Run9 pp 200GeV single electron analysis with HBD

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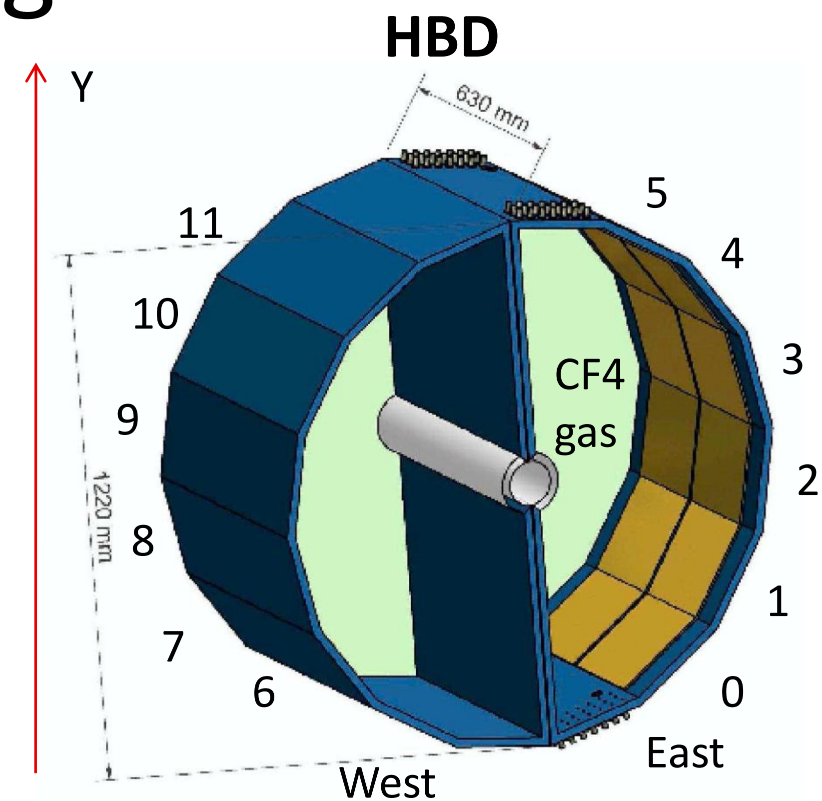
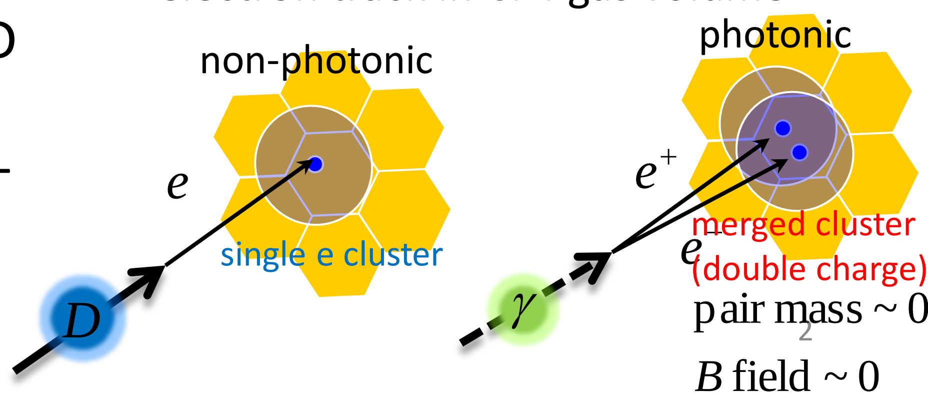
2011 / 8 / 30

analysis flow of single e in Run-9

- HBD
  - important for the non-photonic electron selection
    - effectively reject photonic electrons
- the estimation of non-photonic e yield
  1. purify the non-photonic electron tracks by HBD charge cut
  2. estimate the fraction of single e cluster events in the electron tracks after the HBD charge cut
  3. estimate the fraction of non-photonic electrons in the single e cluster events



detect Cherenkov light produced by electron track in CF4 gas volume

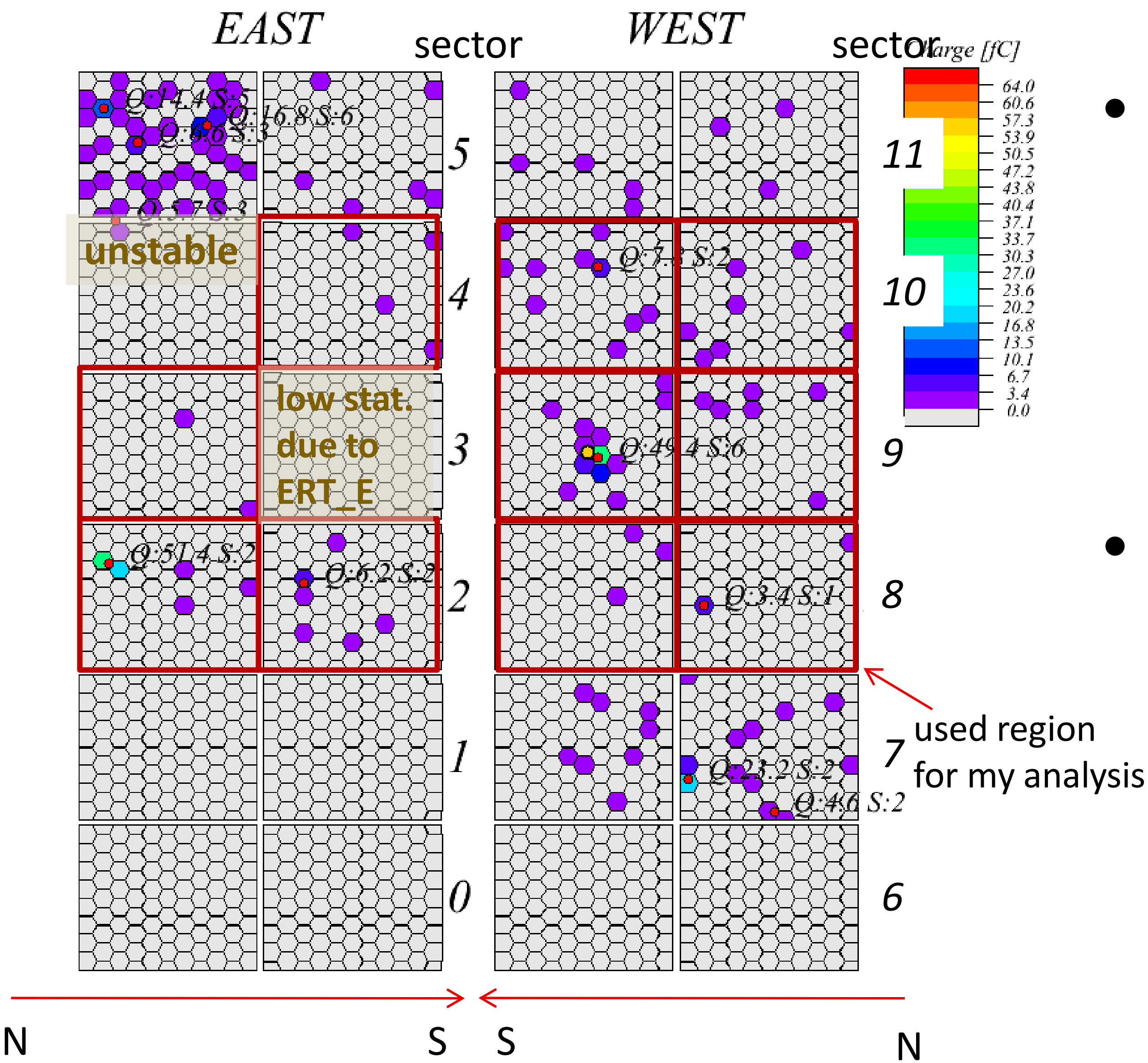


Electron Cut

- **electron cut**
  - abs(bbc_z) < 20cm
  - quality == 63||51||31
  - n0 >= 2
  - ecore/mom
    - 0.50<ecore/mom<1.48 (0.0<pt<0.5GeV/c)
    - 0.57<ecore/mom<1.37 (0.5<pt<1.0GeV/c)
    - 0.60<ecore/mom<1.32 (1.0<pt<1.5GeV/c)
    - 0.64<ecore/mom<1.28 (1.5<pt GeV/c)
  - abs(emcsdphi_e) < 4, abs(emcsdz_e) < 4
  - prob > 0.01
- **HBD association cut**
  - abs(hbdsdphi) < 3.5, abs(hbdsdz) < 3.5
    - hbdsdphi and hbdsdz are the distances between the HBD cluster position and the projection point of the reconstructed track.
  - hbdsize >= 2 (hbdsize is the number of pads associating to the HBD cluster)
    - reject scintillation hit effectively
  - 8p.e.<hbdcharge (hbdsect!=3)
  - 4p.e.<hbdcharge (hbdsect==3)
- **HBD cluster charge cut**
  - 8p.e.<hbdcharge<28p.e. (hbdsect!=3)
  - 4p.e.<hbdcharge<17p.e. (hbdsect==3)
    - the charge distributions in all HBD pads are calibrated by using scintillation hit charge distributions.

- event selection
  - using ERT_ELL1&BBCLL1(noVtx) trigger events in EWG_ERT(run9-200GeV-pp) data set for electron yield analysis

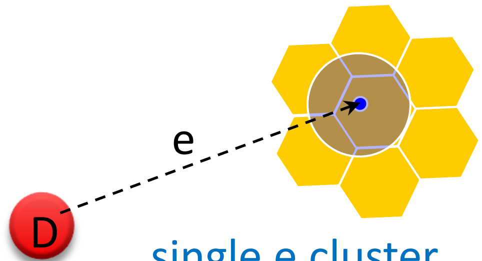
HBD event display



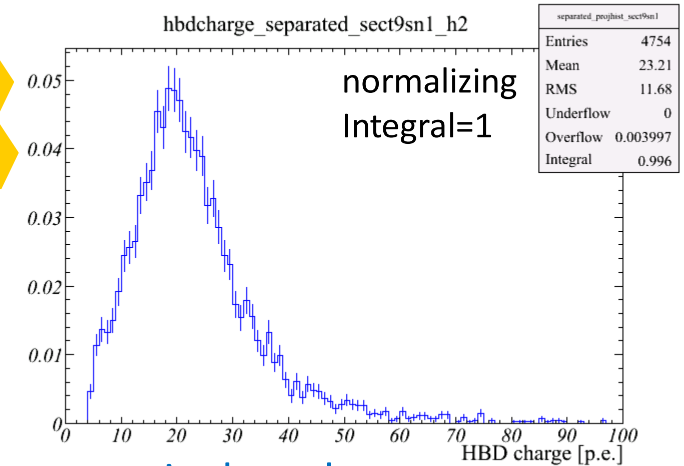
- projection of reconstructed track matches HBD cluster position well
- small hits are produced by scintillation lights from CF_4

HBD cluster charge distribution

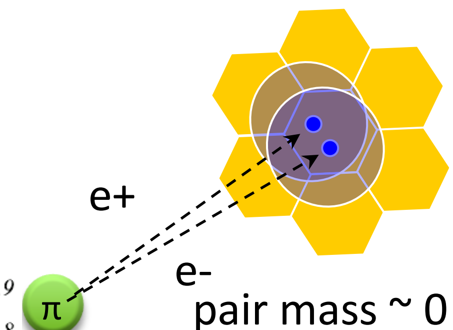
- estimation of HBD cluster charge distribution
  - using unlike-sign di-electron events
    - requiring HBD cluster association for the 2 electrons
  - 2 electrons associating different 2 HBD clusters
    - → single e cluster event
  - 2 electrons associating same HBD cluster
    - → merged cluster event
- momentum dependence must be ignorable
  - electron beta ~= 1



single e cluster



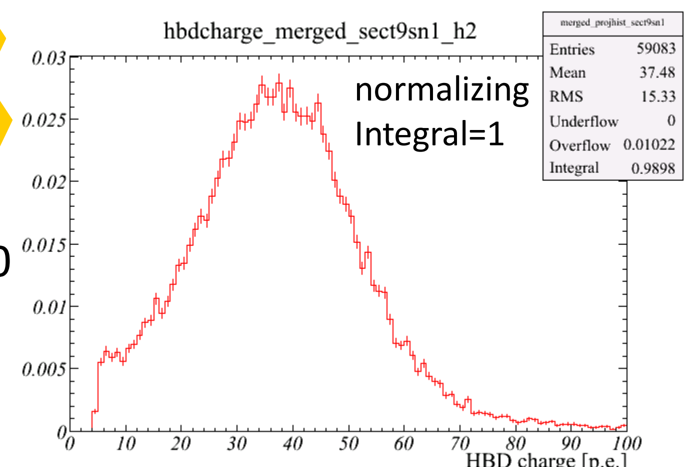
single e cluster event



pair mass ~ 0

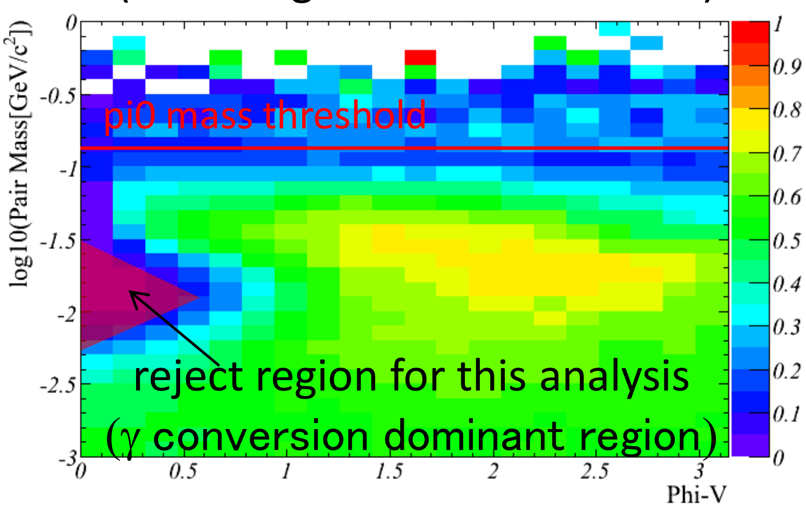
field ~ 0

merged cluster



merged cluster event

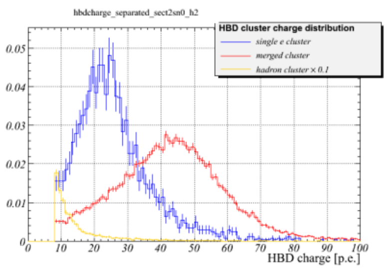
HBD hit association efficiency (unlike-sign di-electron events)



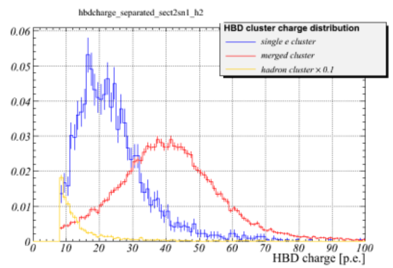
HBD cluster charge distribution

~ purification of non-photonic electrons with HBD ~

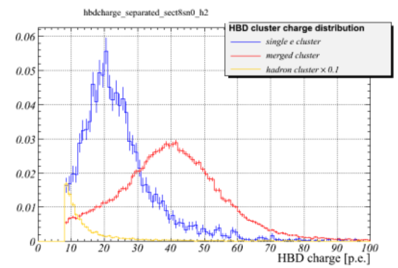
Sect2 South



Sect2 North



Sect8 South



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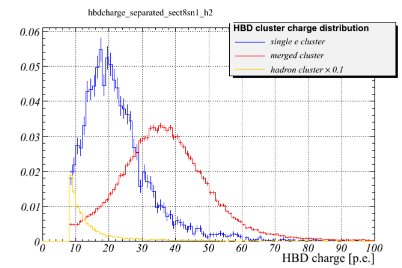
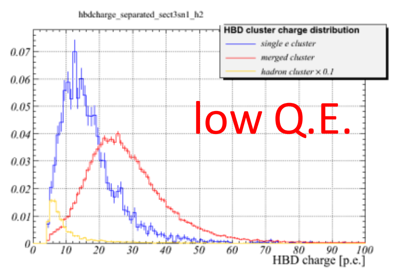
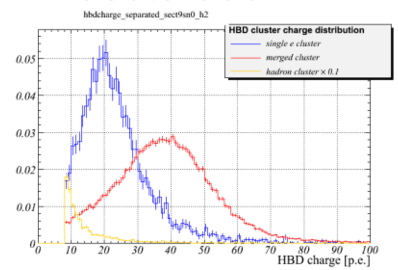


Sect3 North



Sect9 South



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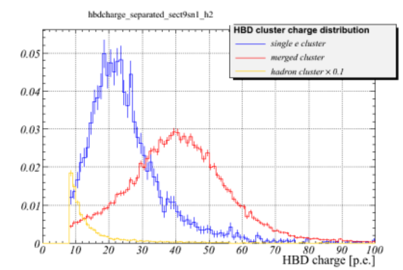
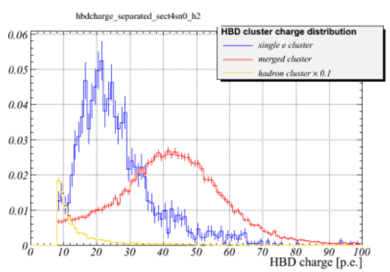
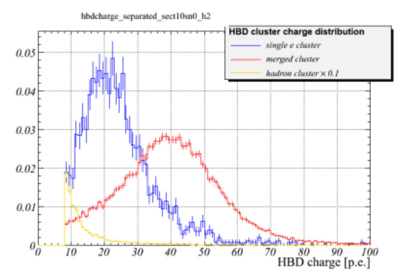


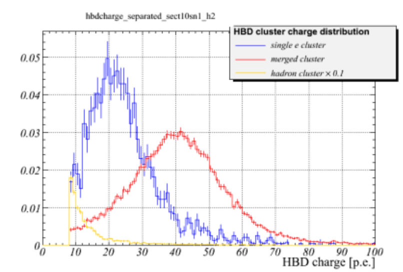
Sect4 South



Sect10 South



Sect10 North



Blue: single electron cluster

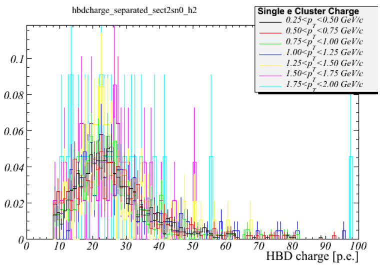
Red: merged cluster

Yellow: hadron hits (scintillation hits)

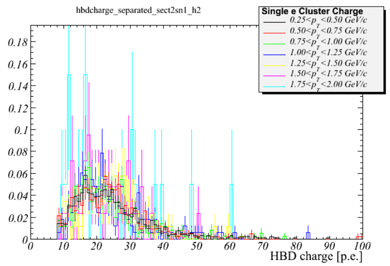
- all distributions normalized as Integral=1 (0.1 only for the hadron charge distribution)
- the hadron charge distribution is estimated by using hadron events
  - abs(bbcz)<20 quality =63 n0<=0 e/p<0.4 abs(emcsdphi)<4 abs(emcsdz)<4 0.5<pt<3.0GeV/c

pt dependence of HBD single e cluster charge distribution

Sect2 South

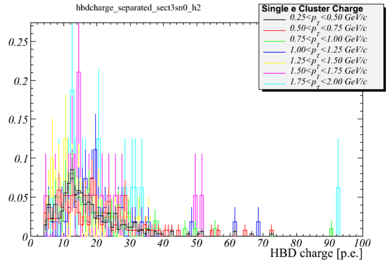


Sect2 North

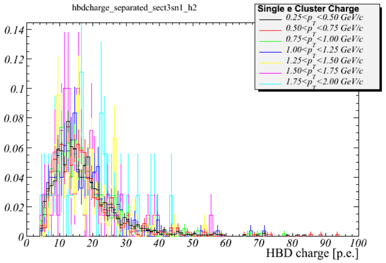


black: 0.25<pt<0.50GeV/c
red: 0.50<pt<0.75GeV/c
green:0.75<pt<1.00GeV/c
blue: 1.00<pt<1.25GeV/c
yellow:1.25<pt<1.50GeV/c
purple: 1.50<pt<1.75GeV/c
cyan: 1.75<pt<2.00GeV/c

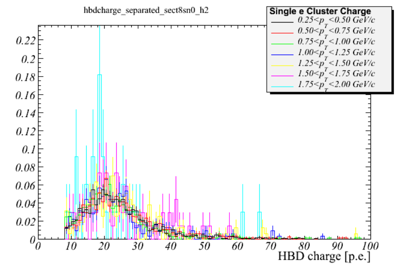
Sect3 North



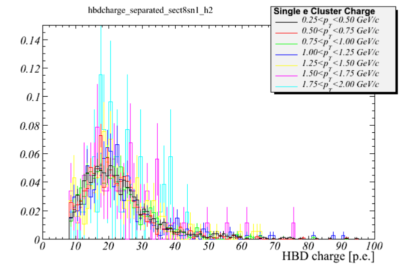
Sect4 South



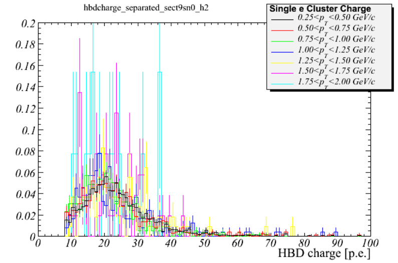
Sect8 South



Sect8 North



Sect9 South



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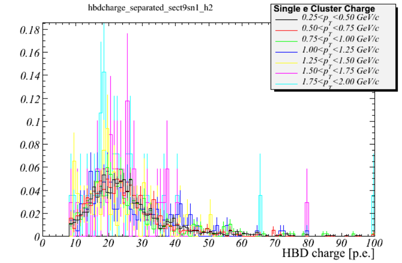
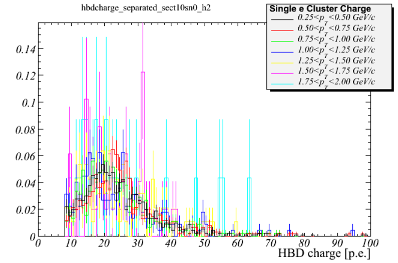


Sect10 South



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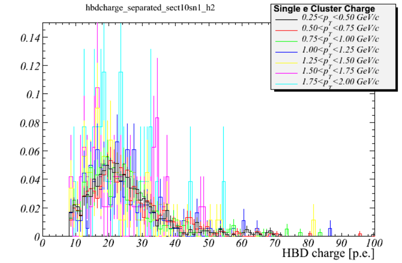
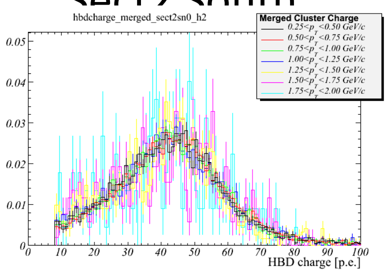
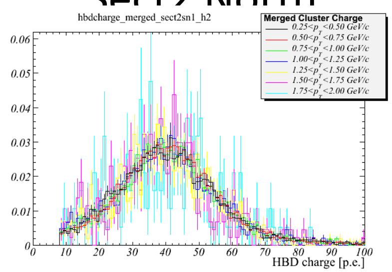


pt dependence of HBD merged cluster charge distribution

Sect2 South



Sect2 North



black: 0.25<pt<0.50GeV/c
red: 0.50<pt<0.75GeV/c
green:0.75<pt<1.00GeV/c
blue: 1.00<pt<1.25GeV/c
yellow:1.25<pt<1.50GeV/c
purple: 1.50<pt<1.75GeV/c
cyan: 1.75<pt<2.00GeV/c

