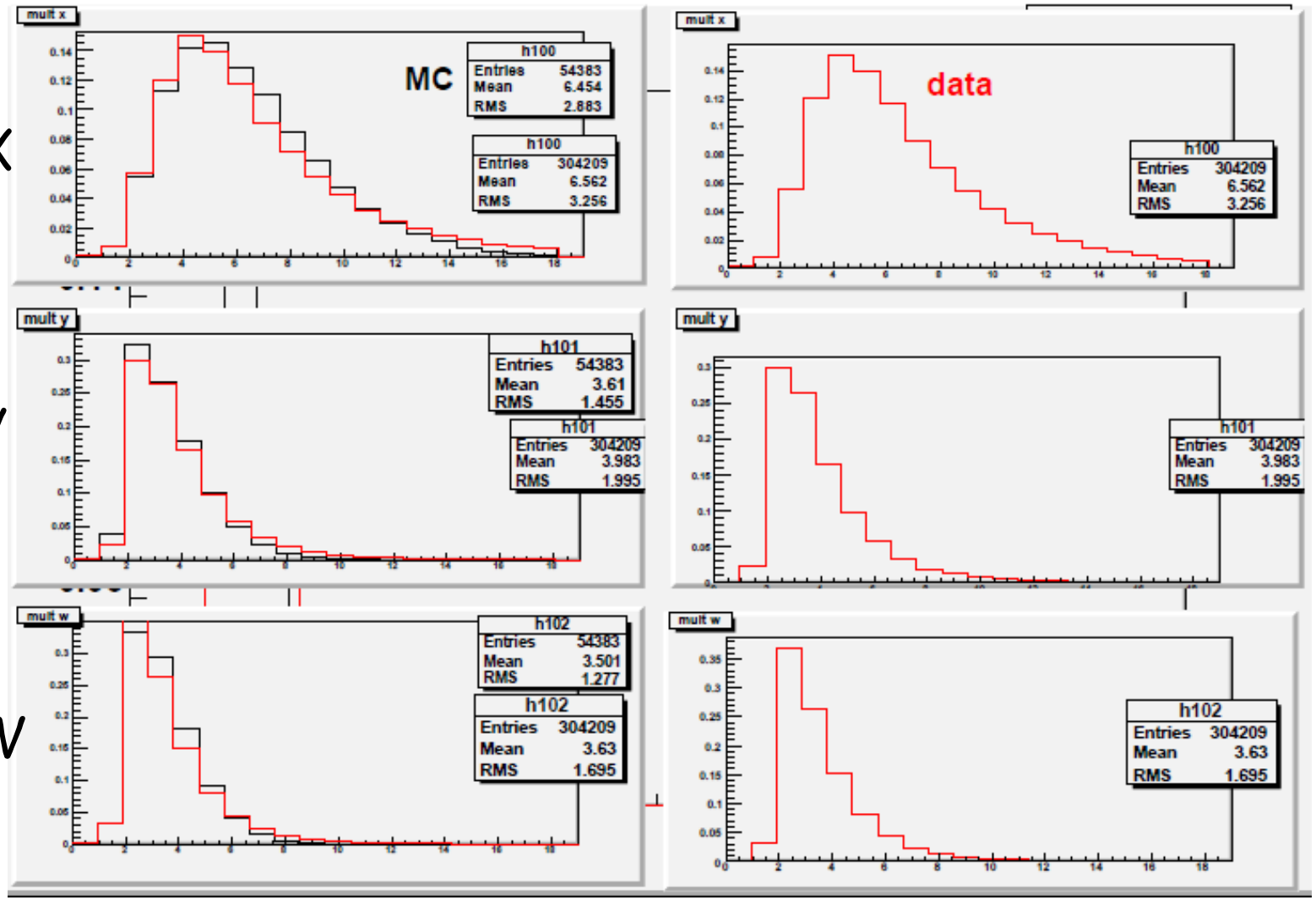
Hit multiplicity in "Raw" data and MC – 2009 run

Only the request of ≥ 2 tracks in DC

SFDX

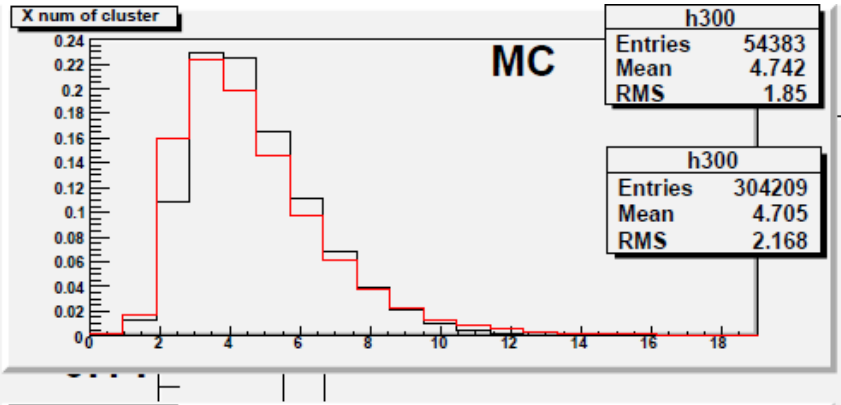
SFDY

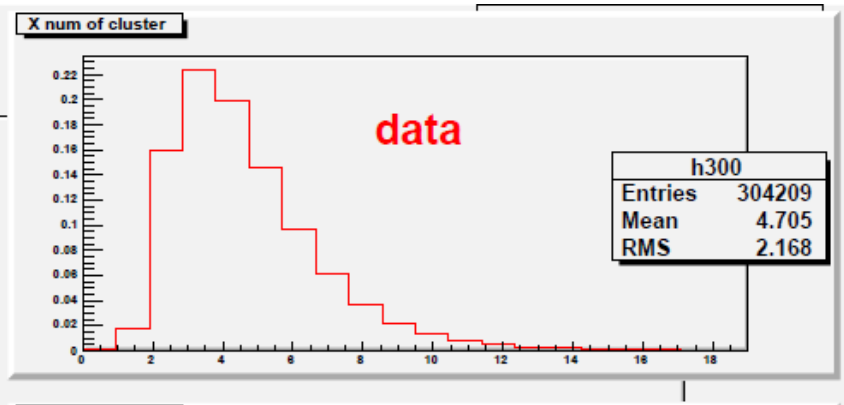
SFDW



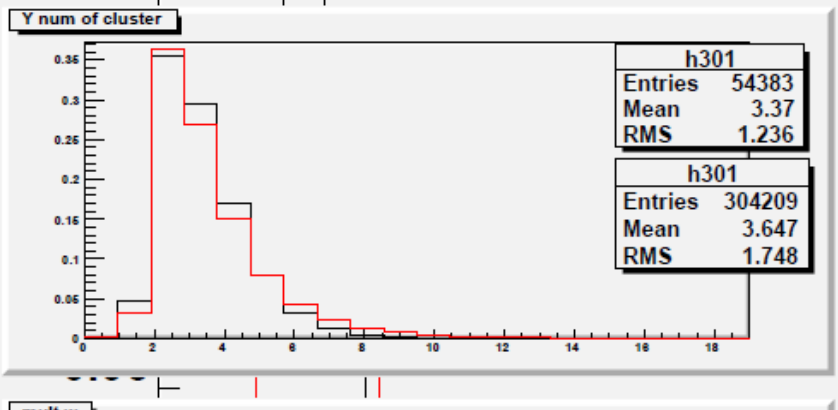
Number of clusters in "Raw" data and MC – 2009 run