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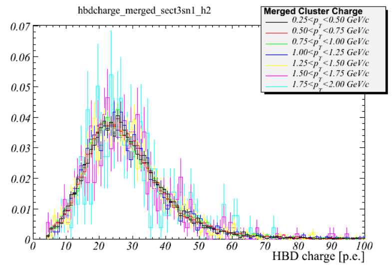

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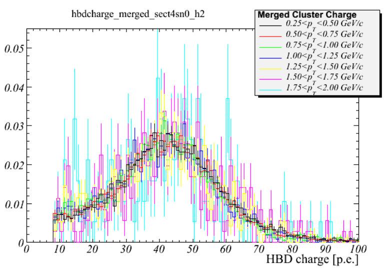

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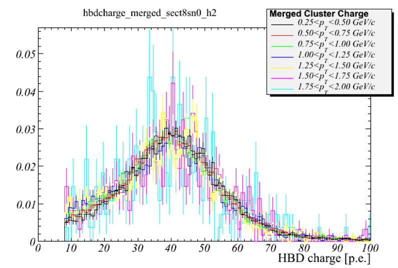

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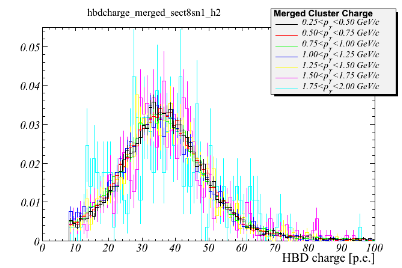

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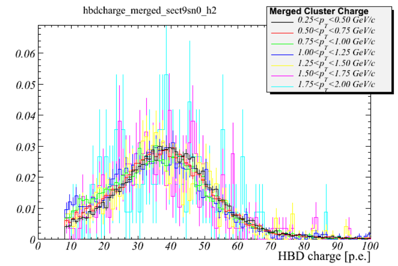

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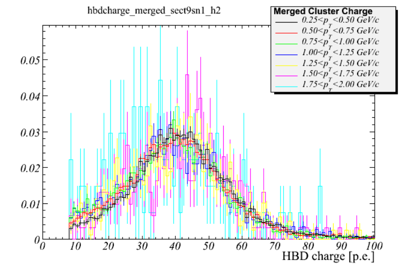

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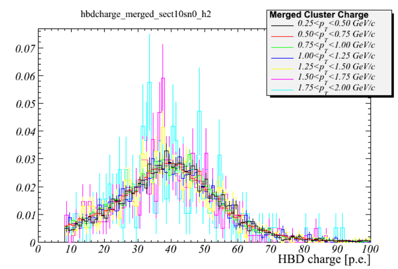

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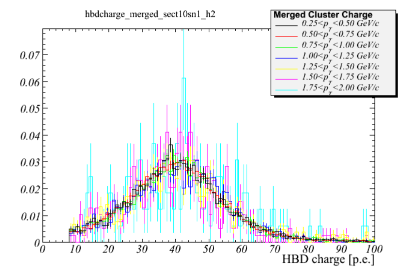
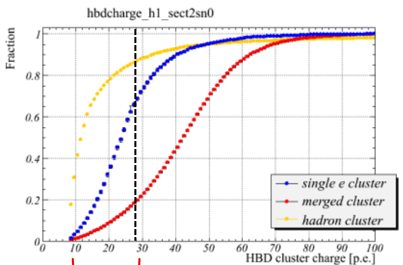


HBD cluster charge cut efficiency

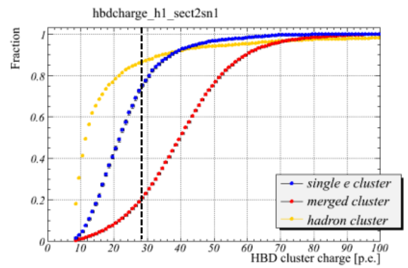
~ purification of non-photonic electrons with HBD ~

Sect2 South

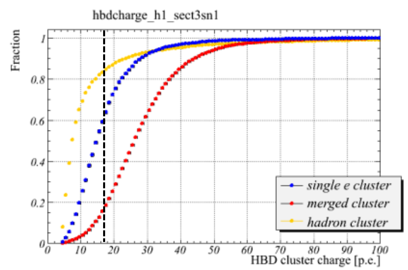


HBD cluster charge cut acceptable region

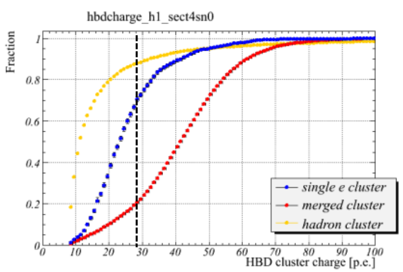
Sect2 North



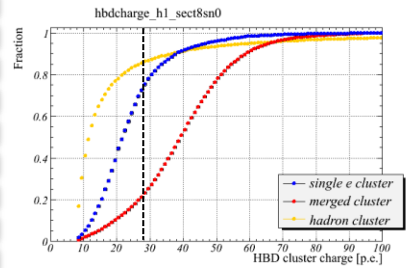
Sect3 North



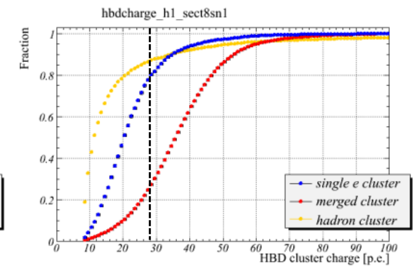
Sect4 South



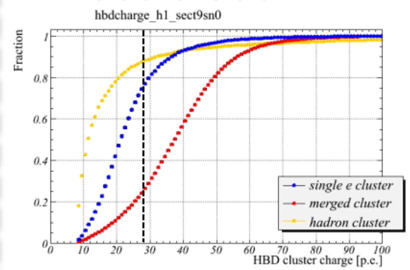
Sect8 South



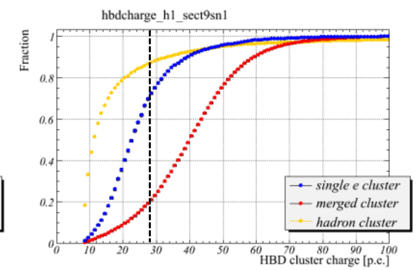
Sect8 North



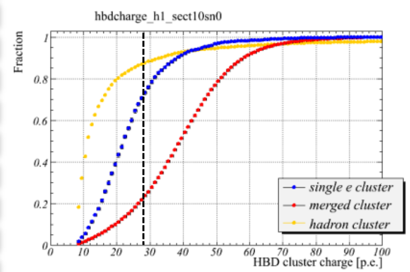
Sect9 South



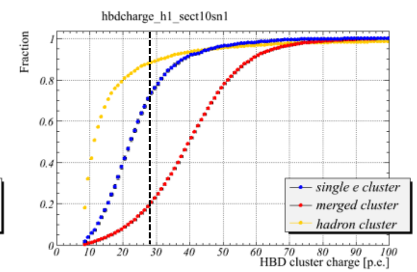
Sect9 North



Sect10 South



Sect10 North

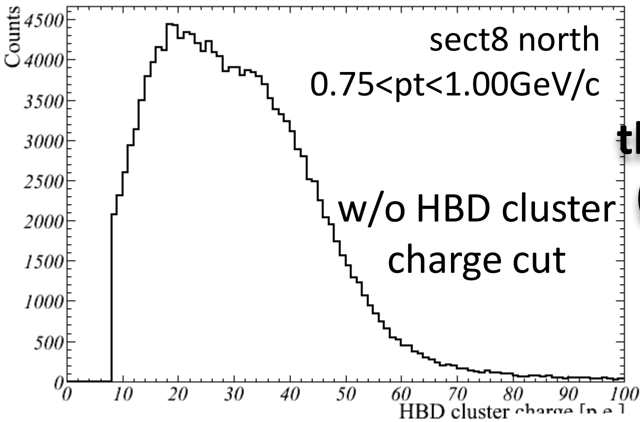


Blue: single electron cluster
Red: merged cluster
Yellow: hadron hits (scintillation hits)

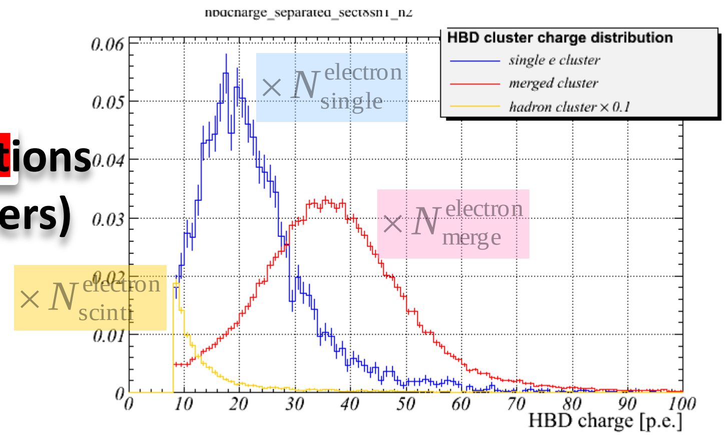
HBD cluster charge cut:
8.0 < Q < 28.0 [p.e.] (4.0 < Q < 17.0 [p.e.] only for Sect3)

estimation of the fractions of single electron clusters and merged clusters

HBD charge distribution for reconstructed electrons



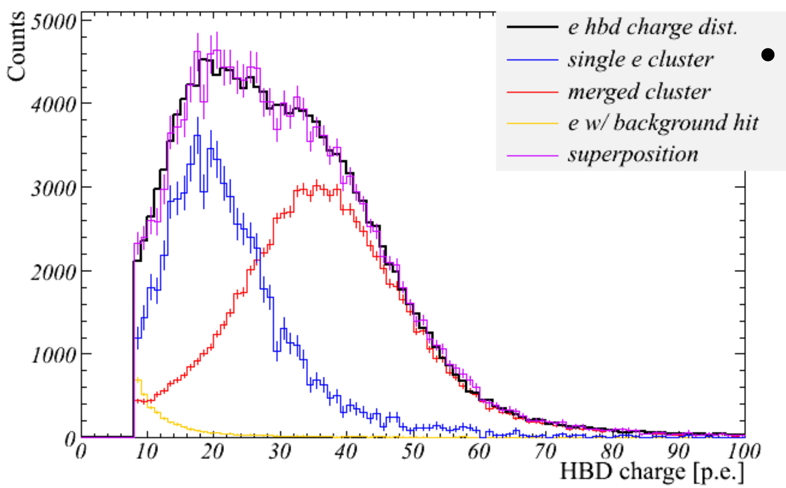
reference charge distributions



fit with
the 3 reference distributions
(with 3 fitting parameters)

fitting result
(sect 8 north) 0.75 < pt < 1.00 GeV/c

log likelihood fitting was used because statistics of low momentum events is small.

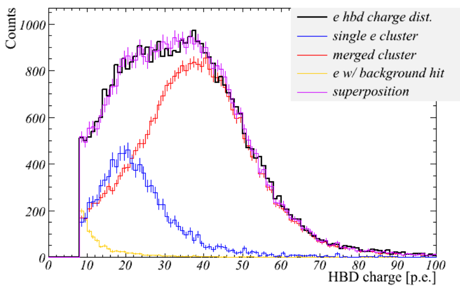


- The fractions of single e clusters and merged clusters (and scintillation hits) can be extracted by this fitting method.

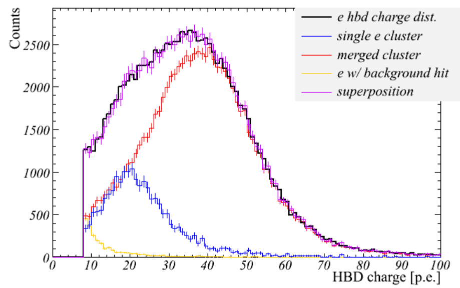
estimation of the fractions of single electron clusters and merged clusters

~ only Sect9(South) fitting results are shown ~

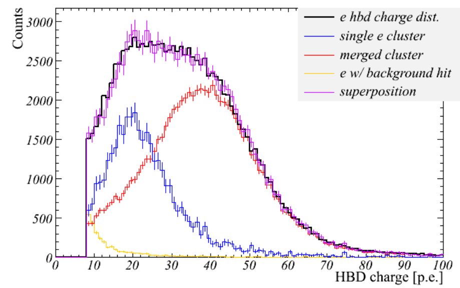
$0.00 < p_T < 0.25$ GeV/c



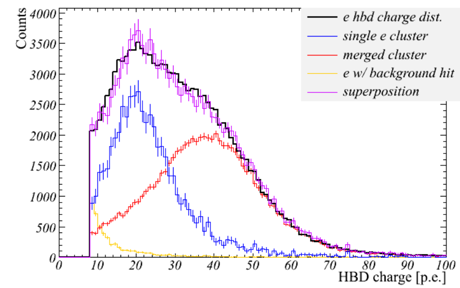
$0.25 < p_T < 0.50$ GeV/c



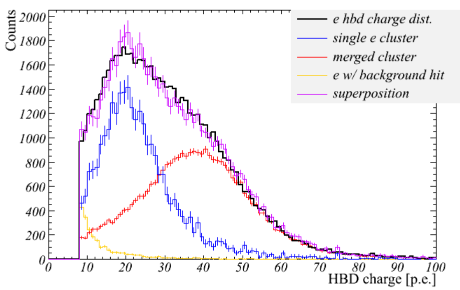
$0.50 < p_T < 0.75$ GeV/c



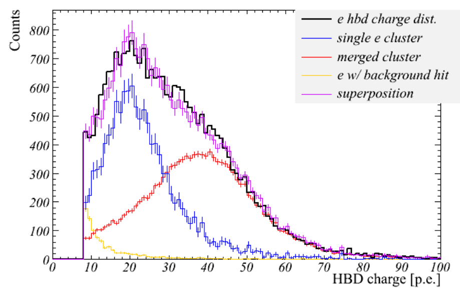
$0.75 < p_T < 1.00$ GeV/c



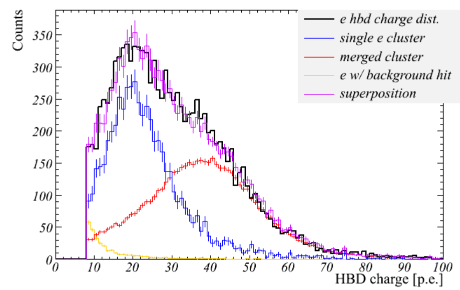
$1.00 < p_T < 1.25$ GeV/c



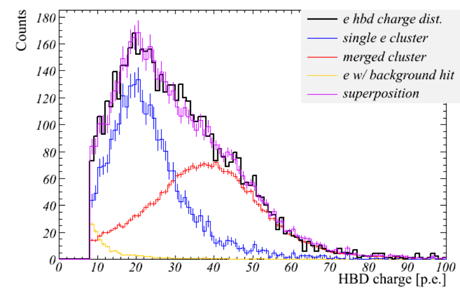
$1.25 < p_T < 1.50$ GeV/c



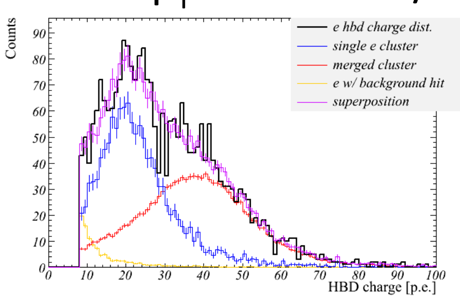
$1.50 < p_T < 1.75$ GeV/c



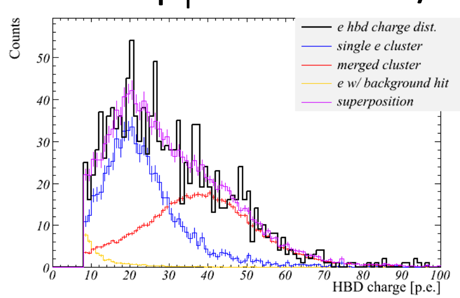
$1.75 < p_T < 2.00$ GeV/c



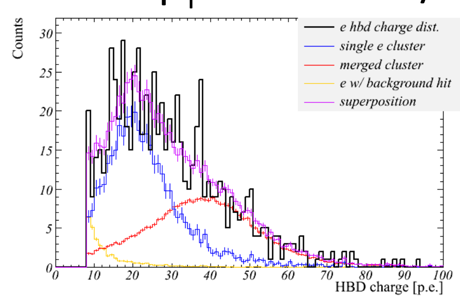
$2.00 < p_T < 2.25$ GeV/c



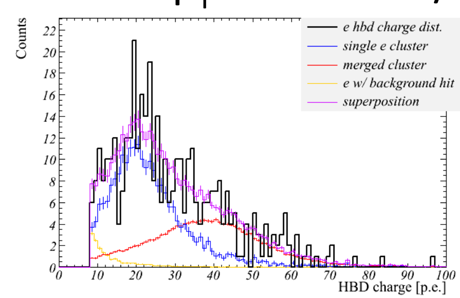
$2.25 < p_T < 2.50$ GeV/c



$2.50 < p_T < 2.75$ GeV/c



$2.75 < p_T < 3.00$ GeV/c

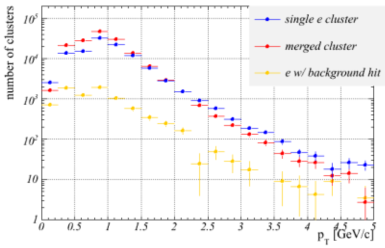


Blue: single electron cluster Red: merged cluster Yellow: hadron hits (scintillation hits)

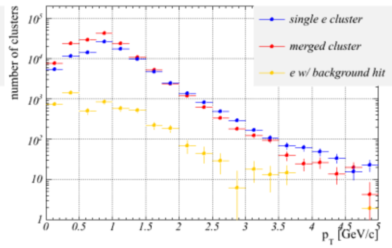
momentum spectra of single electron clusters and merged clusters

~ **before** HBD cluster charge cut ~

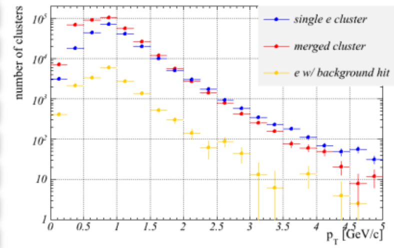
Sect2 South



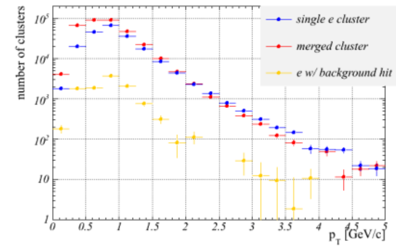
Sect2 North



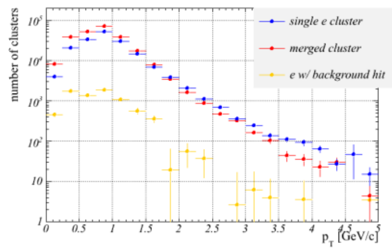
Sect8 South



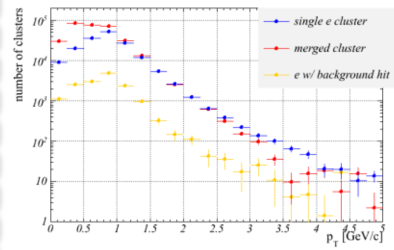
Sect8 North



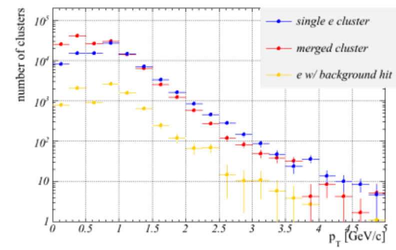
Sect3 North



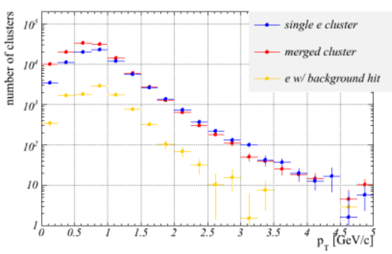
Sect9 South



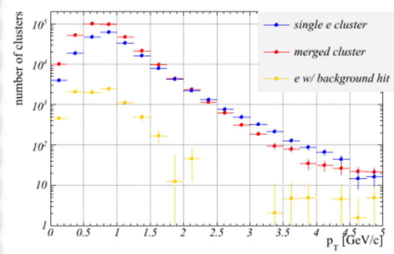
Sect9 North



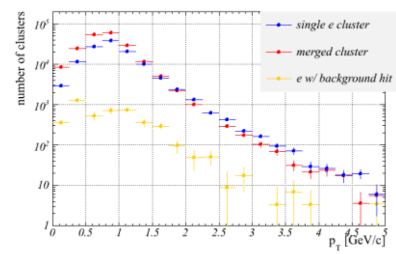
Sect4 South



Sect10 South



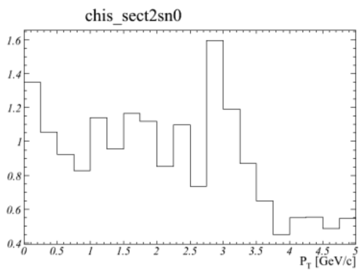
Sect10 North



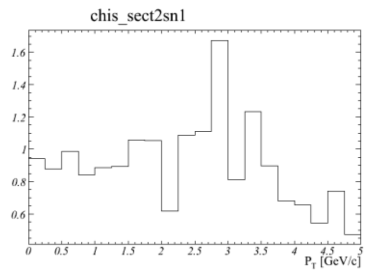
<u>These spectra were produced from the previous fitting results at all of pt regions.</u>

momentum spectra of fitting reduced chi-square

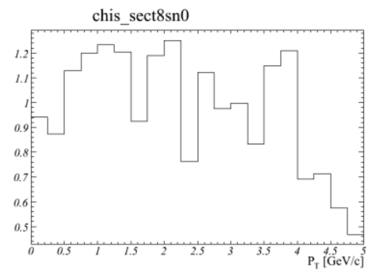
Sect2 South



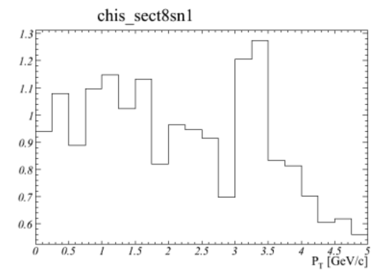
Sect2 North



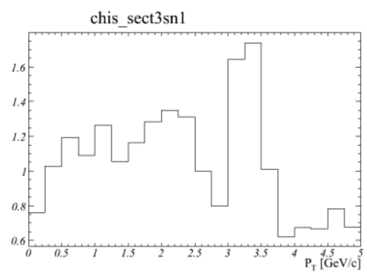
Sect8 South



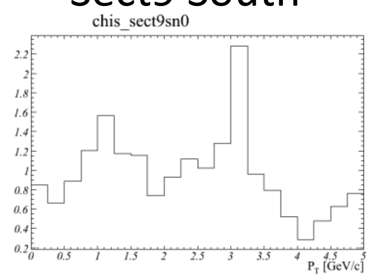
Sect8 North



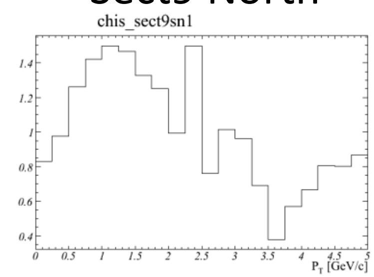
Sect3 North



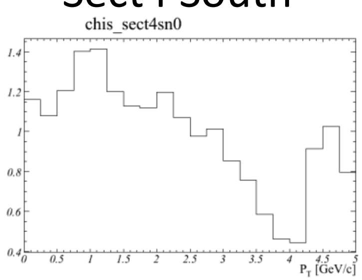
Sect9 South



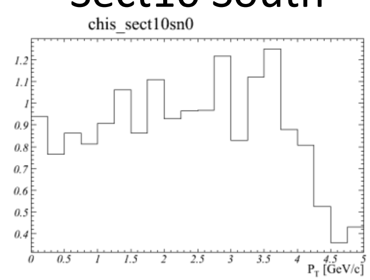
Sect9 North



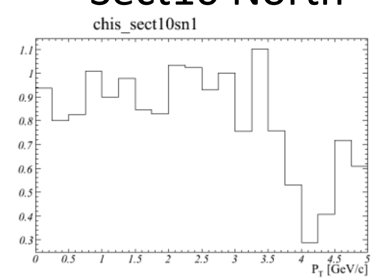
Sect4 South



Sect10 South



Sect10 North

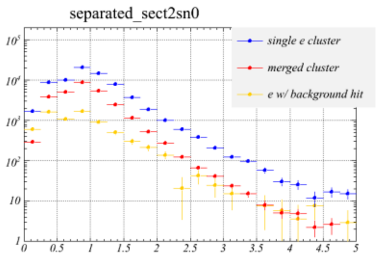


<u>These spectra were produced from the previous fitting results at all of pt regions.</u>

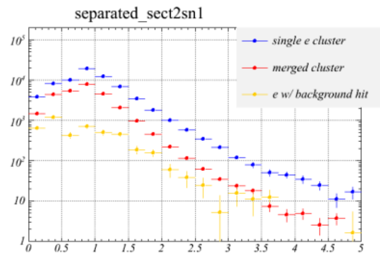
momentum spectra of single electron clusters and merged clusters

~ **after** HBD cluster charge cut ~

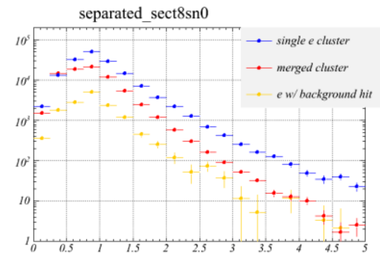
Sect2 South



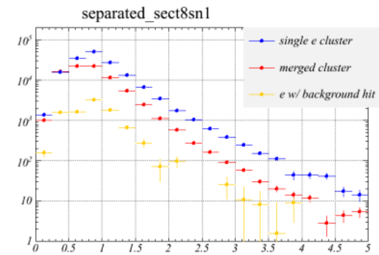
Sect2 North



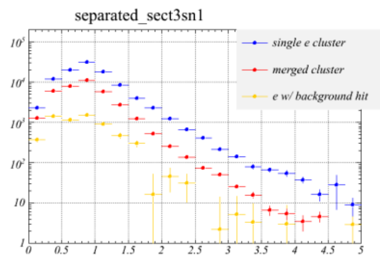
Sect8 South



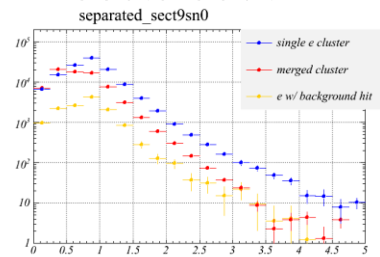
Sect8 North



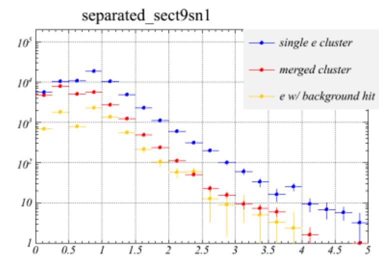
Sect3 North



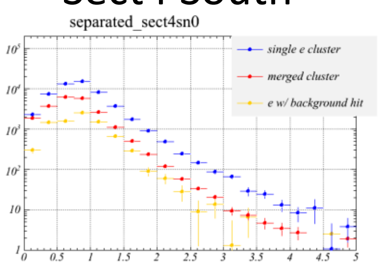
Sect9 South



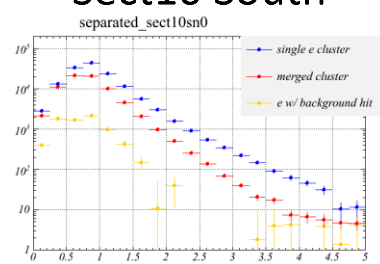
Sect9 North



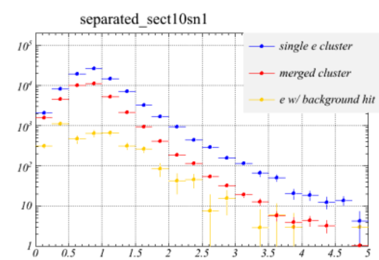
Sect4 South



Sect10 South



Sect10 North

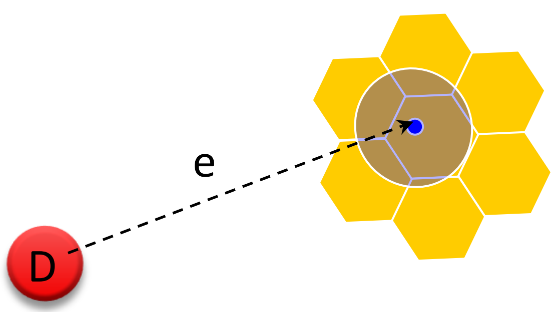


These spectra are products of previous spectra and efficiencies for the HBD charge cut.
As you can see, the fraction of single electron clusters is enhanced comparing with that of merged clusters.

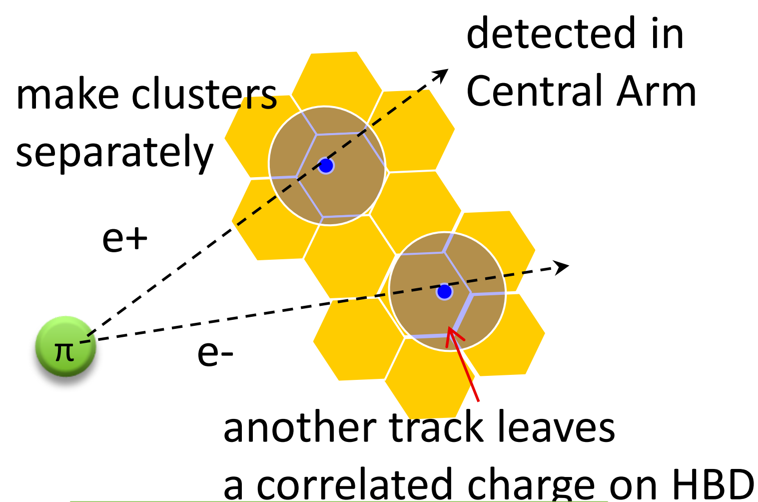
estimation of the fraction of photonic electrons in the single e cluster events

- Not all of single electron clusters consists of non-photonic electrons. They include also photonic electrons such like large-angle Dalitz decay electrons.

- The fraction of the photonic electrons in the single electron clusters must be estimated
  - For the photonic electron, another photonic electron leaves a HBD charge around the projection of the reconstructed electron track
  - → the distributions of the charge around the reconstructed track for non-photonic electrons and photonic electrons are different.
  - comparing with **simulation** results, the fraction can be estimated.

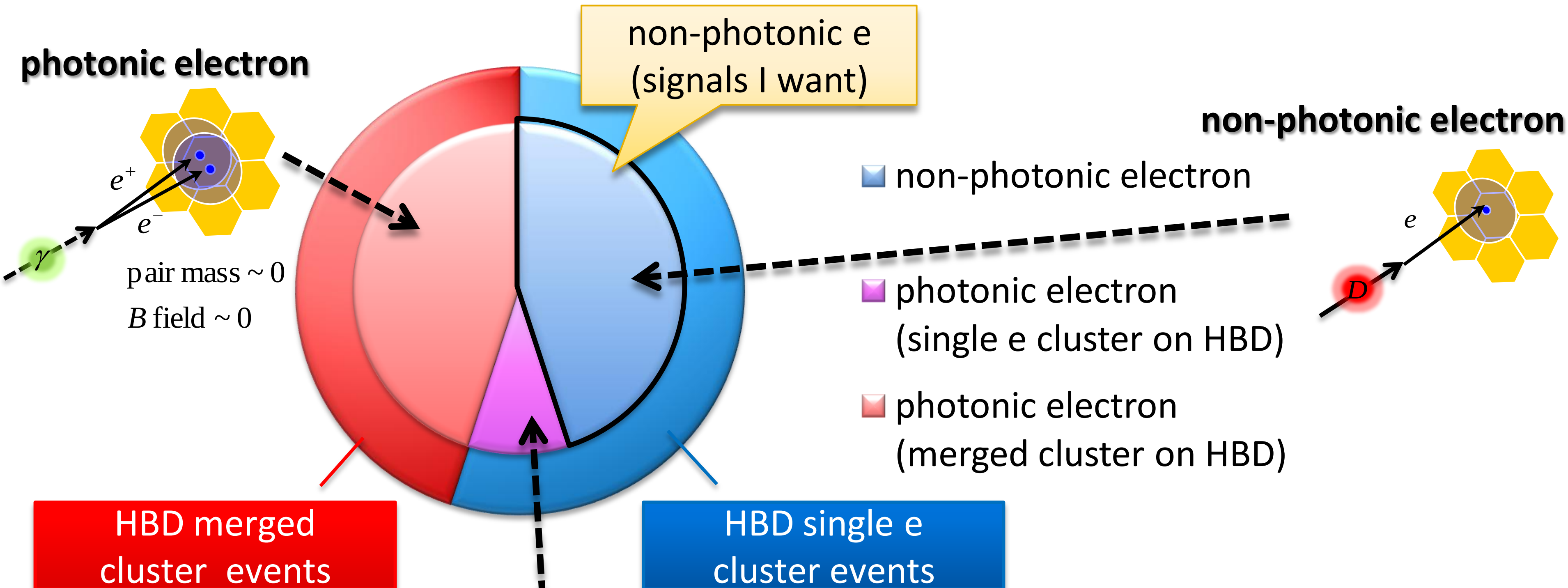


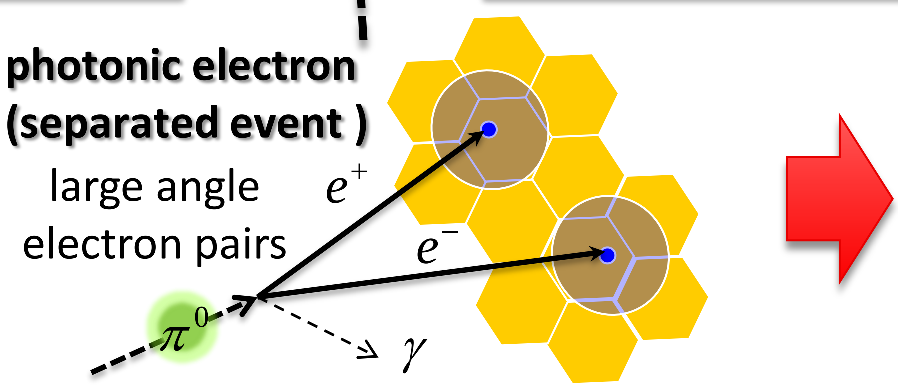
single e cluster produced by non-photonic electron



single e cluster produced by photonic electron

chart of electron events

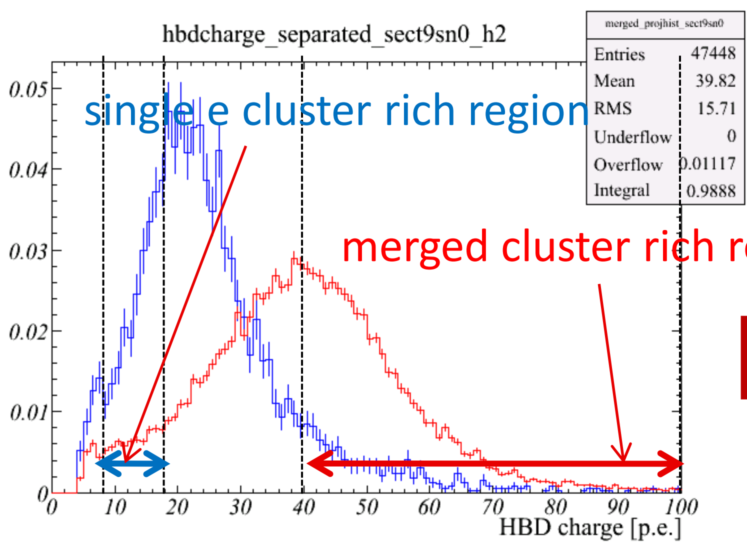




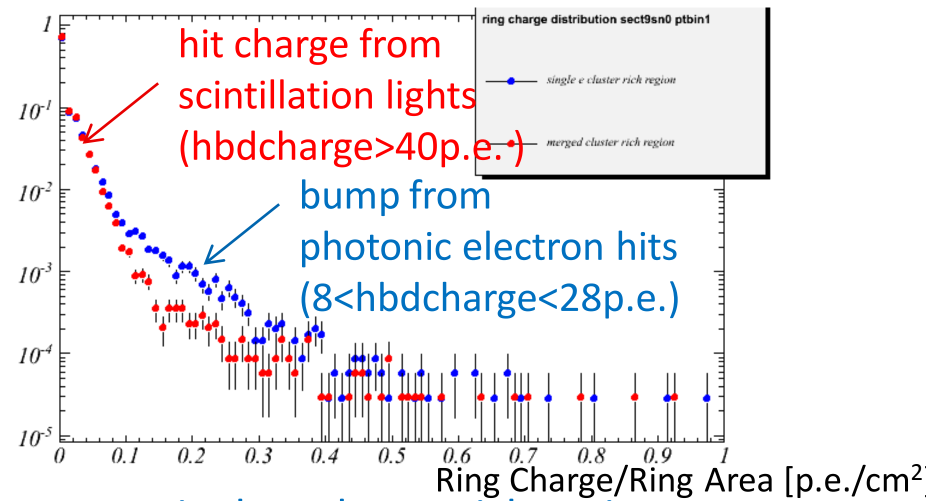
- need to know the fraction of photonic electrons in the single e cluster events

ring charge distribution in data

HBD charge distribution



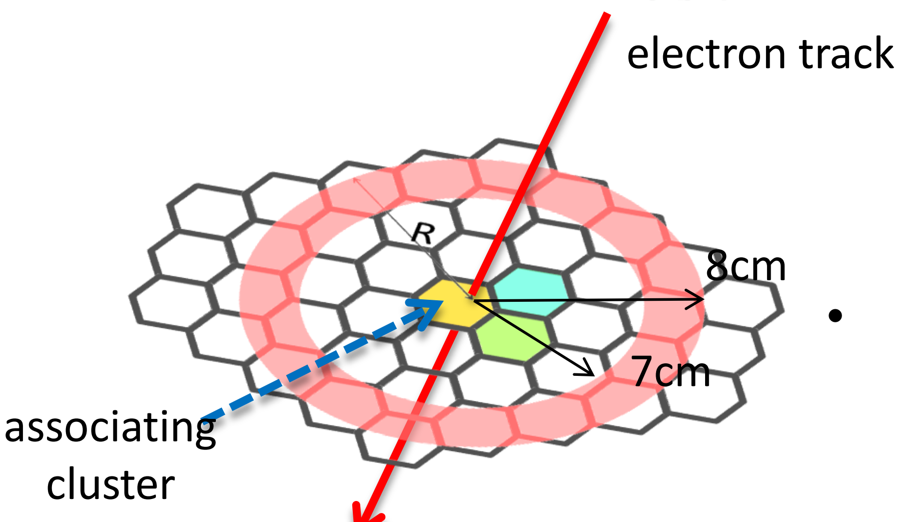
Total HBD charge in the ring
(not including the associating cluster charge)



single e cluster rich region

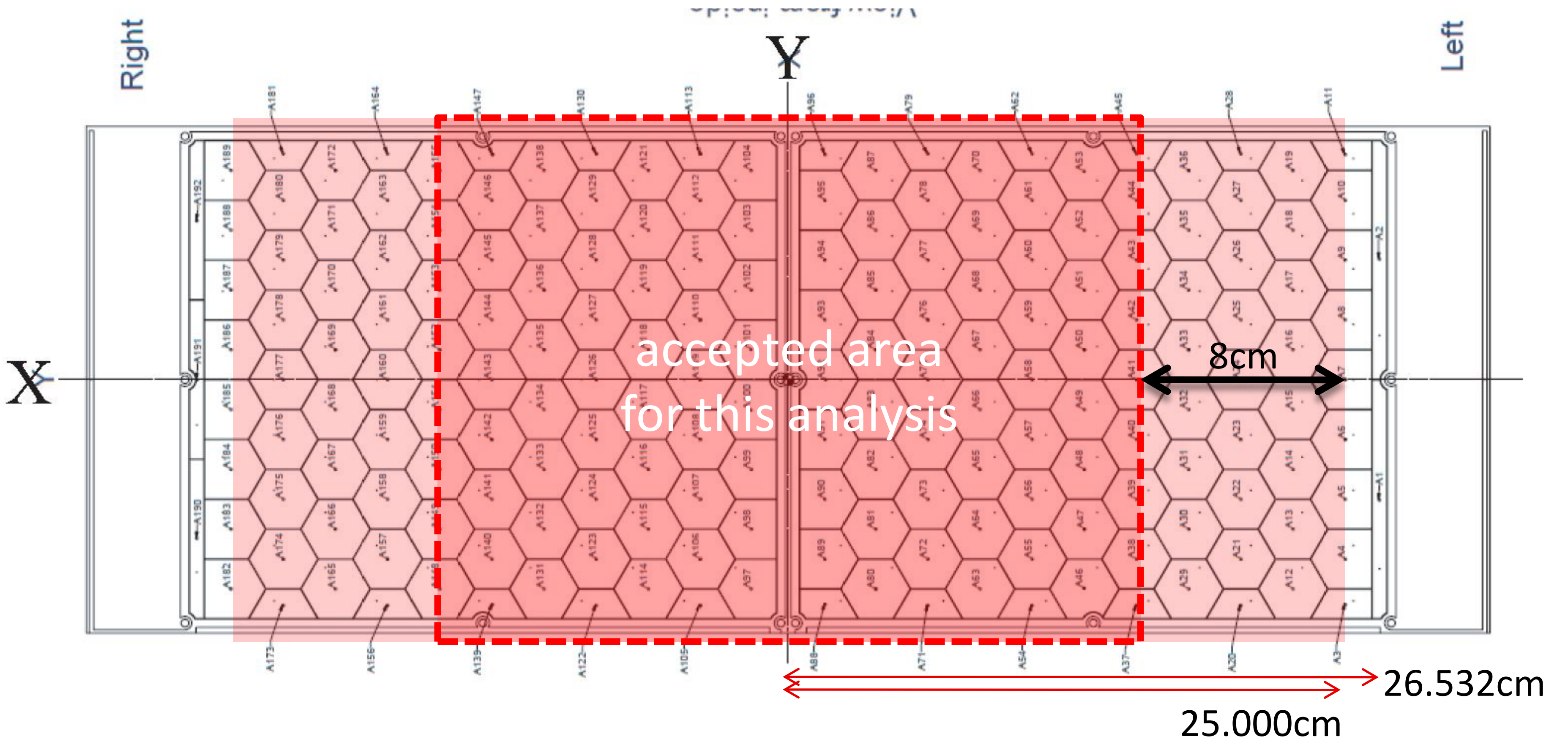
merged cluster rich region

the total charge in the horizontal axis is normalized by an area of the ring $= \pi(8^2 - 7^2)$ cm^2



- Comparing with MC results, the fraction of the photonic electrons in the single e cluster events can be estimated from the bump.

fitting for estimation of number of electrons making correlated hit



- using electrons in the accepted area for the ring charge distribution analysis

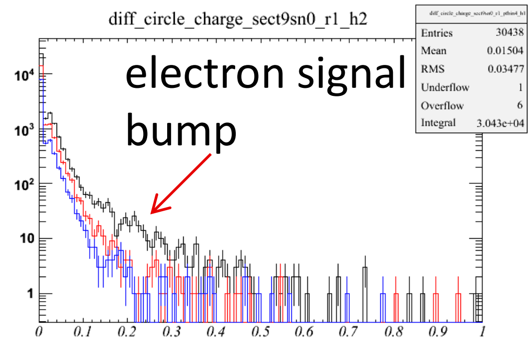
R dependence of ring charge distribution (Sect9 South, 1.00 < pt < 1.25 GeV/c)

black: e (8<hbdcharge<28p.e.)