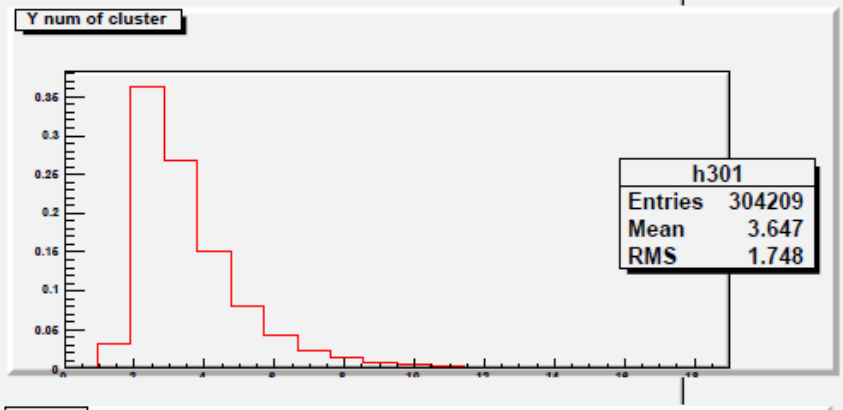
SFDX



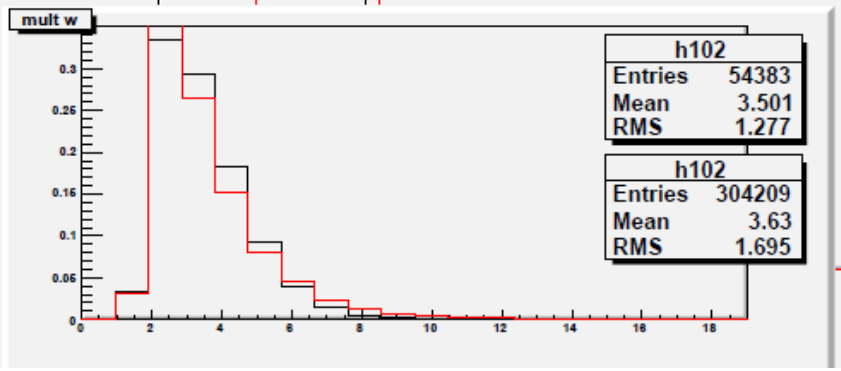


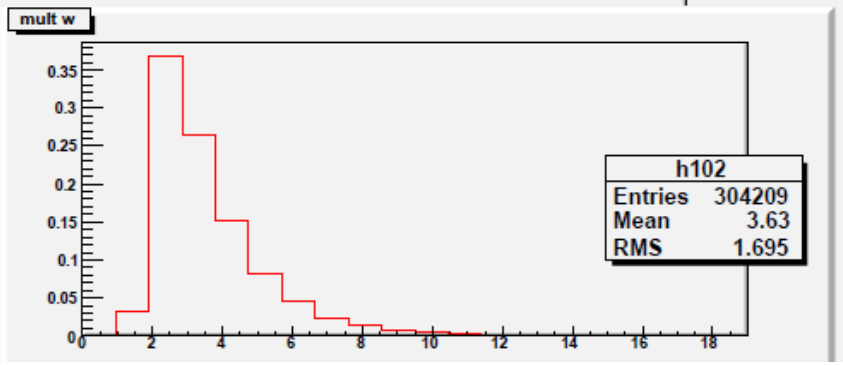
SFDY



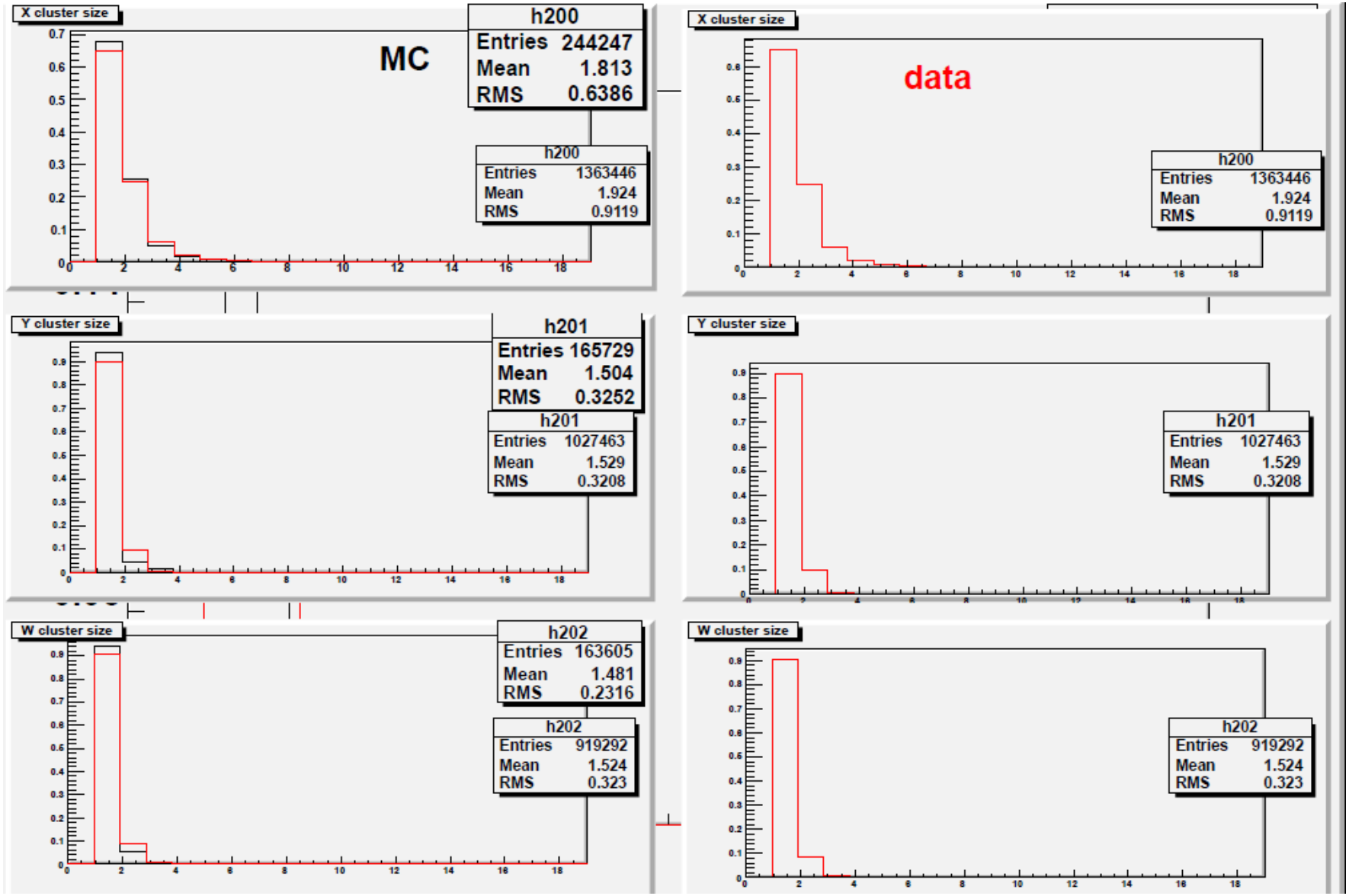


SFDW

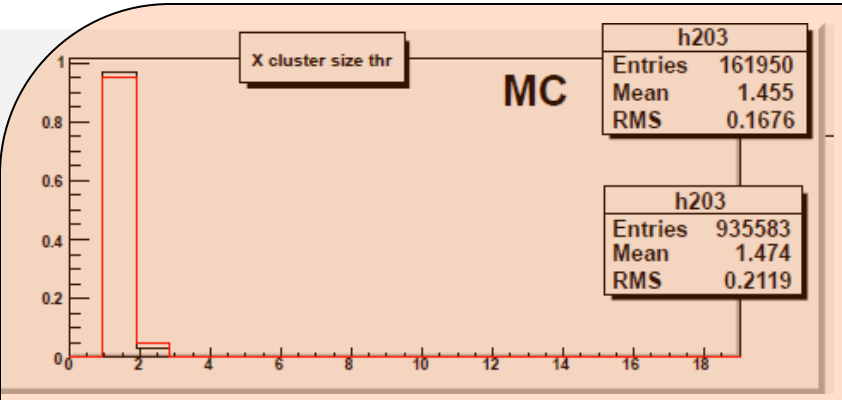


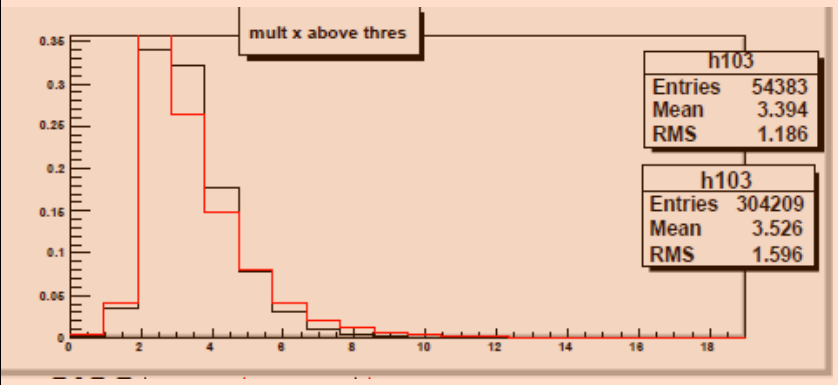


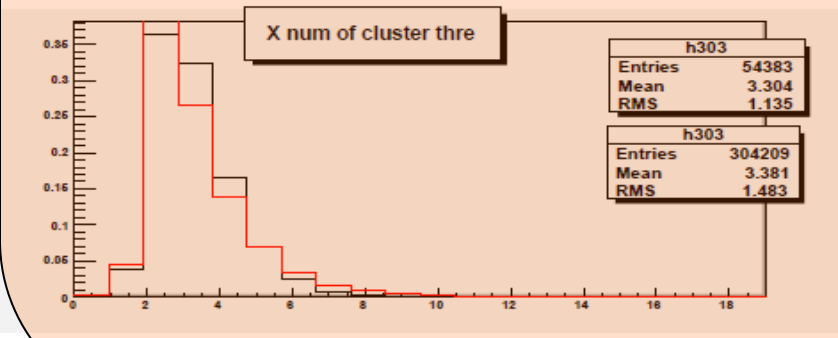
Cluster Size in "Raw" data and MC – 2009 run



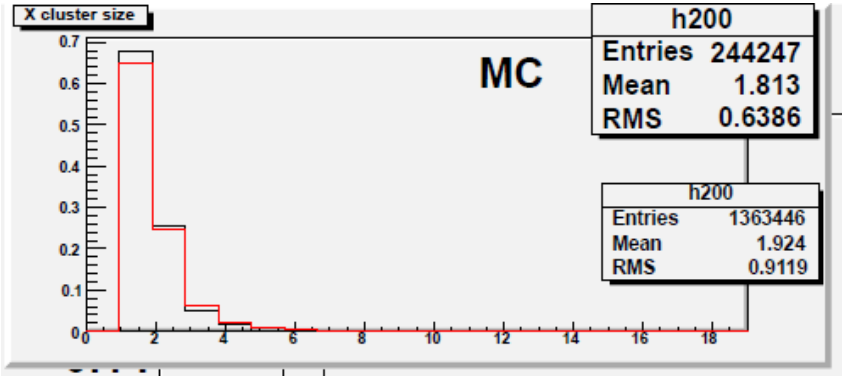
Comparison of distribution considering SFD x hit above the threshold