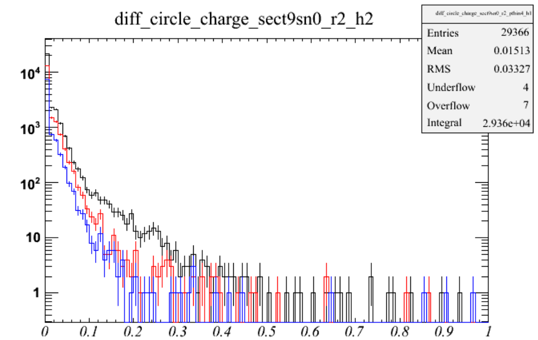
red : e (hbdcharge>40p.e.)

blue : hadron

R=6~7cm

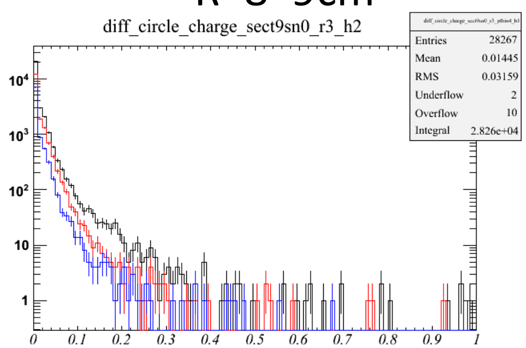


R=7~8cm

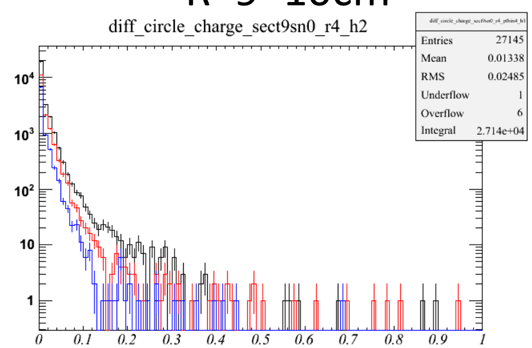


(HBD ring charge)/Area [p.e./cm^2]

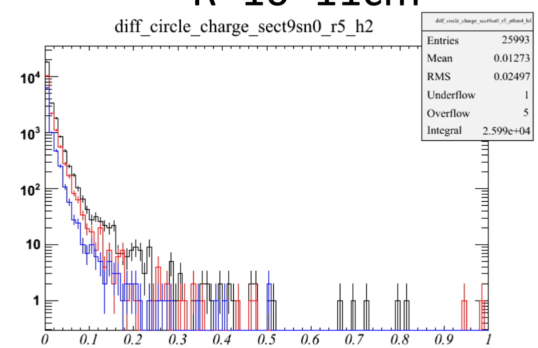
R=8~9cm



R=9~10cm



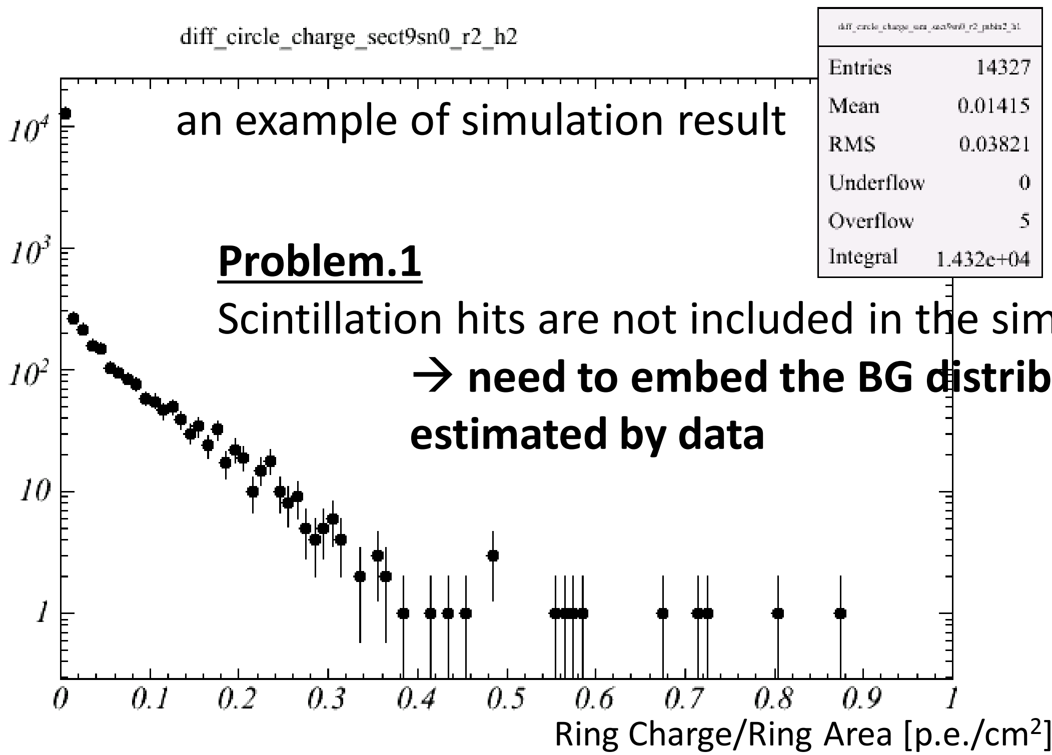
R=10~11cm



- considering S/N, R=7~8 looks the best radius

ring charge distribution in simulation ~ simulation with pi0 Dalitz events ~

- for the simulation, pi0 Dalitz events were generated by EXODUS.

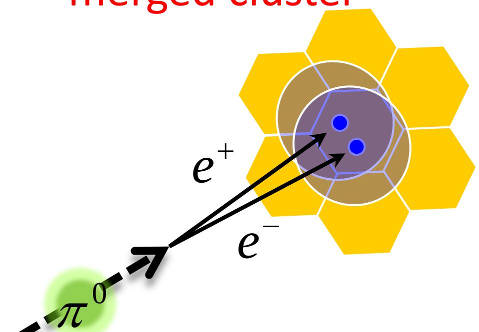


an example of simulation result

Problem.1

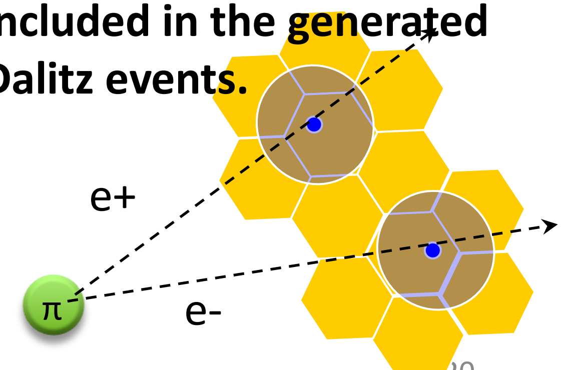
Scintillation hits are not included in the simulation

→ **need to embed the BG distribution estimated by data**



Problem.2

Need to know how many **single electron clusters** **are included in the generated Dalitz events.**



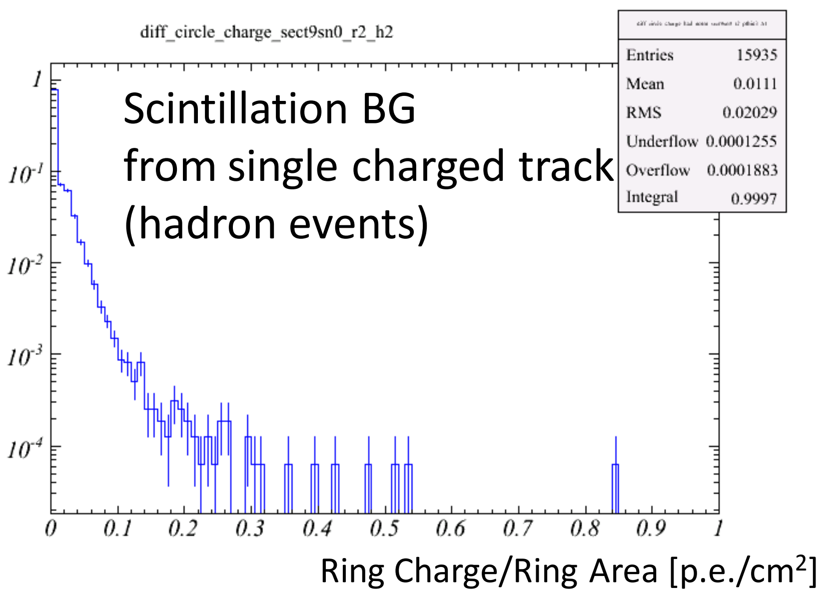
solution for Problem.1

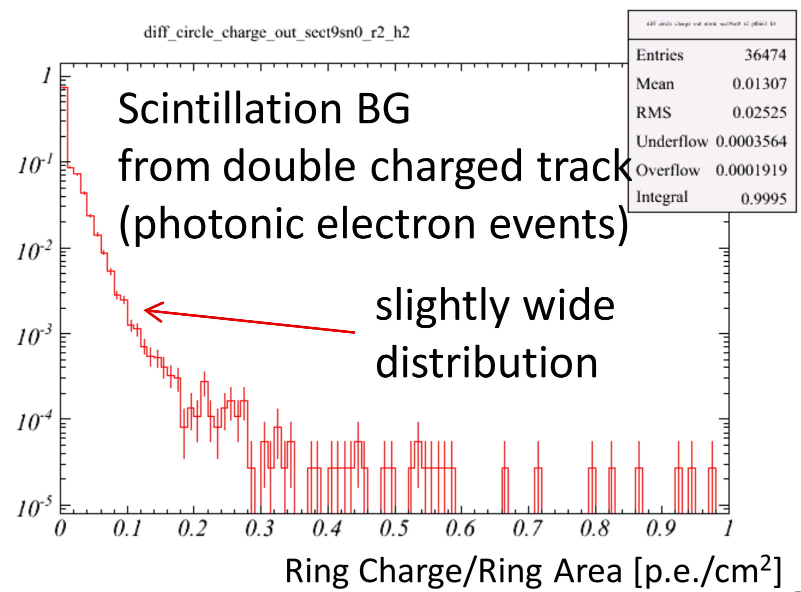
estimation of background scintillation lights distribution

- Scintillation BG from single charged track
  - (scintillation from single electrons or hadrons)
  - →estimate by using hadron events
- Scintillation BG from double charged track
  - (scintillation from photonic electron pairs)
  - estimate by using electron events with HBD cluster charge > 40p.e.
    - merged cluster events due to photonic electrons are enriched

basically, hadron leaves only scintillation hits

the merged cluster has no correlation hit around the cluster → there are only scintillation hits

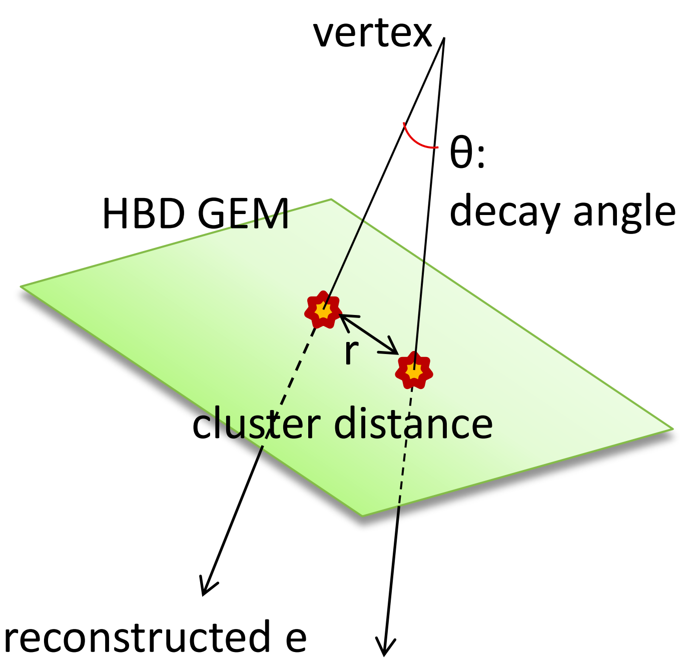




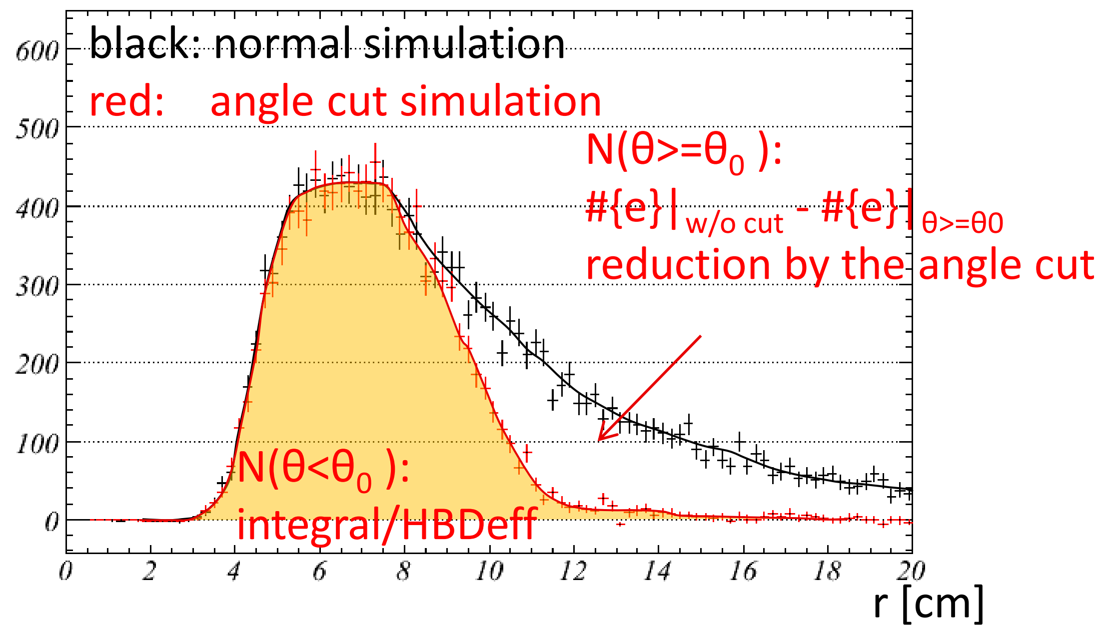
solution for Problem.2

estimation for the number of the single electron clusters made by pi0 Dalitz

- I need to know how many single electron clusters were generated from the Dalitz simulation.
- → What I need to do is to search another cluster around the associated HBD cluster
  - the number is same as Integral(r =0 ~ inf)/HBDeff , but the estimation is difficult since large r region is almost out of HBD acceptance.
- SOLUTION
  - use also Dalitz decay data applied a decay angle cut, $\theta < \theta_0 = 1/6\text{rad} \rightarrow r \sim 10\text{cm}$
  - The number of single e cluster events = inner side: Integral(angle cut data)/HBDeff + outer side: #{electron reduction}



cluster distance distribution in the simulation

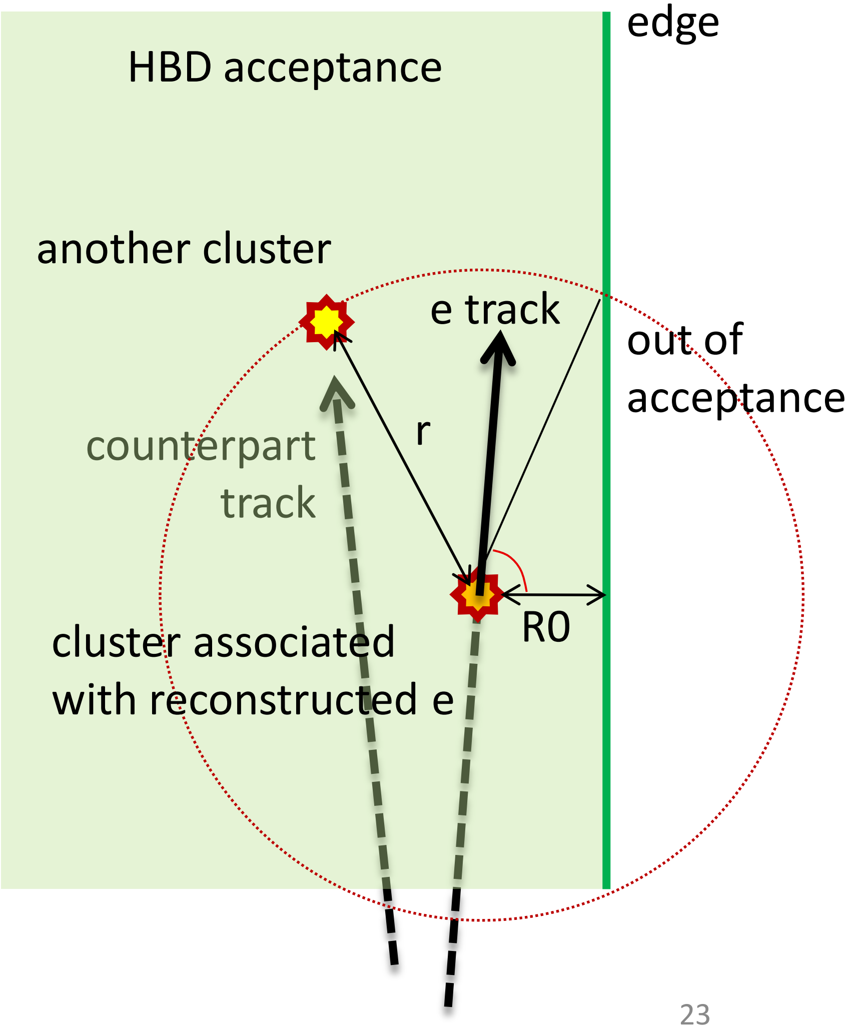


cluster distance distribution of pi0 simulation data

correction for limited acceptance of HBD

- Since HBD acceptance is limited, acceptance correction must be considered.
- → fill the cluster distance with appropriate weight when the track passes near HBD edge
- weight

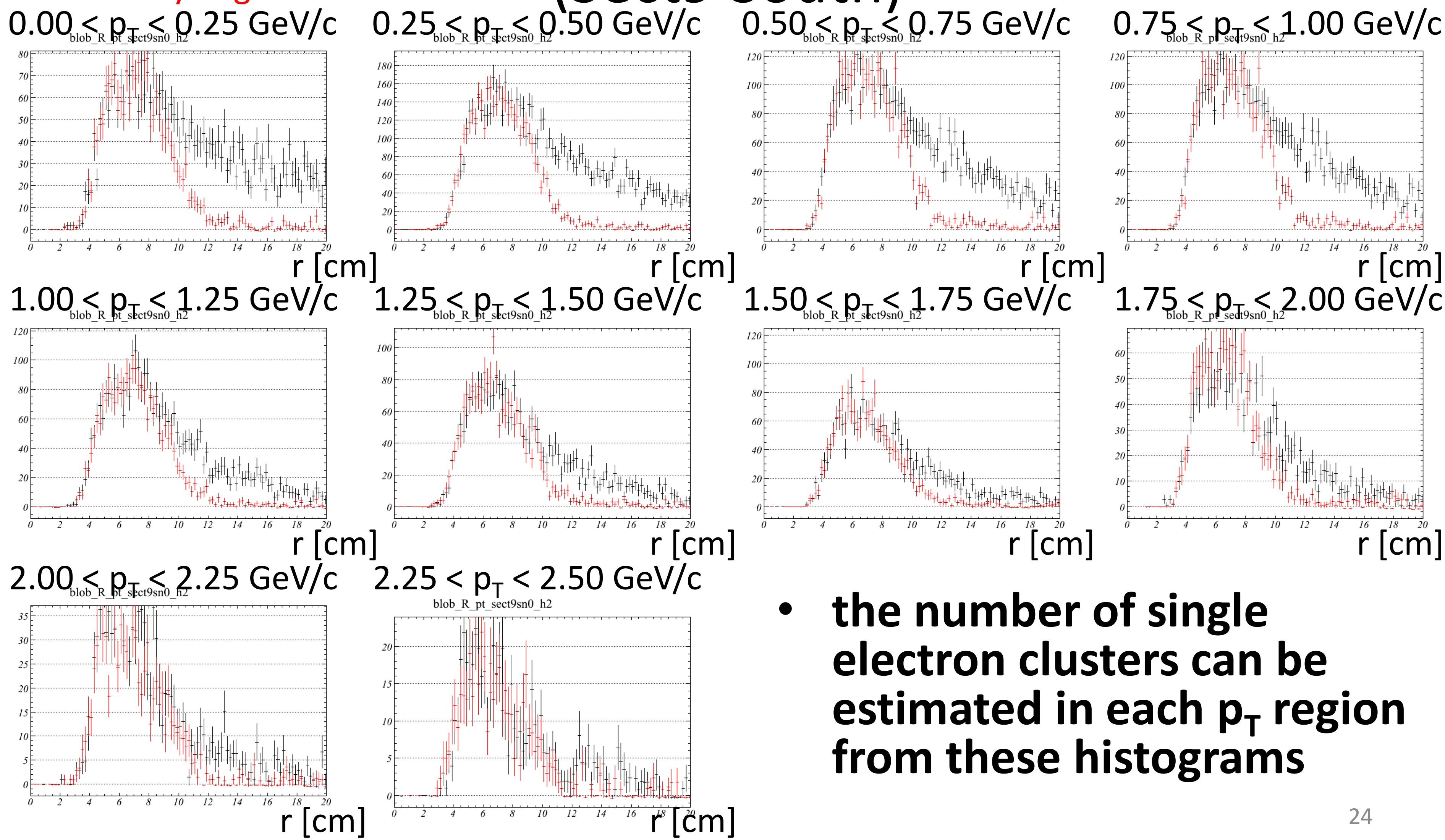
```
if(R0 < r){
  w = π/(π - acos( R0/r ));
  histo->Fill(r, w);
} else{
 histo->Fill(r);
}
```



cluster distance distributions between surrounding clusters (Sect9 South)

Black: normal simulation

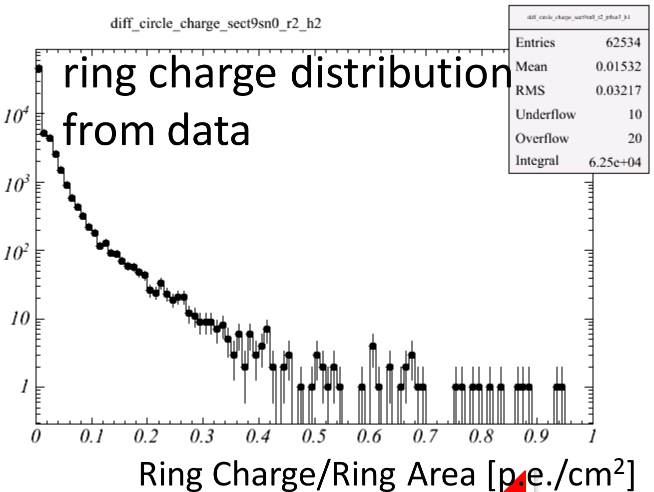
Red: decay angle cut

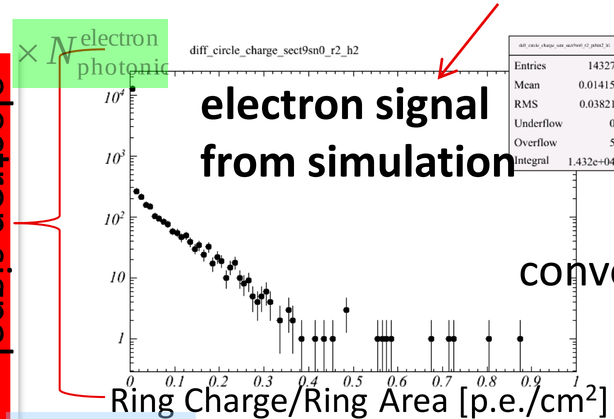


- **the number of single electron clusters can be estimated in each p_T region from these histograms**

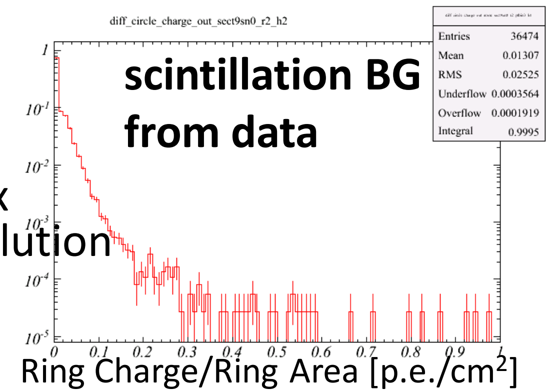
fitting

subtract the number of the merged cluster events estimated by the previous method





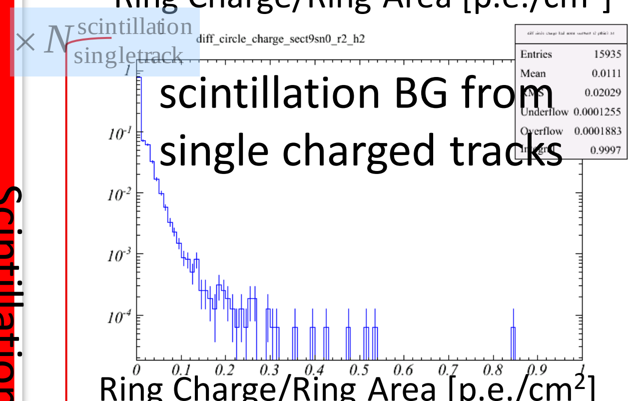
x convolution



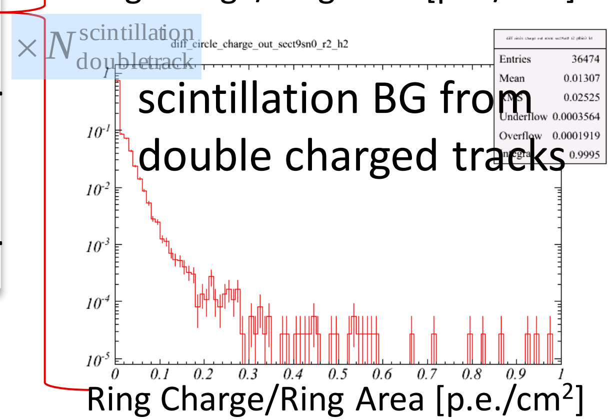
electron signal

Scintillation Background

fit with the superposition of these 3 distributions (3 parameters fitting)



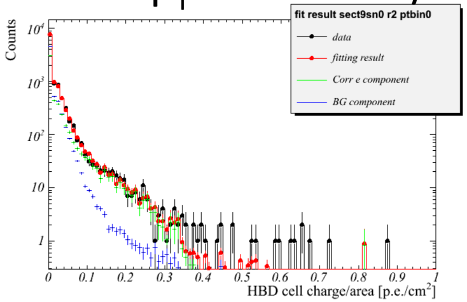
scintillation hits from hadron
(scintillation lights from single electrons + hadrons)



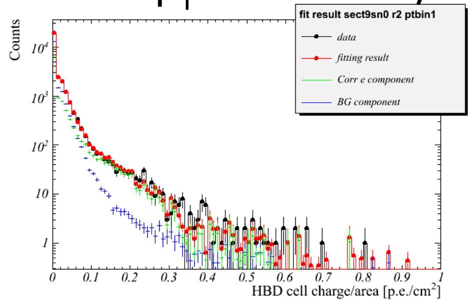
scintillation hits from large HBD cluster charge events
(scintillation lights from photonic electron pairs)

ring charge distribution fitting (Sect9 South R=7~8cm)

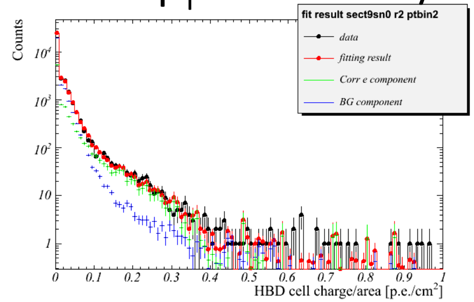
$0.00 < p_T < 0.25$ GeV/c



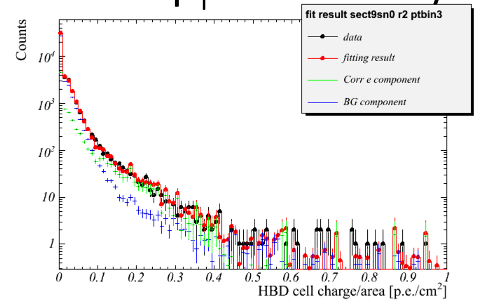
$0.25 < p_T < 0.50$ GeV/c



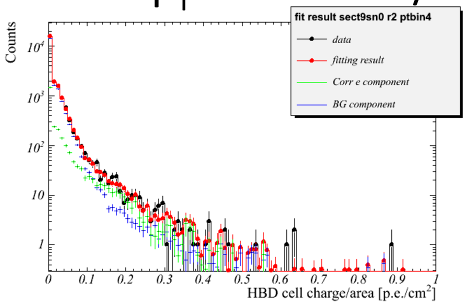
$0.50 < p_T < 0.75$ GeV/c



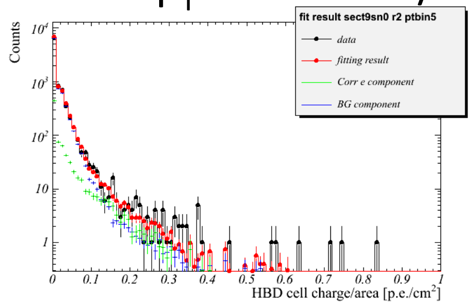
$0.75 < p_T < 1.00$ GeV/c



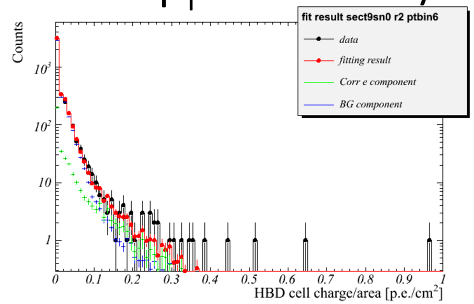
$1.00 < p_T < 1.25$ GeV/c



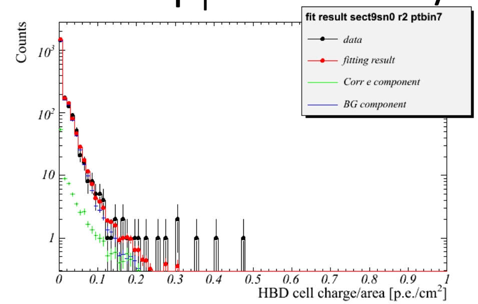
$1.25 < p_T < 1.50$ GeV/c



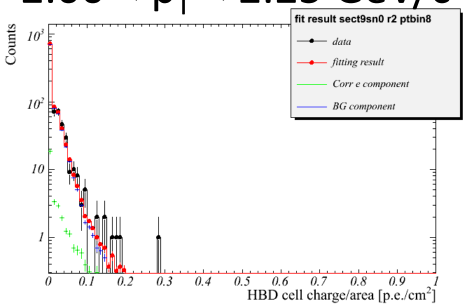
$1.50 < p_T < 1.75$ GeV/c



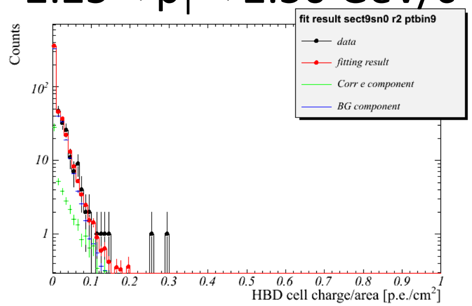
$1.75 < p_T < 2.00$ GeV/c



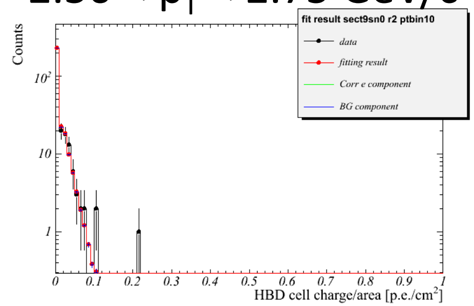
$2.00 < p_T < 2.25$ GeV/c



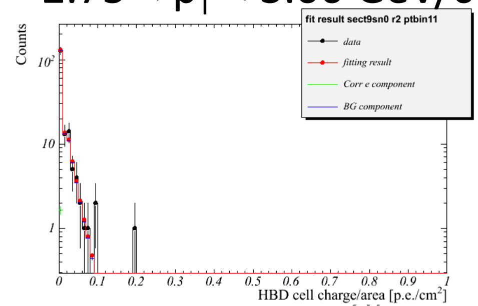
$2.25 < p_T < 2.50$ GeV/c



$2.50 < p_T < 2.75$ GeV/c



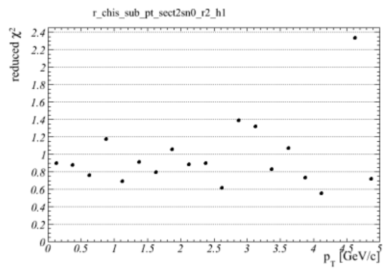
$2.75 < p_T < 3.00$ GeV/c



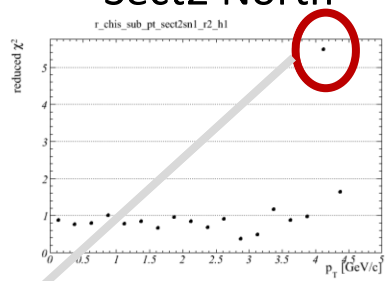
Black: data Green: electron signal x scintillation Blue: scintillation BG Red: Superposition

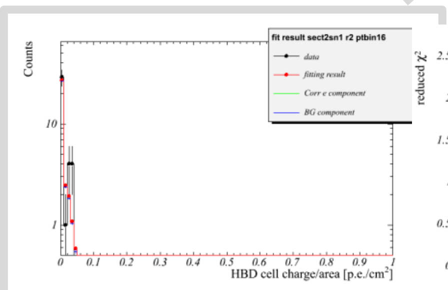
reduced chi square
for the ring charge distribution fitting

Sect2 South

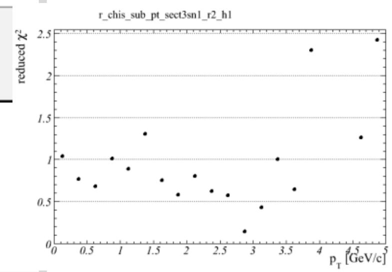


Sect2 North

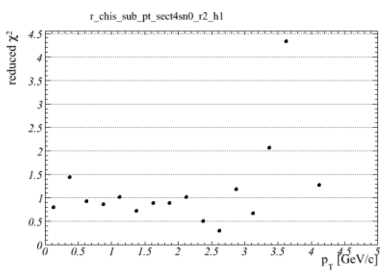




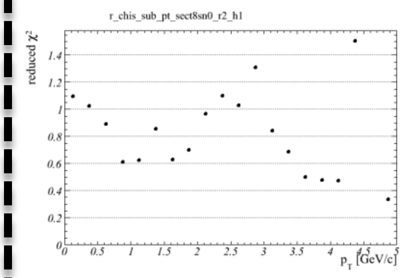
Sect3 North



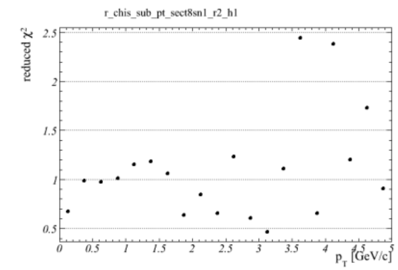
Sect4 South



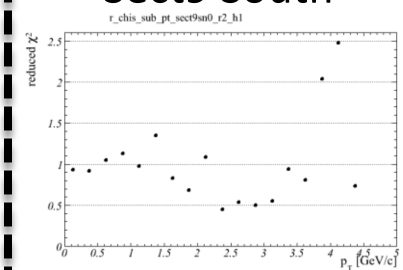
Sect8 South



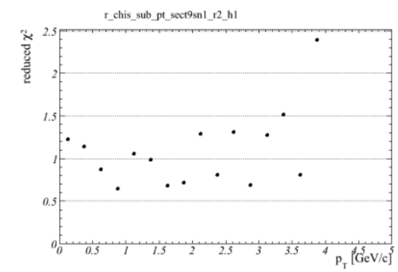
Sect8 North



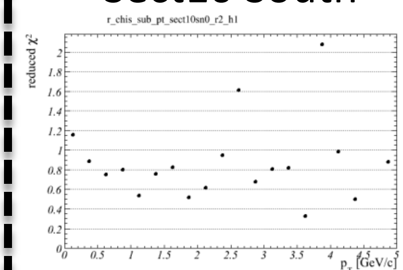
Sect9 South



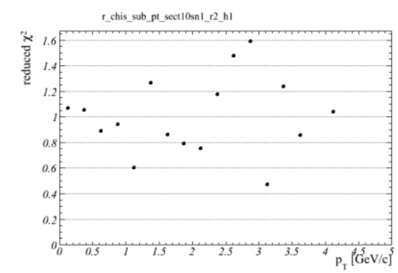
Sect9 North



Sect10 South



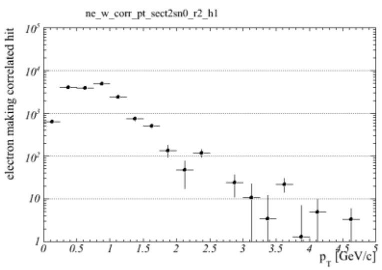
Sect10 North



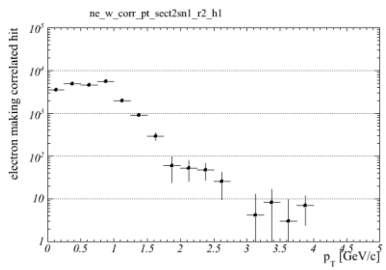
momentum spectra for the photonic electrons in the single electron clusters

~ fitting results ~

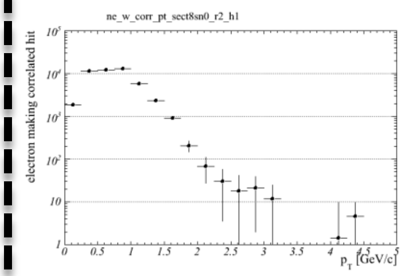
Sect2 South



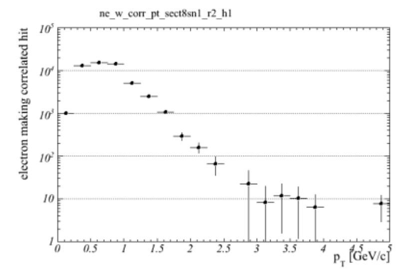
Sect2 North



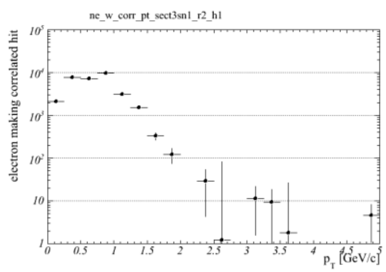
Sect8 South



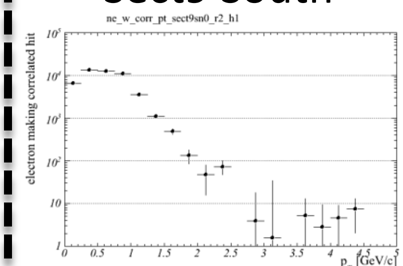
Sect8 North



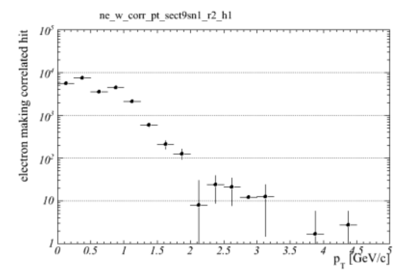
Sect3 North



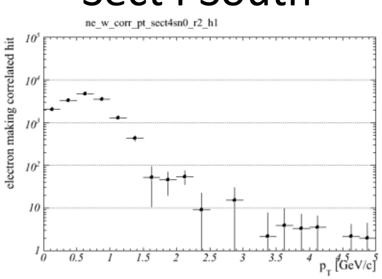
Sect9 South



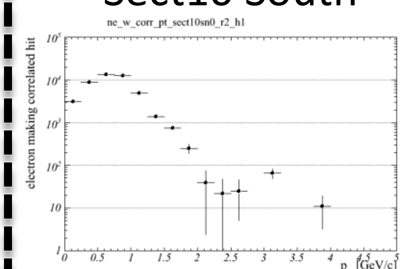
Sect9 North



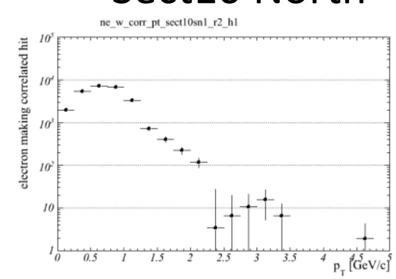
Sect4 South



Sect10 South

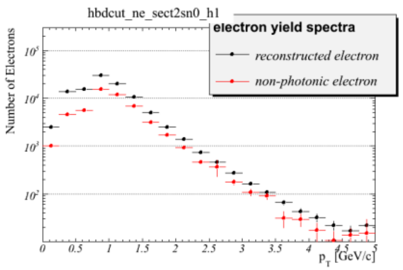


Sect10 North

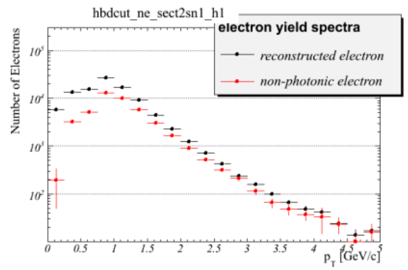


momentum spectra for the non-photonic electrons

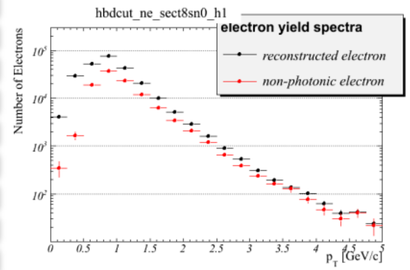
Sect2 South



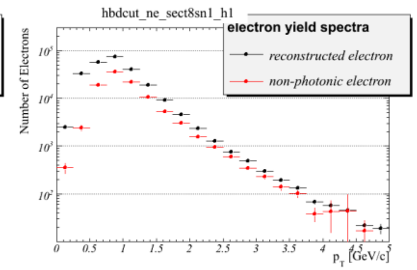
Sect2 North



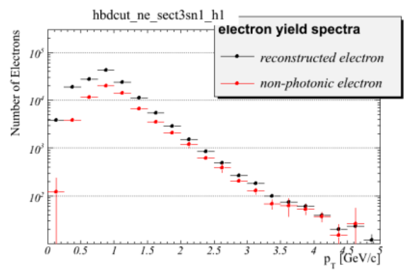
Sect8 South



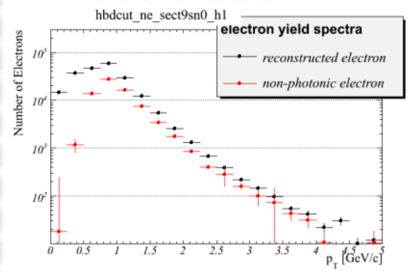
Sect8 North



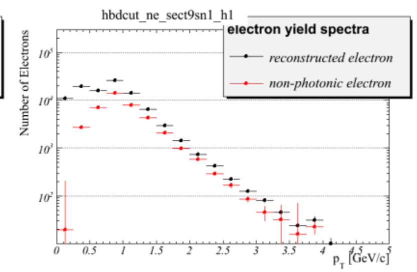
Sect3 North



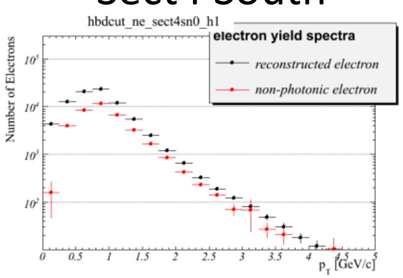
Sect9 South



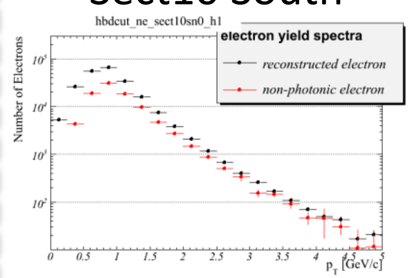
Sect9 North



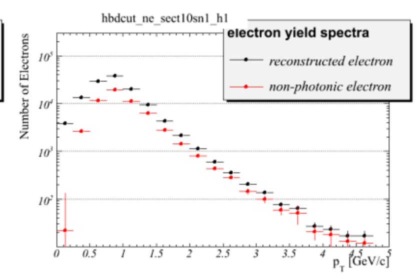
Sect4 South



Sect10 South



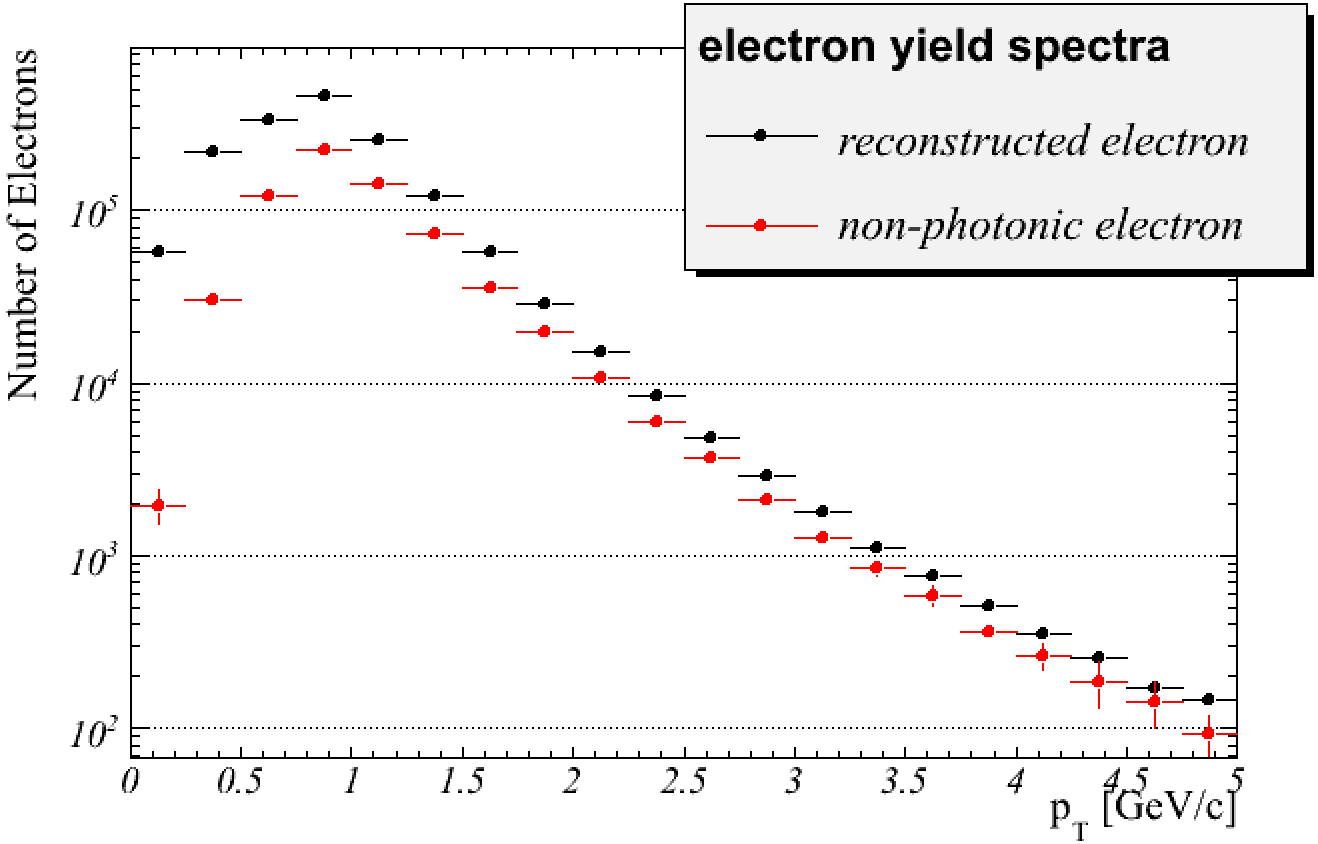
Sect10 North



Black: reconstructed electrons

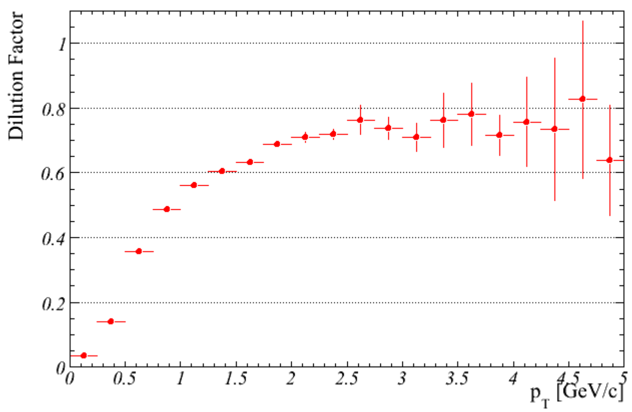
Red: non-phonic electrons

momentum spectra for the non-photonic electrons (total non-photonic electrons)