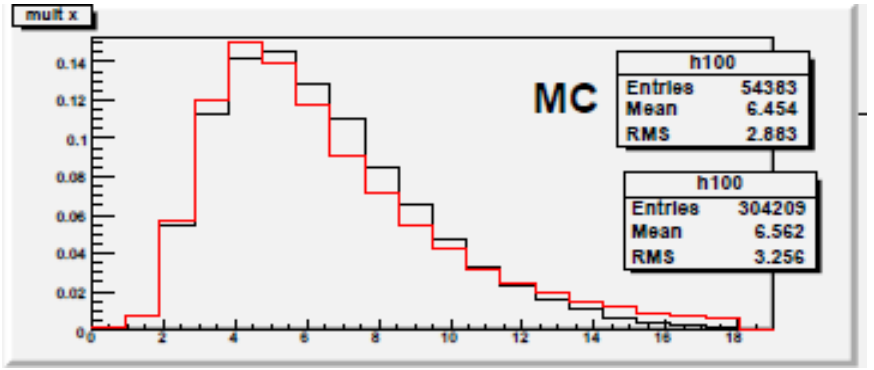


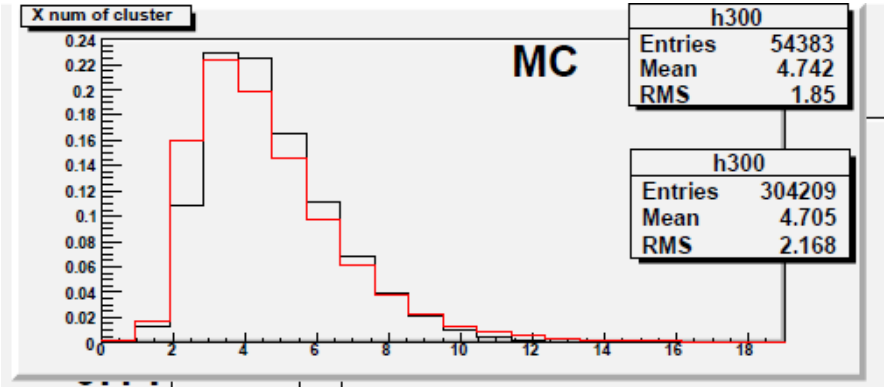




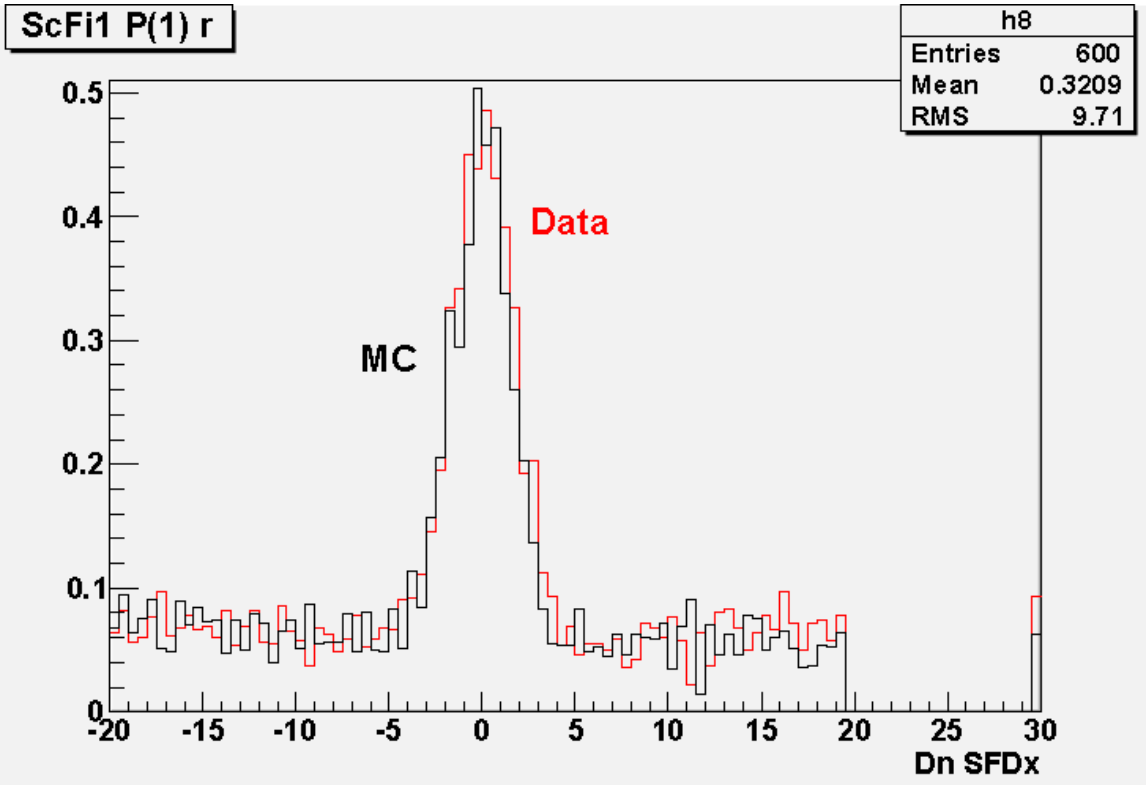
Above the threshold, q > 0.2

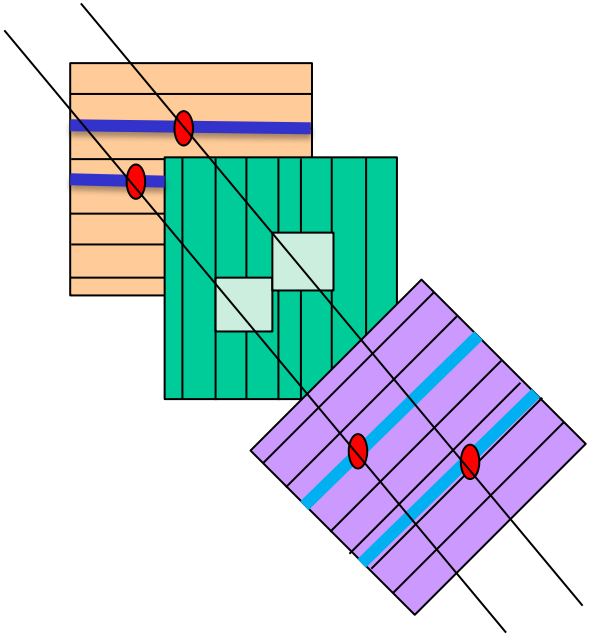






.. Y and W plane are used to check X plane

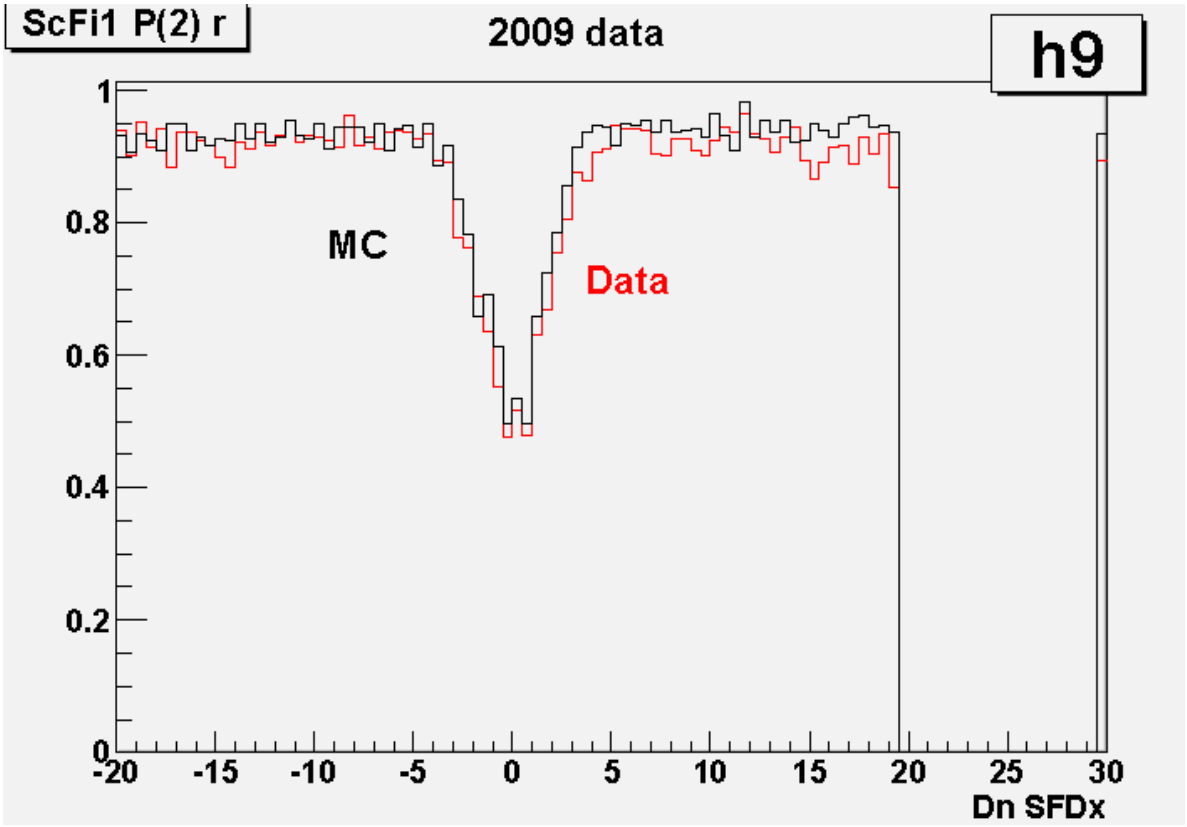


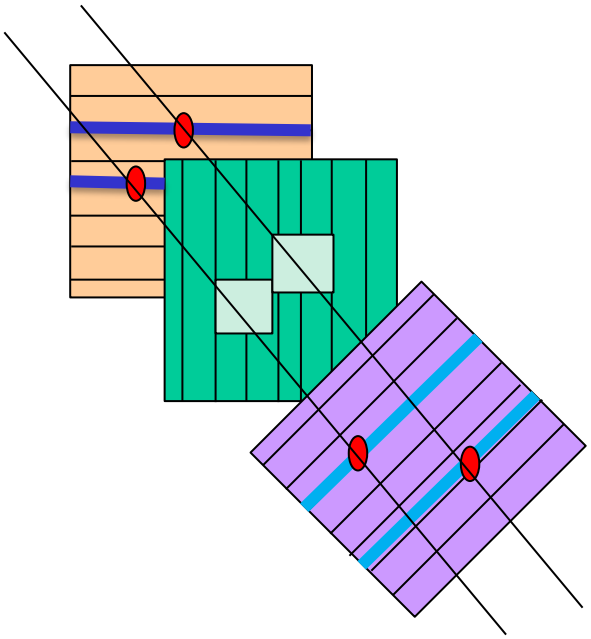


P(1) is the Probability to have
1 hit around the extrapolation at the distance Dn (<20)

Probability that the two tracks of the pair have 1 good experimental hit around the extrapolation.
Dn = 30 is the average