dilution factor spectrum

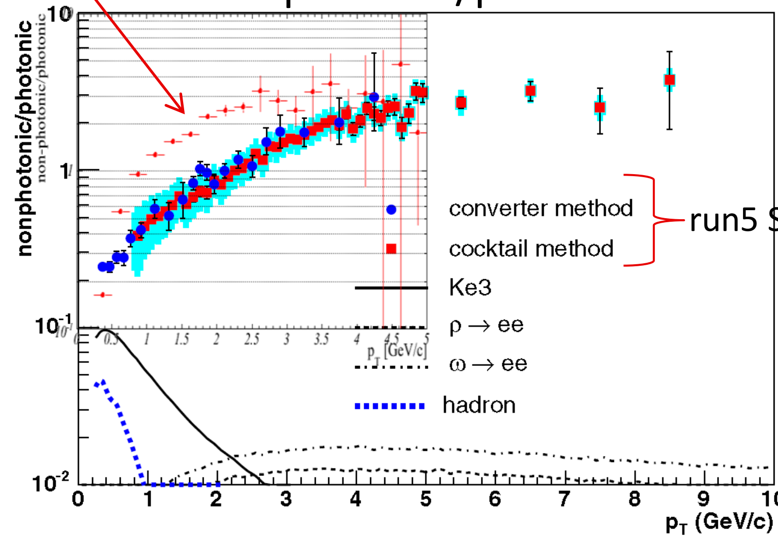
My analysis (w/ HBD)
non-photonic/(non-photonic + photonic)



red: w/ HBD charge cut
(using this cut in my analysis)

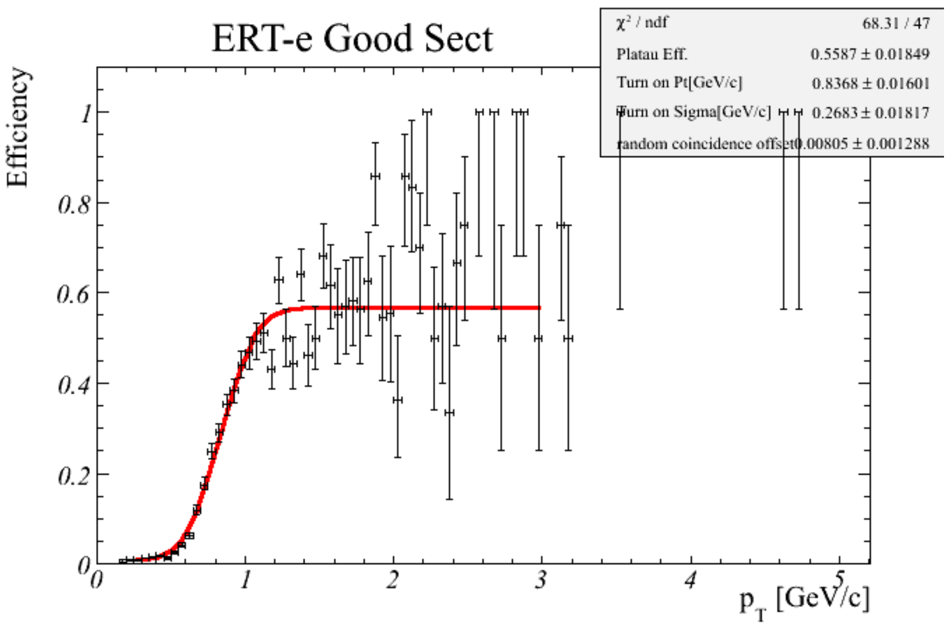
my analysis

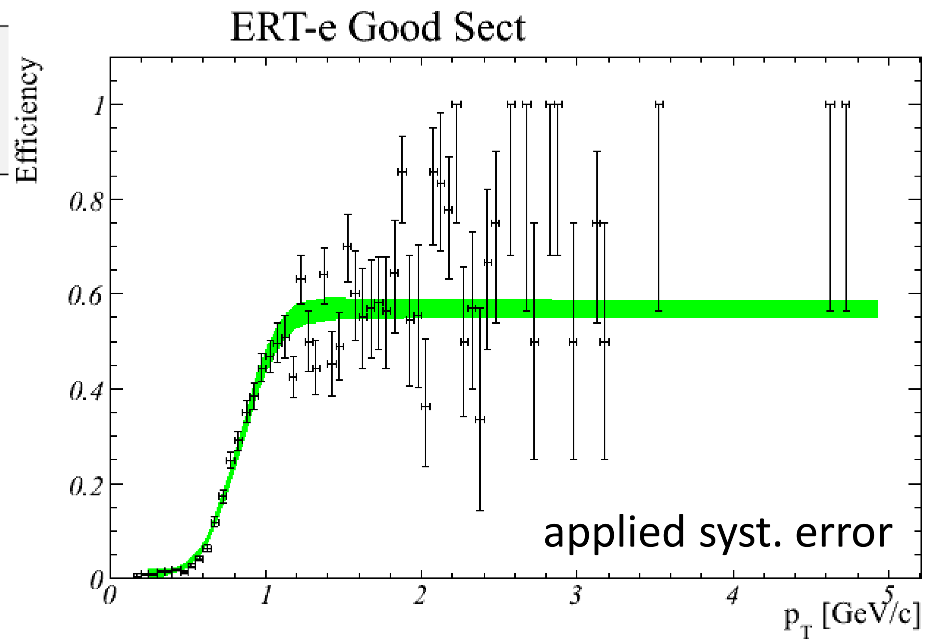
Run5 result (w/o HBD)
non-photonic/photonic



estimation of ERT_E efficiency

ERT_e efficiency





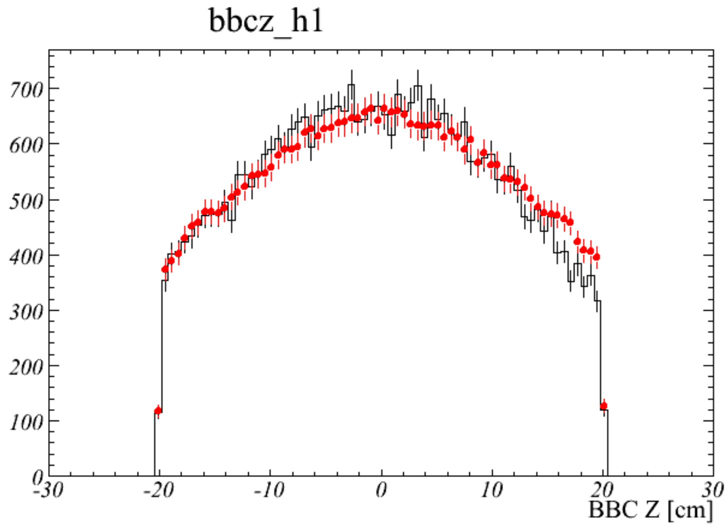
- use all reconstructed electrons in MB data
- applied syst. error
  - 3.3% x (1 + (0.90[GeV/c])^3/p_T^3)
  - this function shape is assigned as it looks enough conservative
    - looks good

estimation of Acc. x Rec. Eff.

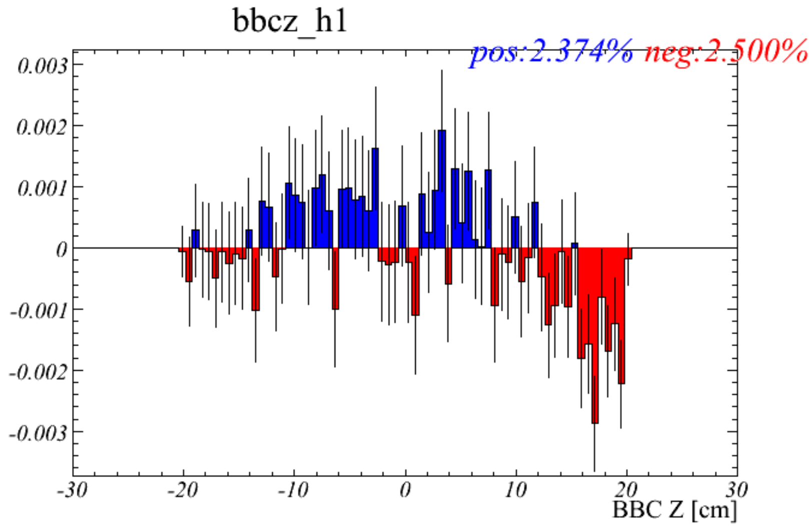
event generation

- generate single electrons with EXODUS
  - abs(bbcz)<30
  - |eta|<0.5
  - 0.23<pt<0.60 GeV/c
  - pt distribution ~ pt^{-2}
    - the distribution is normalized with weights of reconstructed electron pt distribution of MB data

BBC z distribution



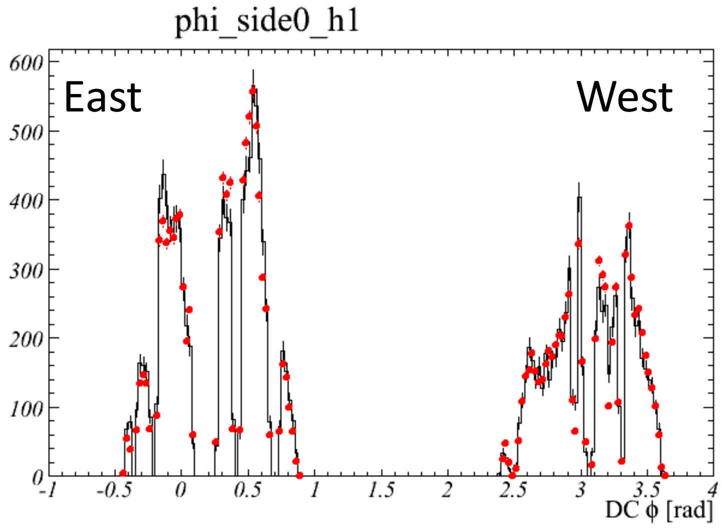
(data – simulation)/(total simulation)



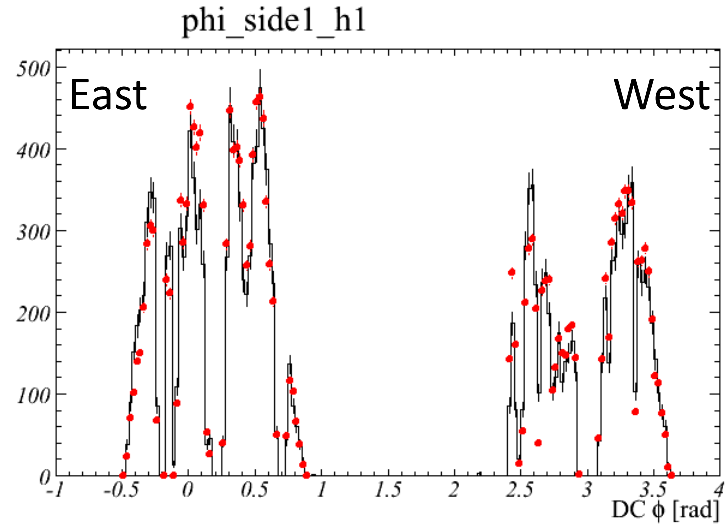
- Black: electrons in MB
- Red: simulation

DC acceptance

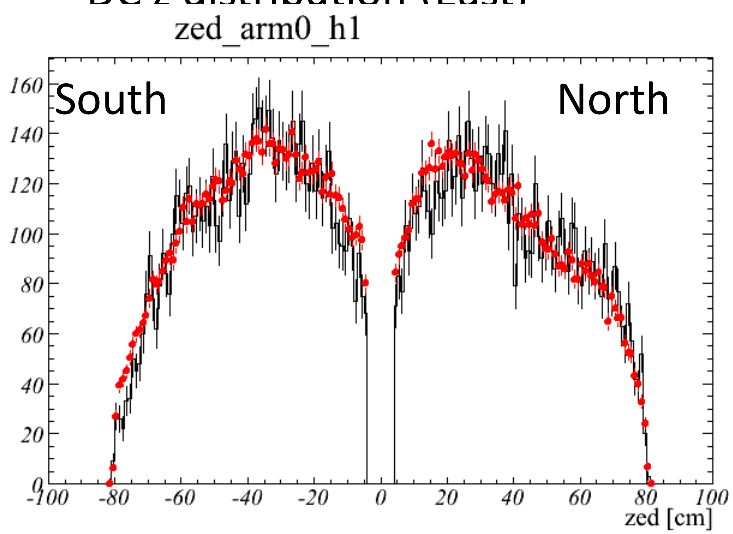
DC phi distribution (North)



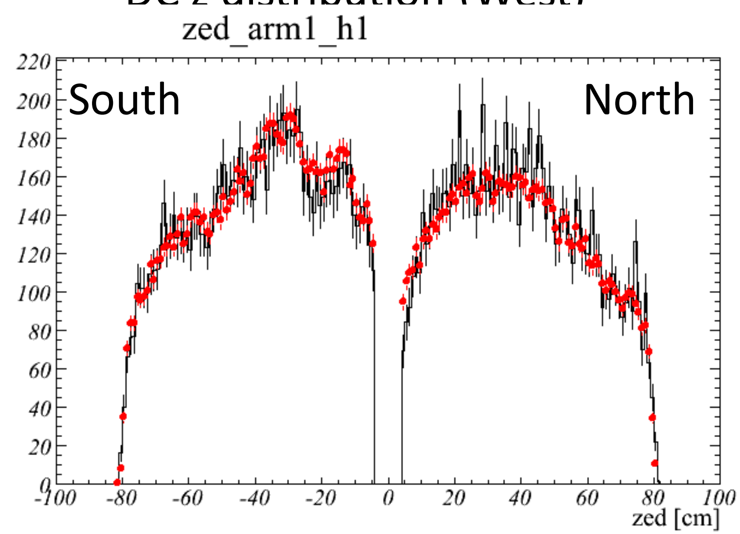
DC phi distribution (South)



DC z distribution (East)

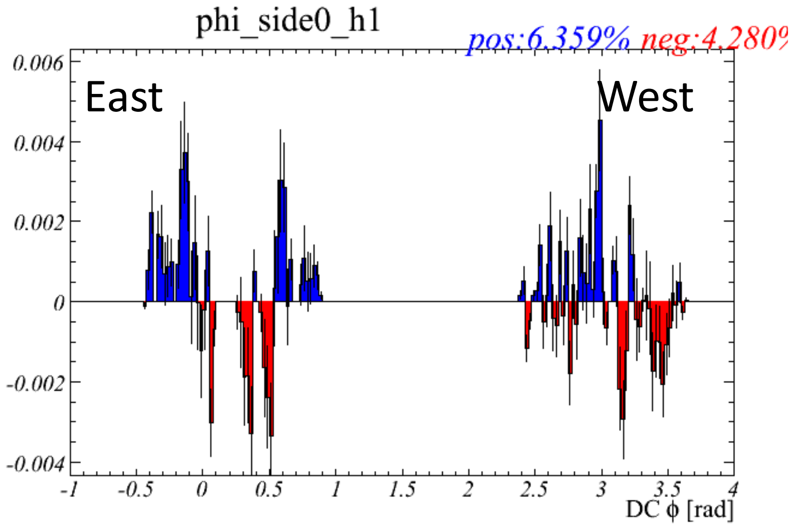


DC z distribution (West)

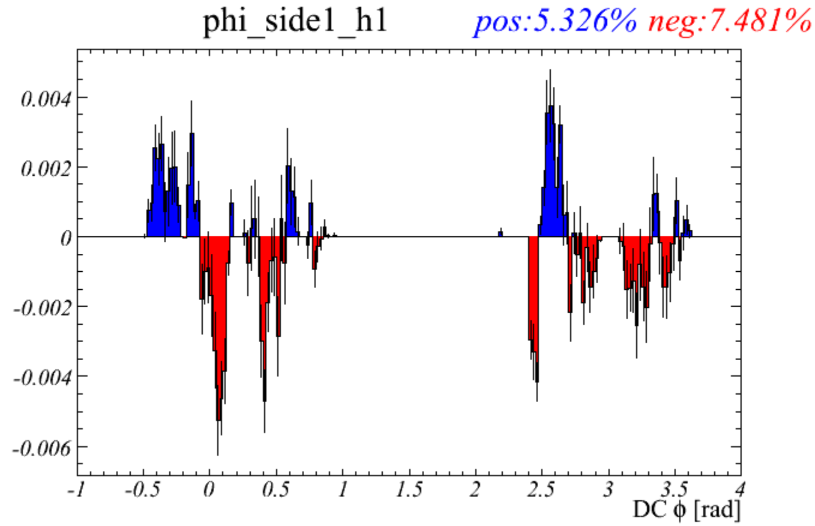


DC acceptance

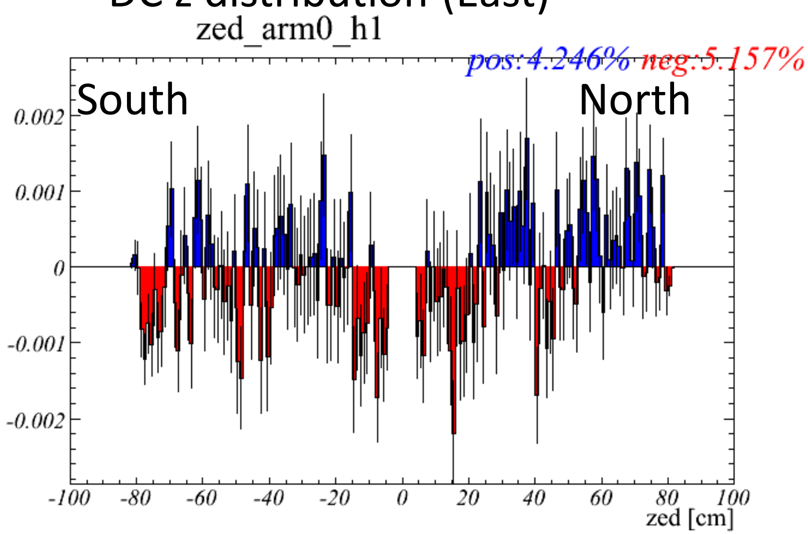
DC phi distribution (North)



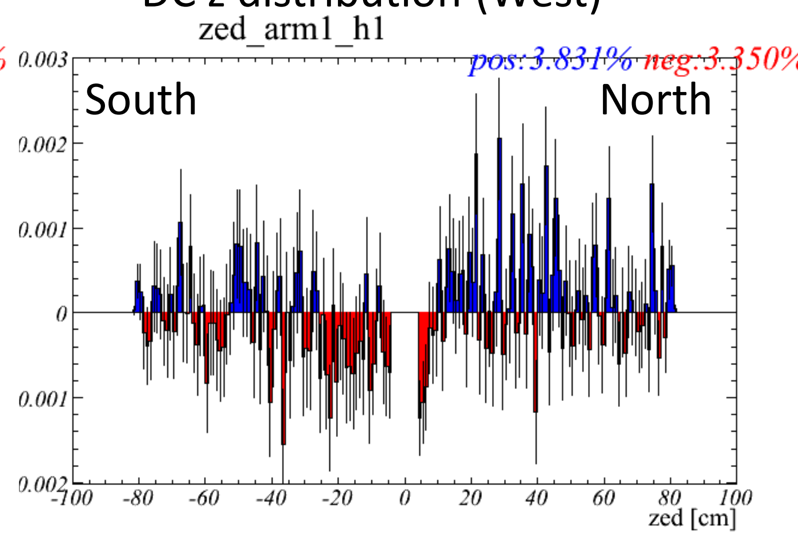
DC phi distribution (South)



DC z distribution (East)

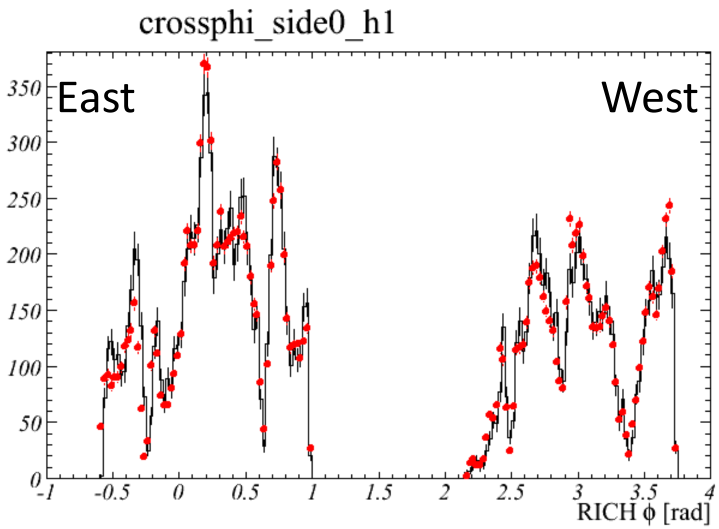


DC z distribution (West)