.. Y and W plane are used to check X plane



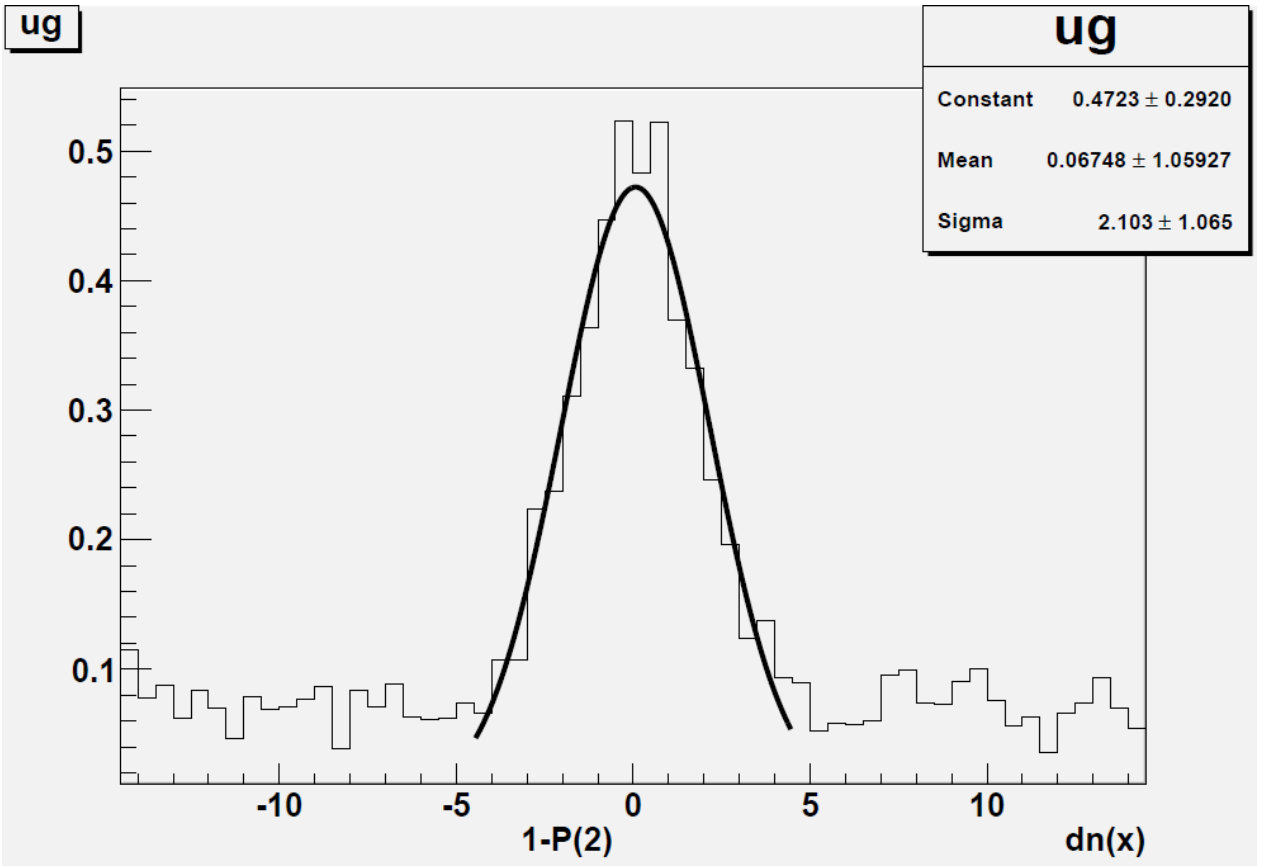


P(2) is the Probability to have
2 hit around the extrapolation at the distance Dn (<20)

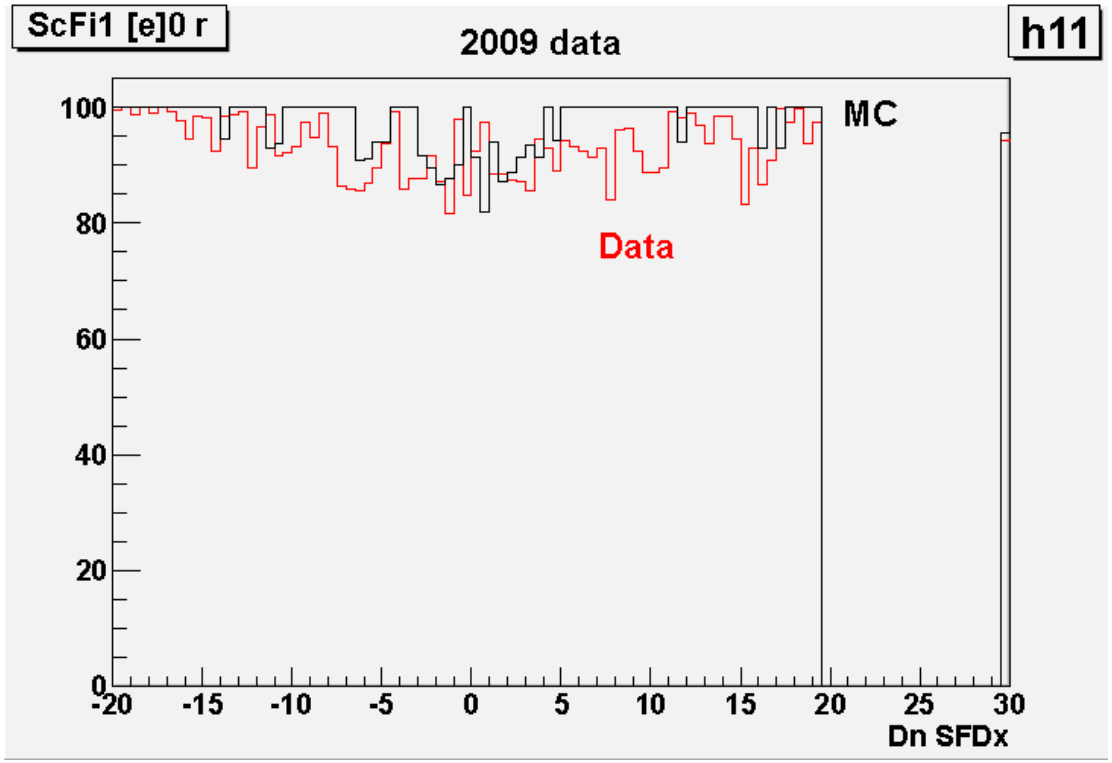
Probability that each of the two tracks of the pair
have 1 good experimental hit around the extrapolation.
Dn = 30 is the average

SFD x resolution for two close tracks

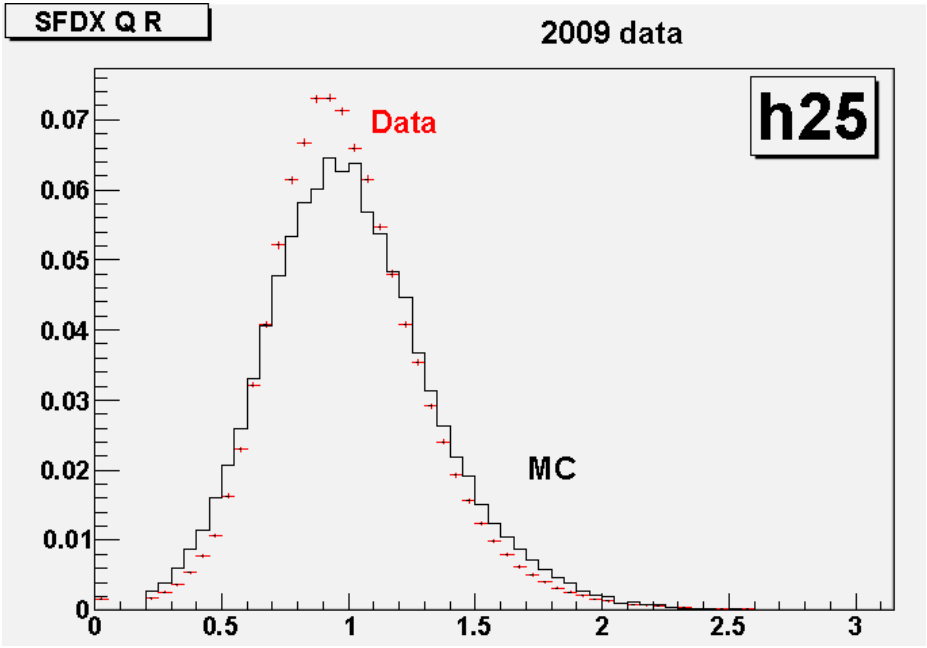
$\Delta x_{\text{double tracks}} = 2.103 \times 0.026 \text{ cm} = 0.055 \text{ cm}$