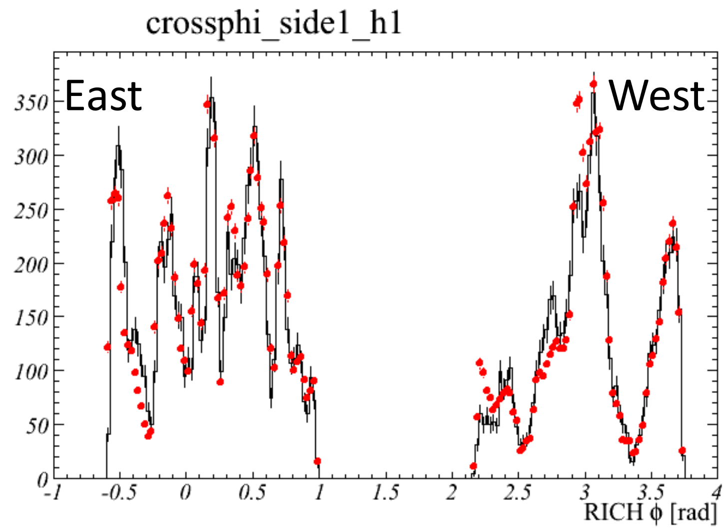


RICH acceptance

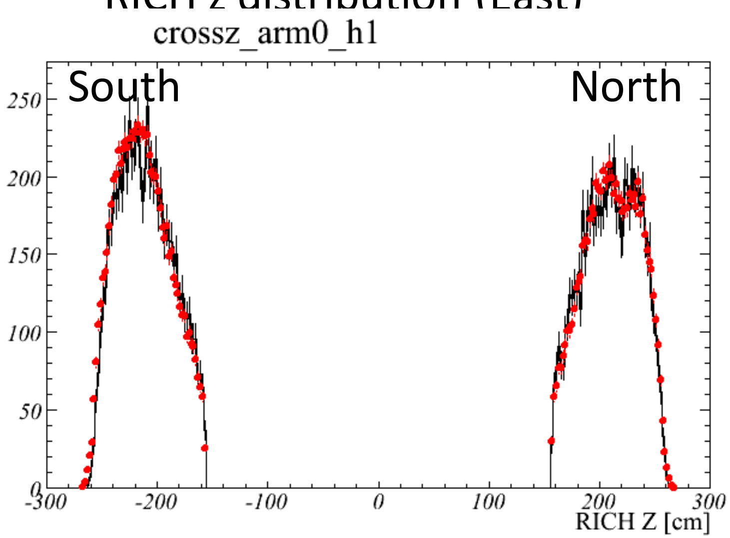
RICH phi distribution (North)



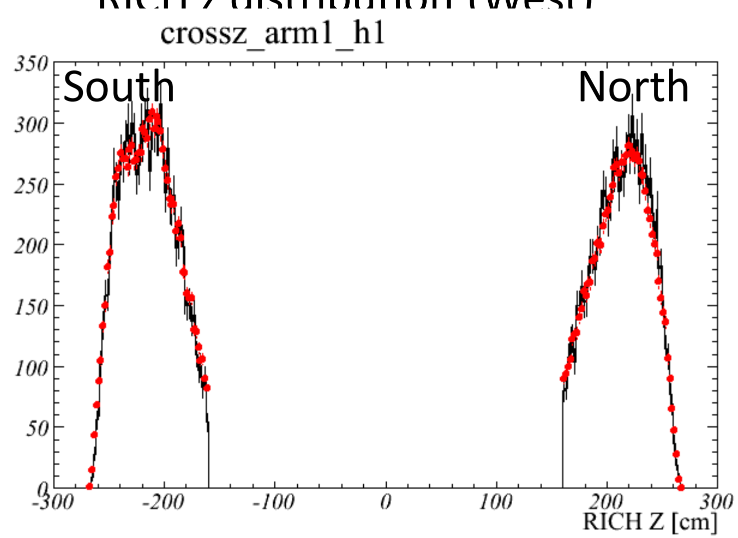
RICH phi distribution (South)



RICH z distribution (East)

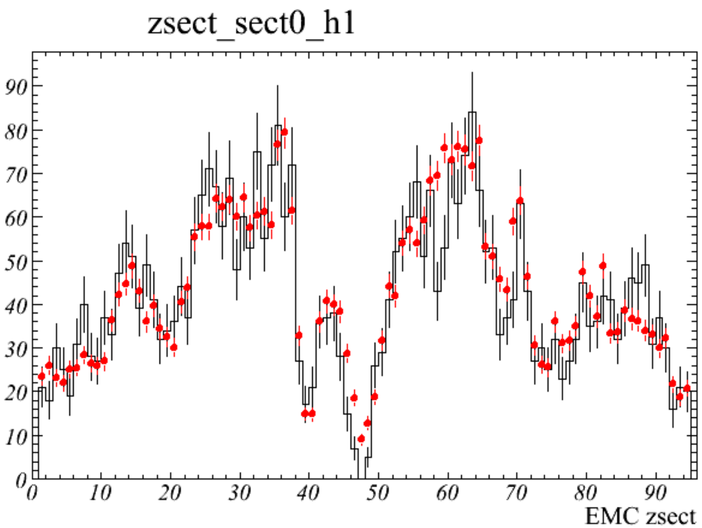


RICH z distribution (West)

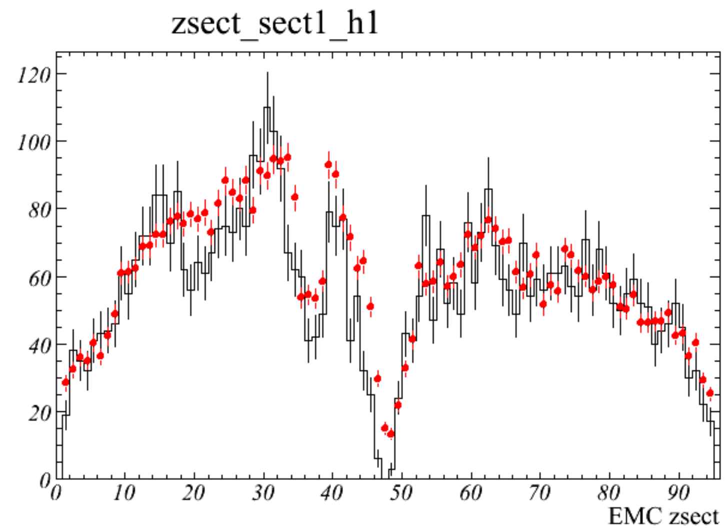


EMC acceptance (East)

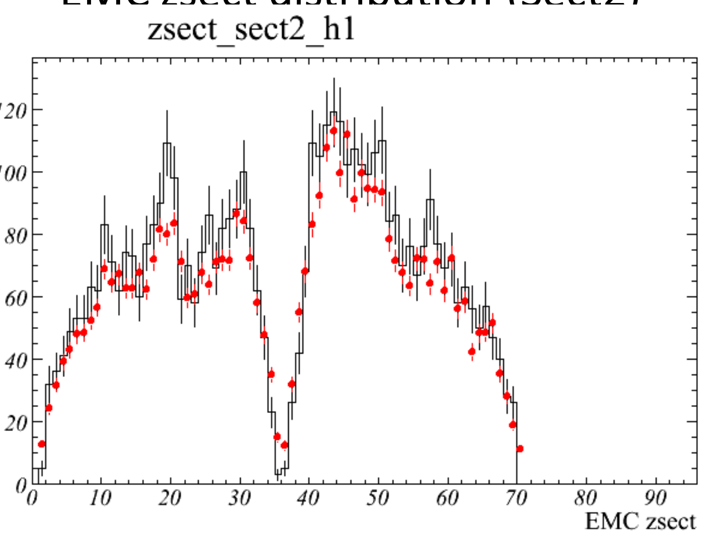
EMC zsect distribution (Sect0)



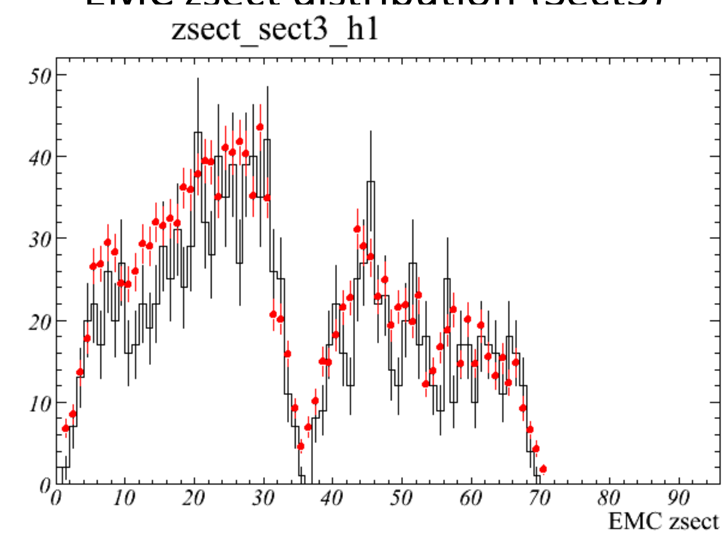
EMC zsect distribution (Sect1)



EMC zsect distribution (Sect2)

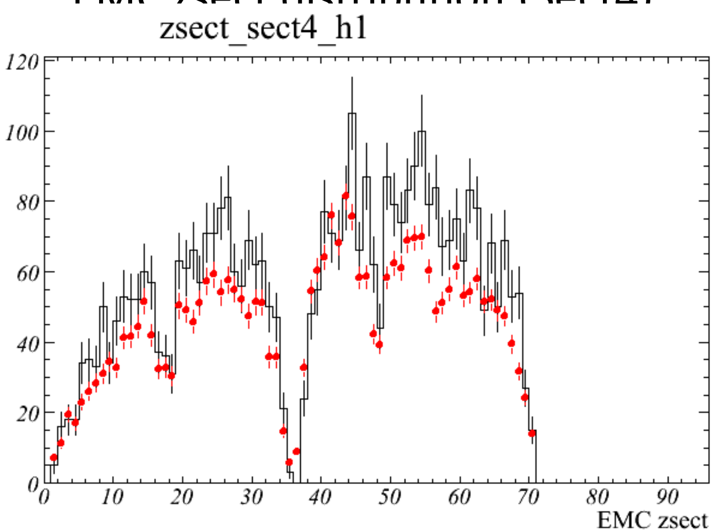


EMC zsect distribution (Sect3)

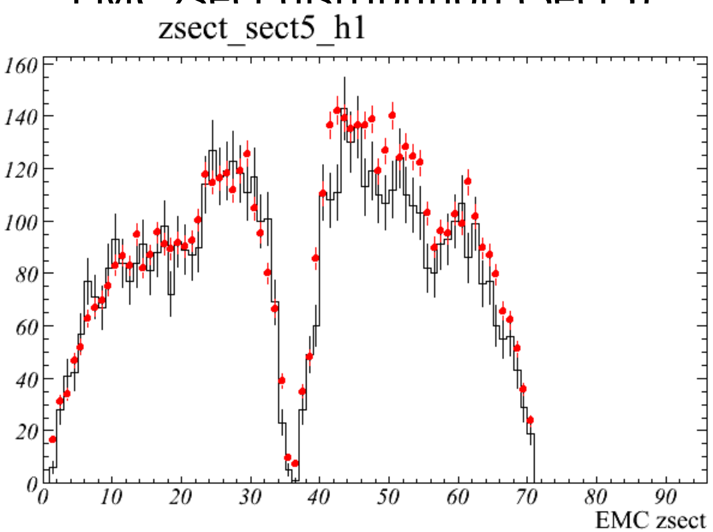


EMC acceptance (West)

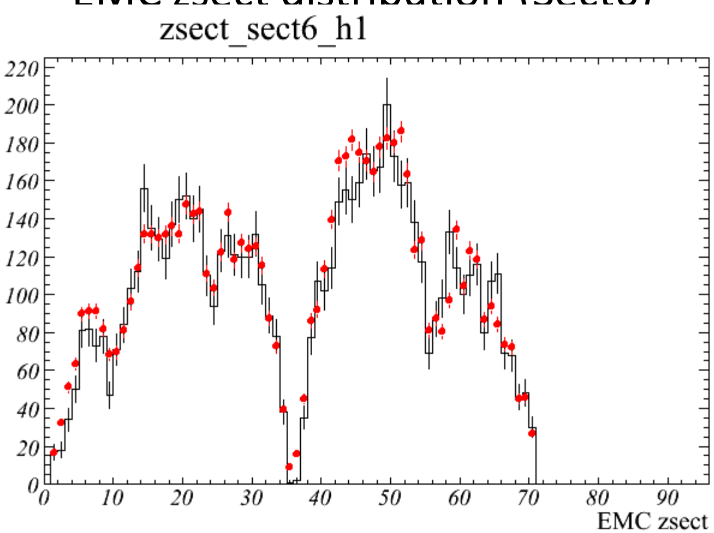
EMC zsect distribution (Sect4)



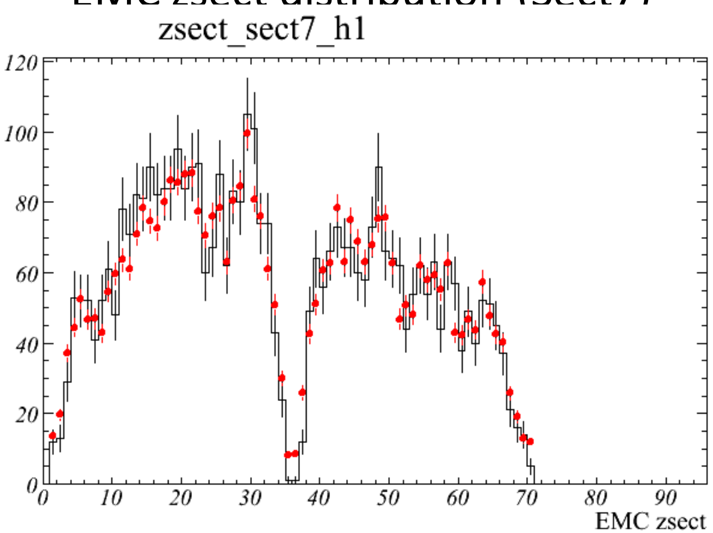
EMC zsect distribution (Sect5)



EMC zsect distribution (Sect6)

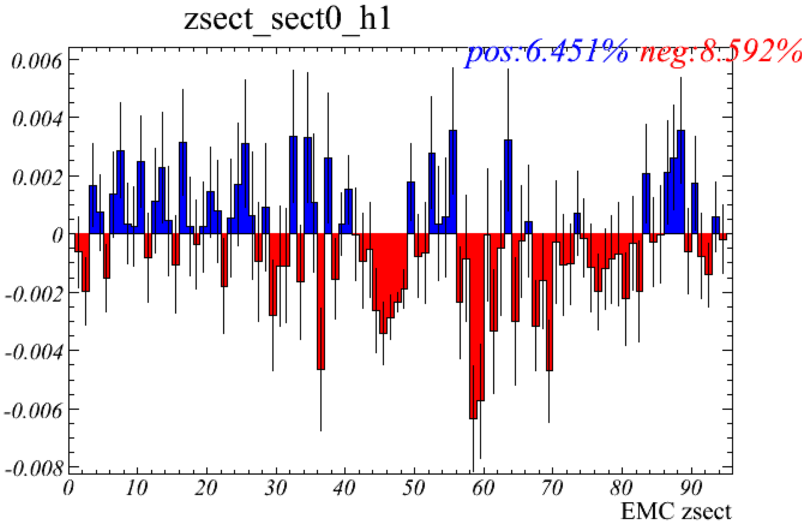


EMC zsect distribution (Sect7)

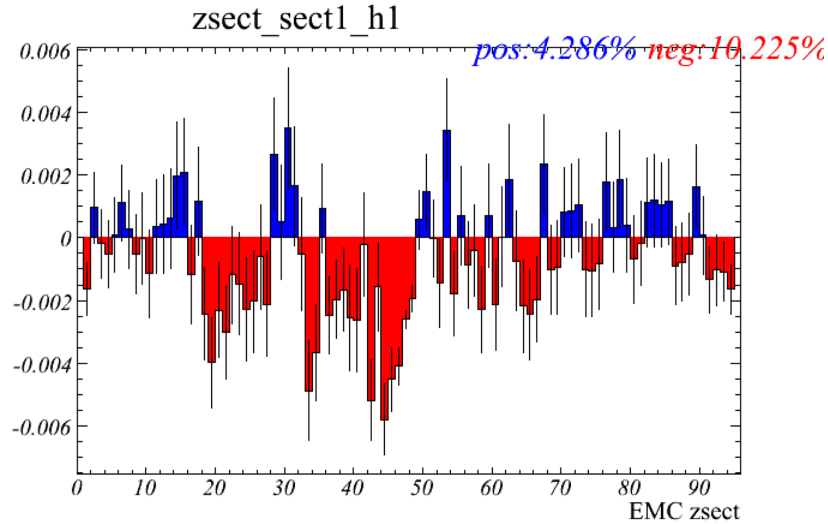


EMC acceptance (East)

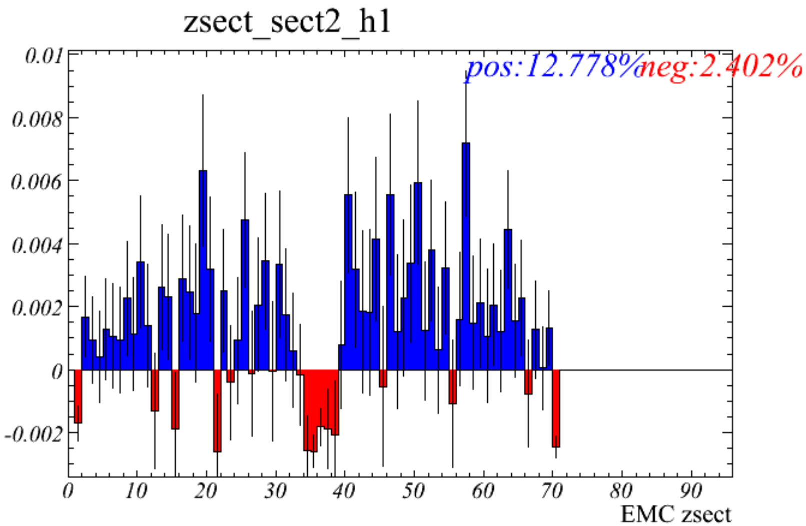
EMC zsect distribution (Sect0)



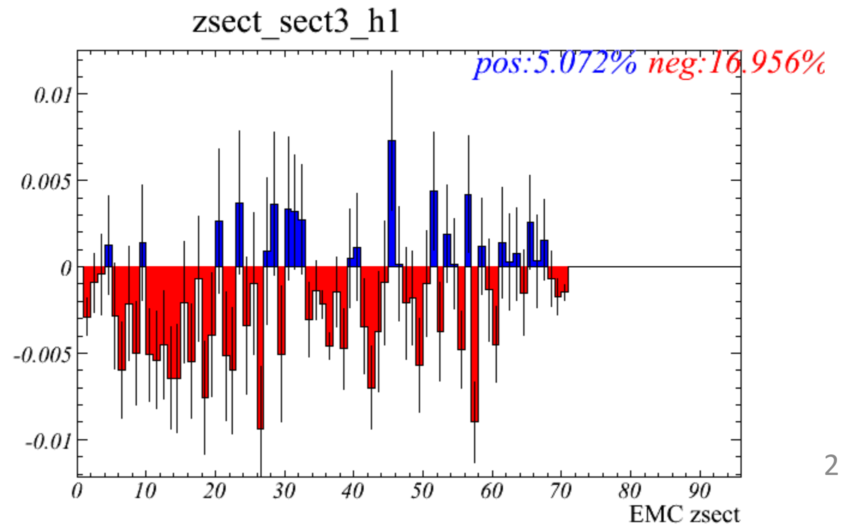
EMC zsect distribution (Sect1)



EMC zsect distribution (Sect2)

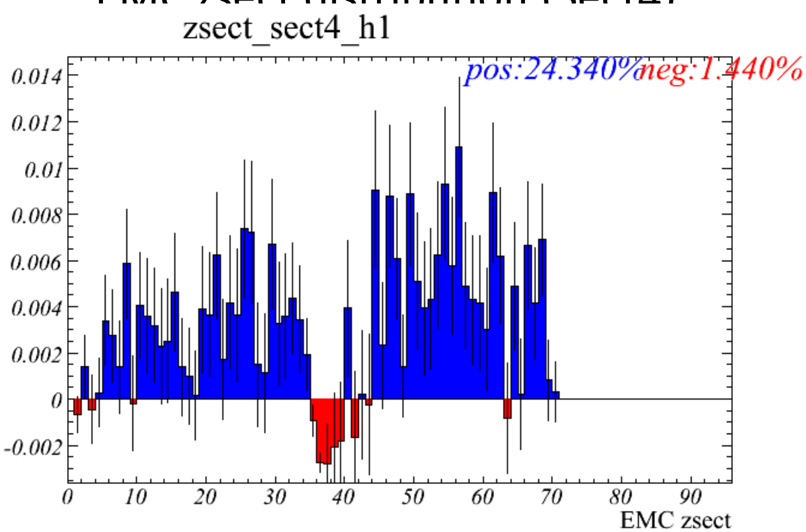


EMC zsect distribution (Sect3)

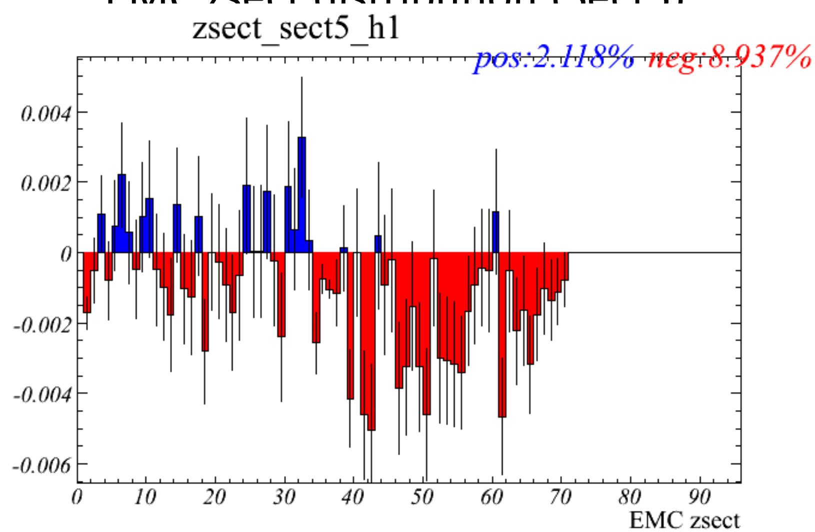


EMC acceptance (West)