.. Y and W plane are used to check X plane

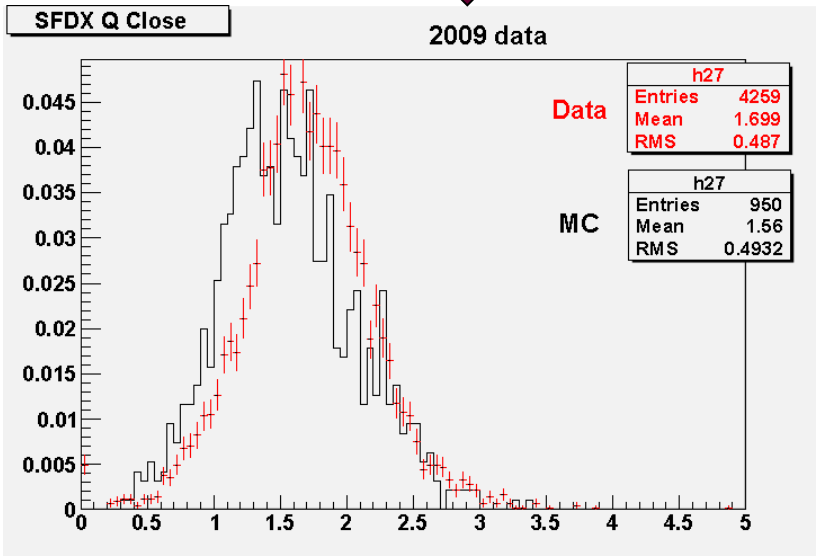


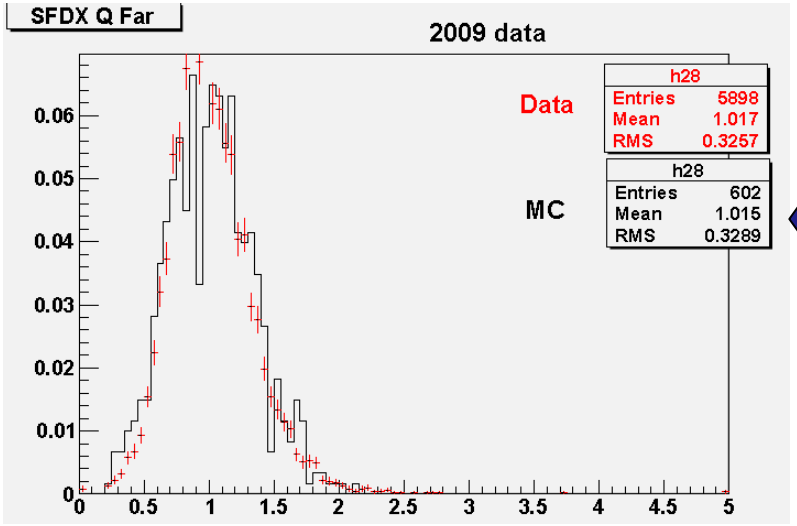
e(0) is the efficiency to have
a hit (1 or 2) around the extrapolation at the distance Dn (<20)



Q distribution
for tracks well isolated

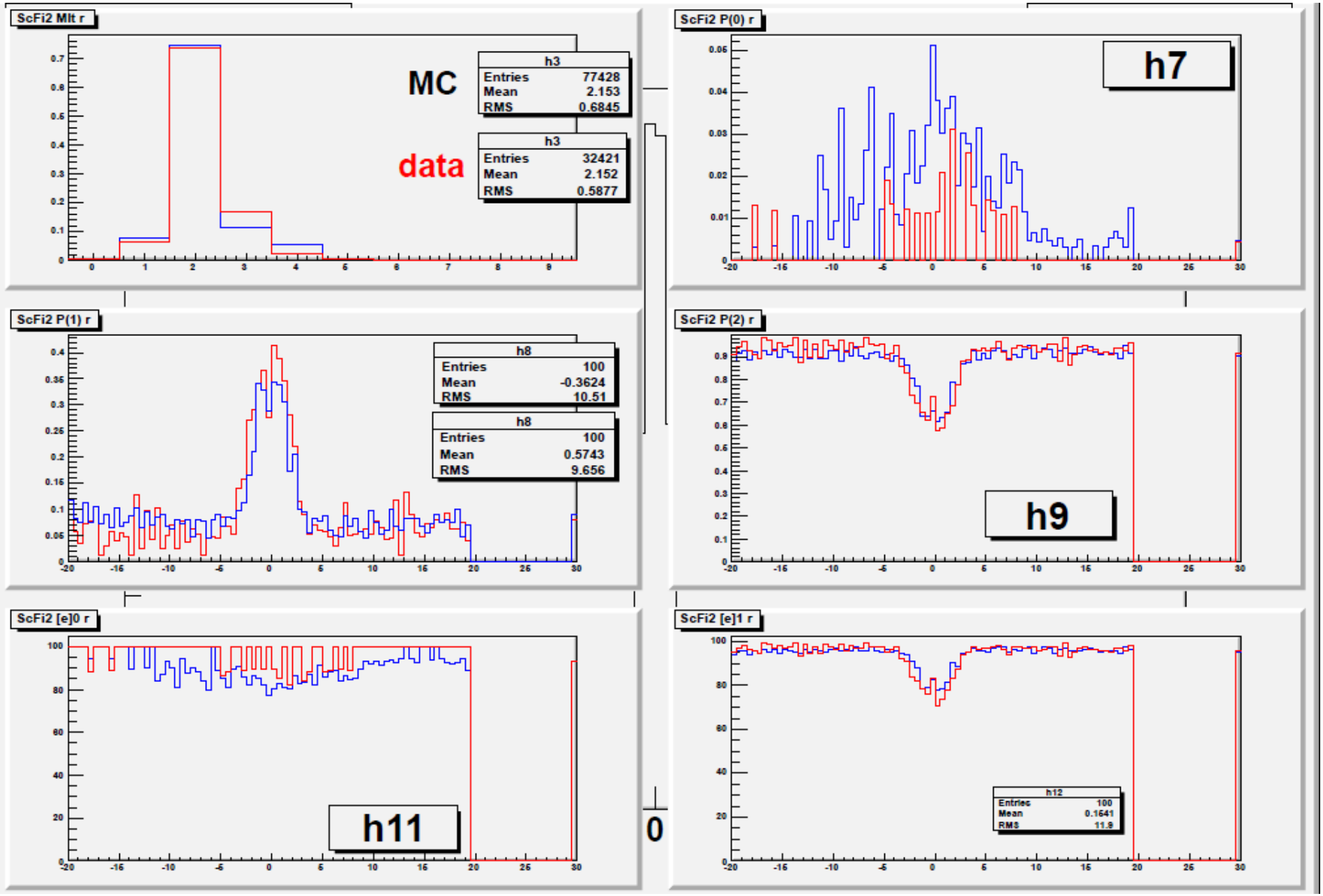
Q distribution for events with 1 hit
for the two tracks and small distance (d<0.05)



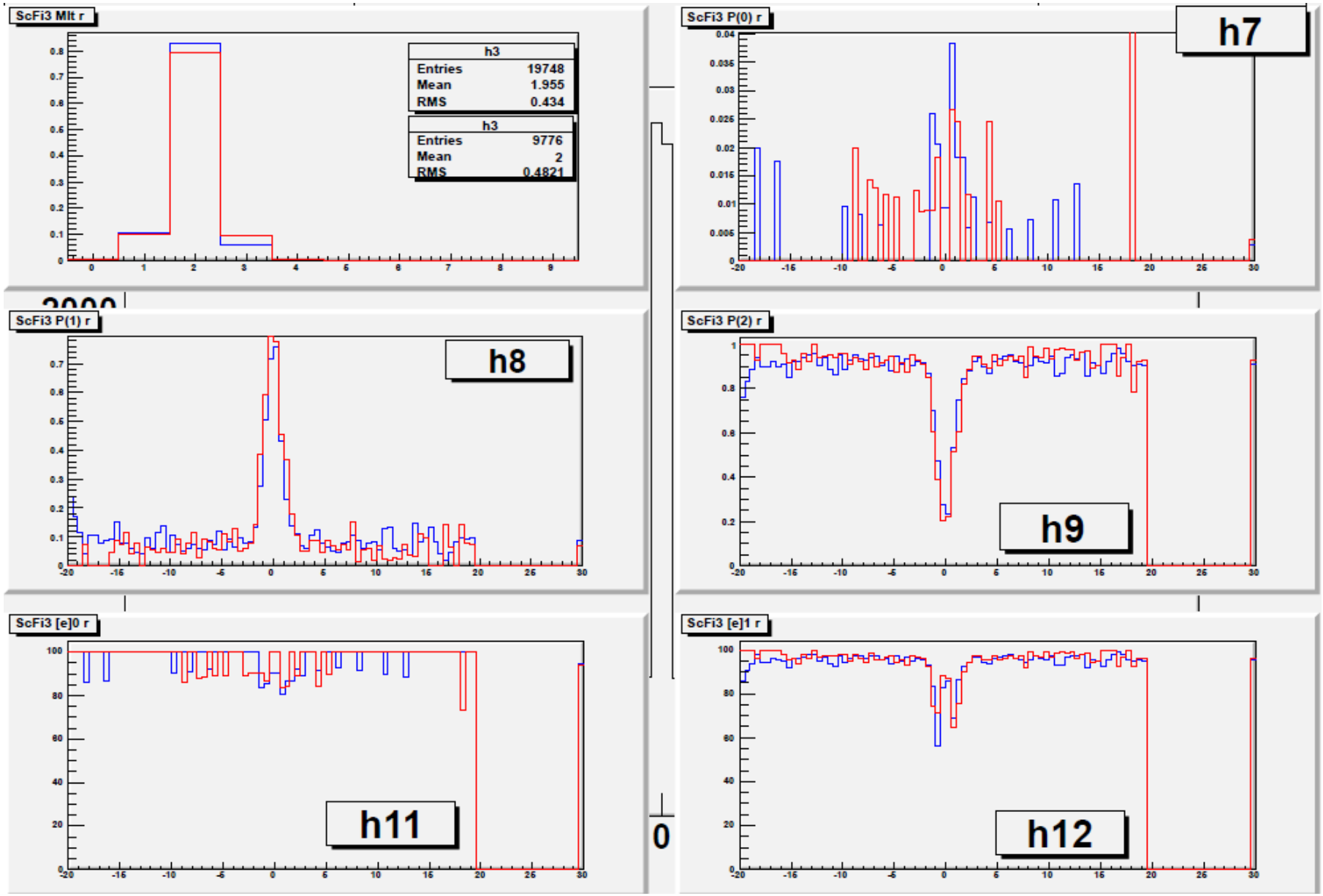


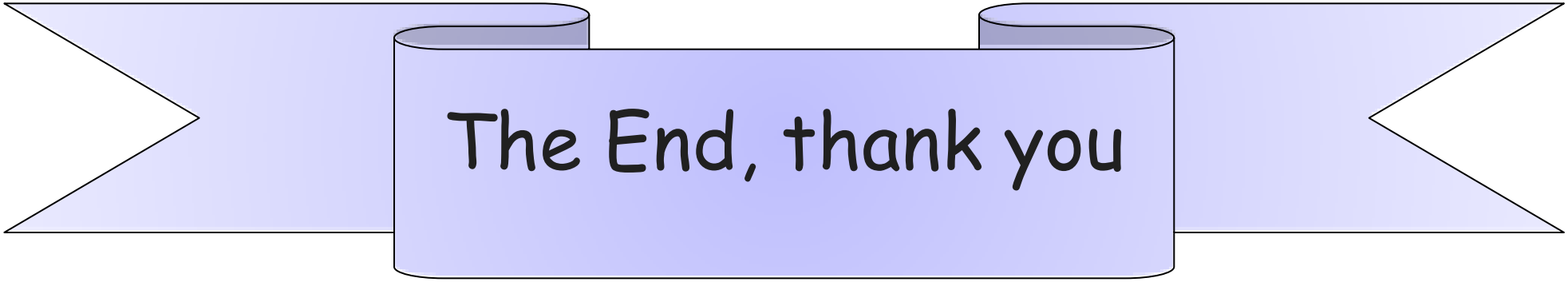
Q distribution
for events
with 1 hit
for two tracks
and big
distance (d>1.5 cm)

SFD y


ScFi2 Mlt r
MC
h3
Entries 77428
Mean 2.153
RMS 0.6845
data
h3
Entries 32421
Mean 2.152
RMS 0.5877
ScFi2 P(0) r
h7
ScFi2 P(1) r
h8
Entries 100
Mean -0.3624
RMS 10.51
h8
Entries 100
Mean 0.5743
RMS 9.656
ScFi2 P(2) r
h9
ScFi2 [e]0 r
h11
0
ScFi2 [e]1 r
h12
Entries 100
Mean 0.1641
RMS 11.9

SFDW


ScFi3 Mlt r
h3
Entries 19748
Mean 1.955
RMS 0.434
h3
Entries 9776
Mean 2
RMS 0.4821
ScFi3 P(0) r
h7
ScFi3 P(1) r
h8
ScFi3 P(2) r
h9
ScFi3 [e]0 r
h11
ScFi3 [e]1 r
h12
0


The End, thank you