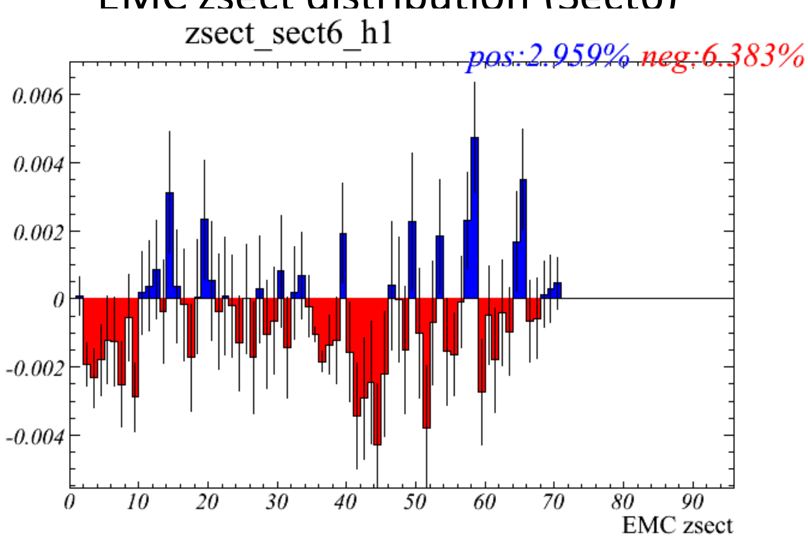
EMC zsect distribution (Sect4)



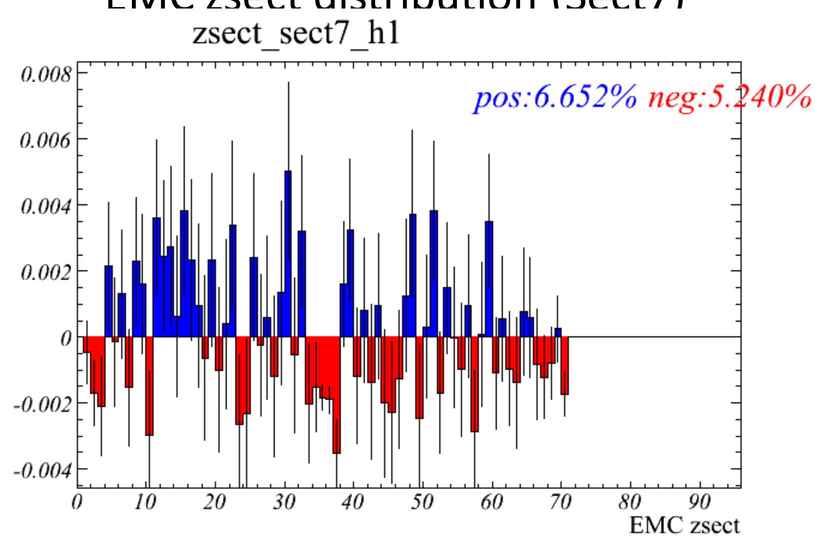
EMC zsect distribution (Sect5)



EMC zsect distribution (Sect6)

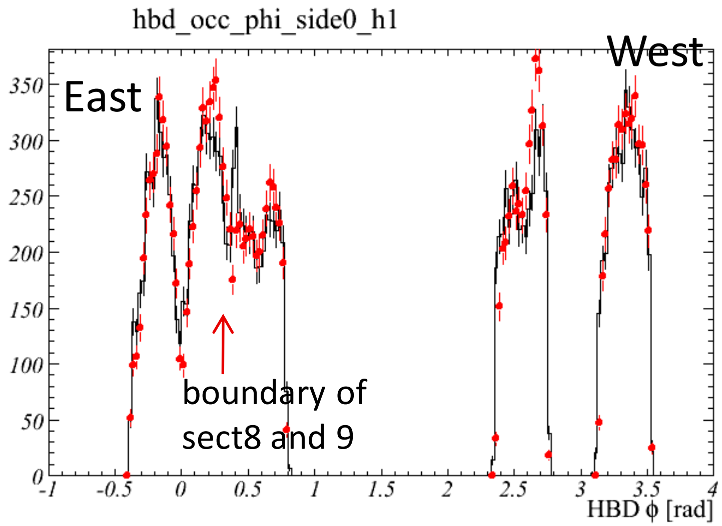


EMC zsect distribution (Sect7)

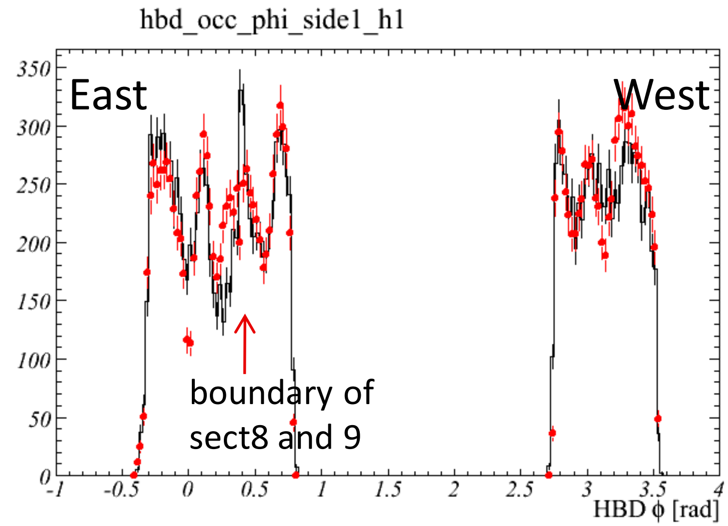


HBD acceptance

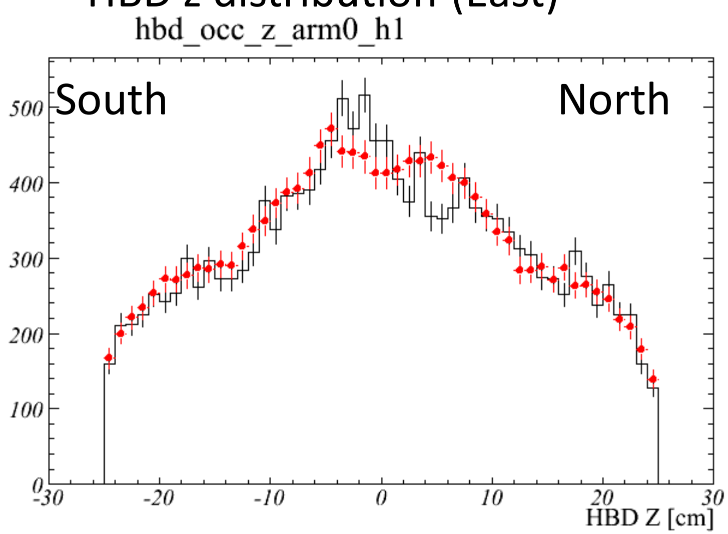
HBD phi distribution (North)



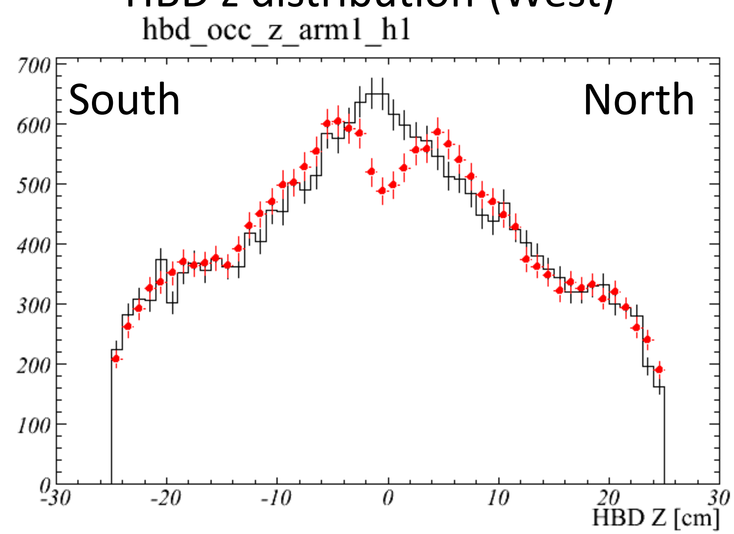
HBD phi distribution (South)



HBD z distribution (East)

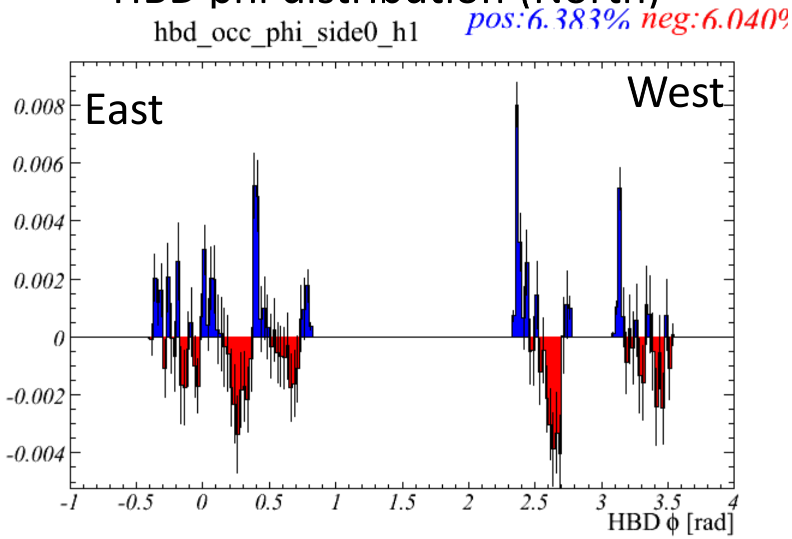


HBD z distribution (West)

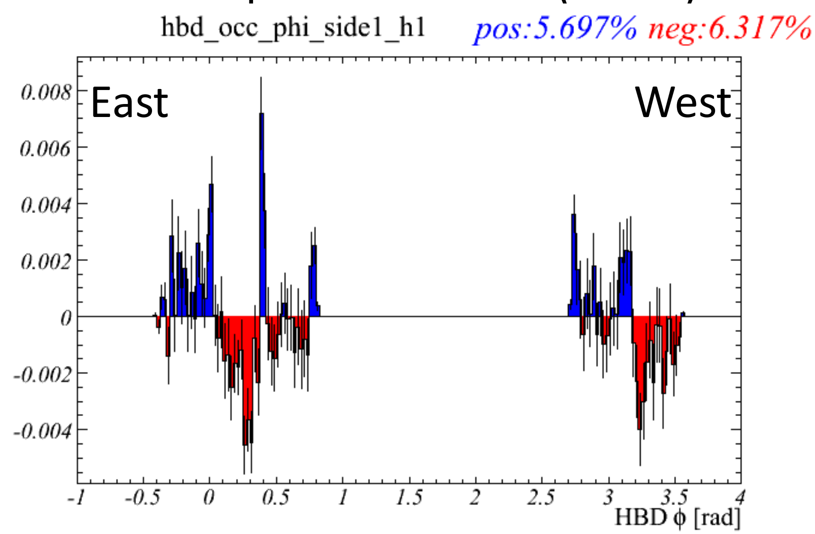


HBD acceptance

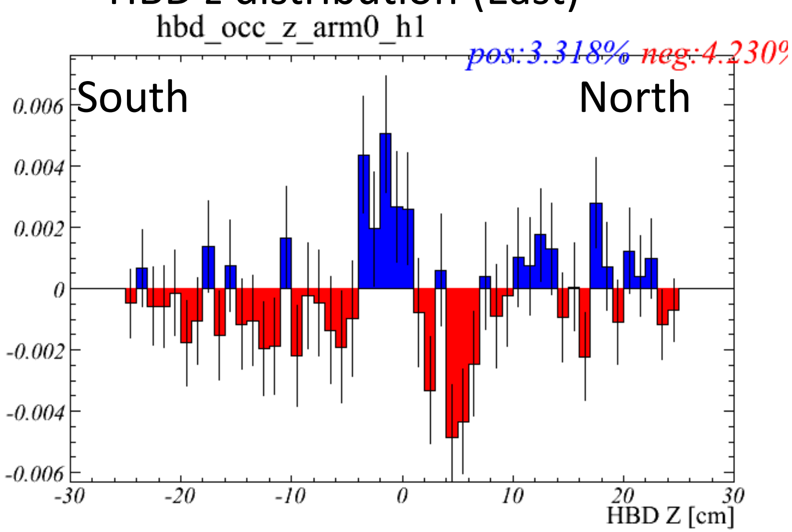
HBD phi distribution (North)



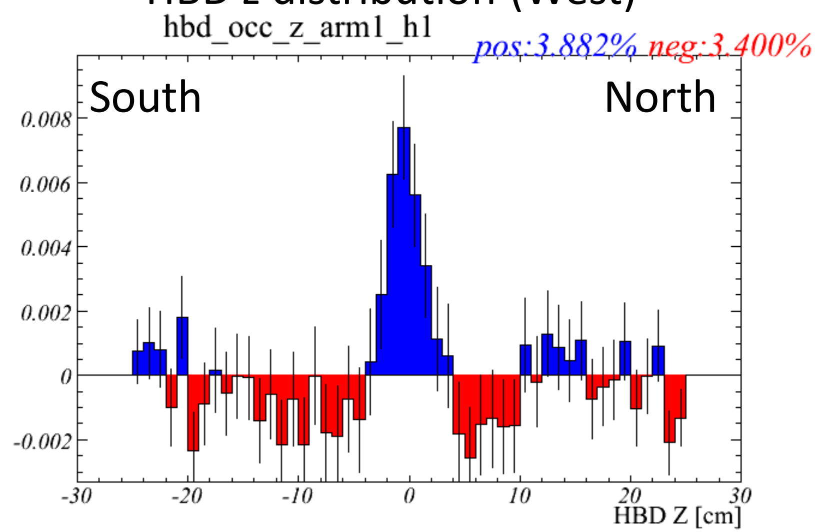
HBD phi distribution (South)



HBD z distribution (East)

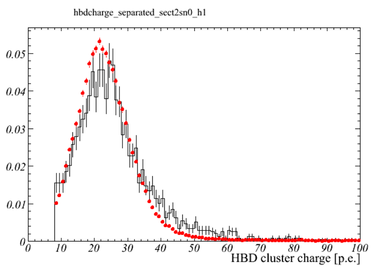


HBD z distribution (West)

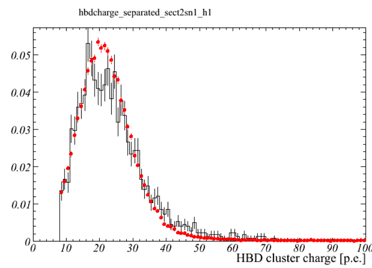


HBD cluster charge comparison

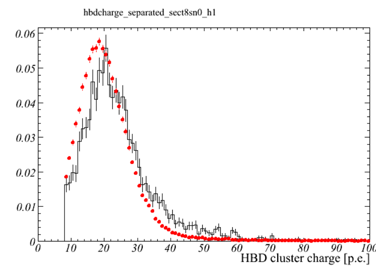
Sect2 South



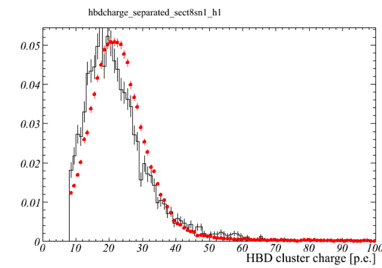
Sect2 North



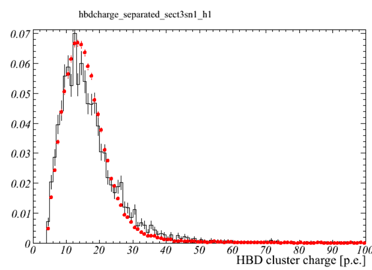
Sect8 South



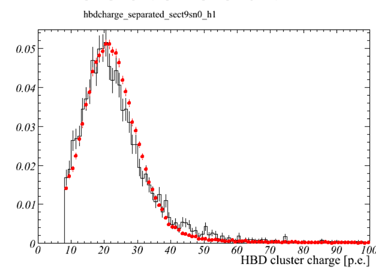
Sect8 North



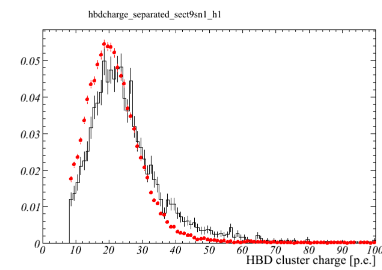
Sect3 North



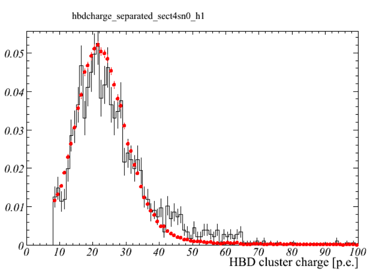
Sect9 South



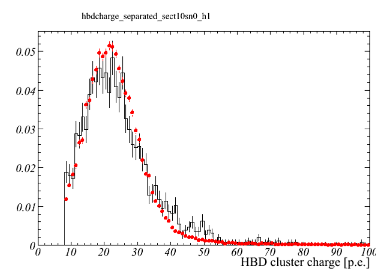
Sect9 North



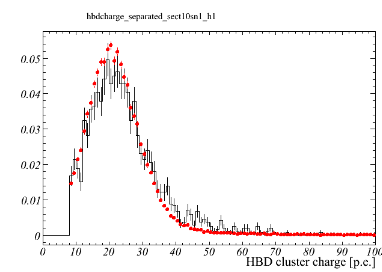
Sect4 South



Sect10 South



Sect10 North

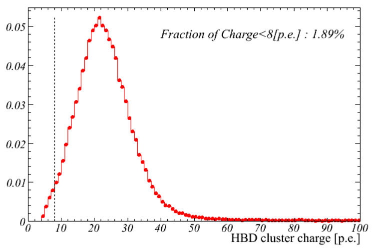


Black: data

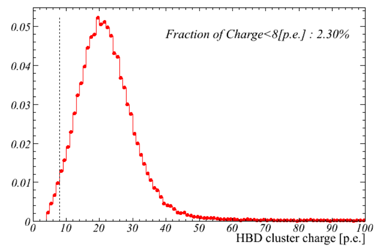
Red: simulation

HBD cluster charge in simulation

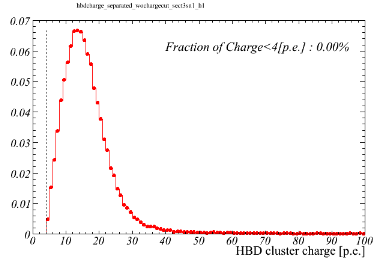
Sect2 South



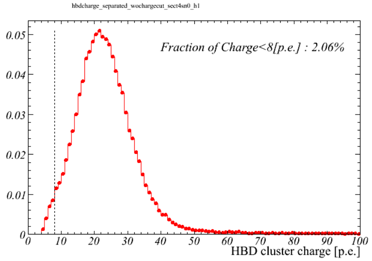
Sect2 North



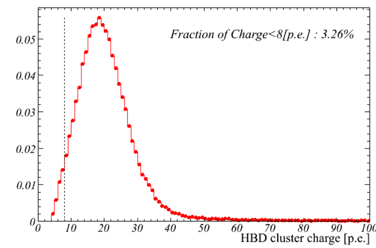
Sect3 North



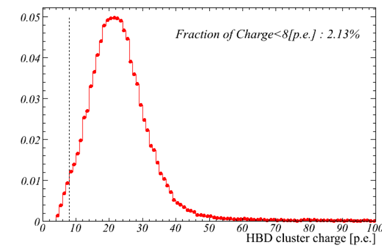
Sect4 South



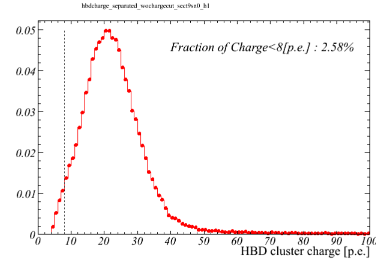
Sect8 South



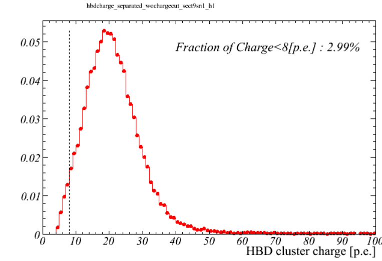
Sect8 North



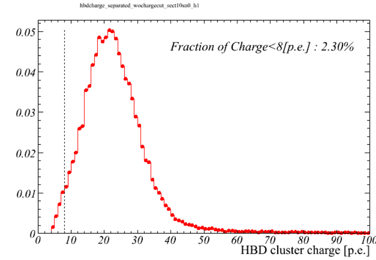
Sect9 South



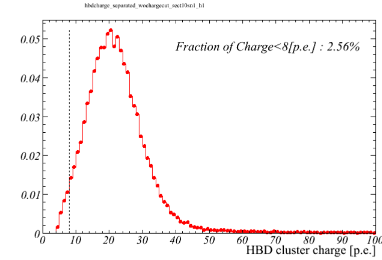
Sect9 North



Sect10 South

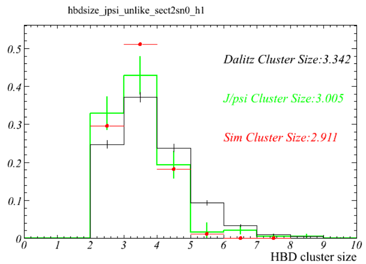


Sect10 North

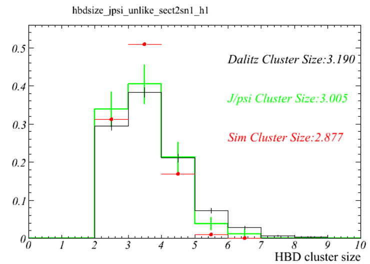


HBD cluster size comparison

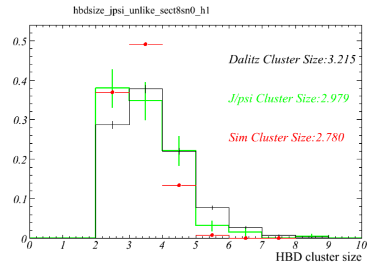
Sect2 South



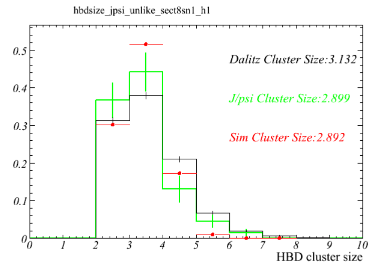
Sect2 North



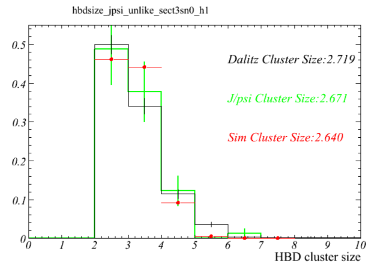
Sect8 South



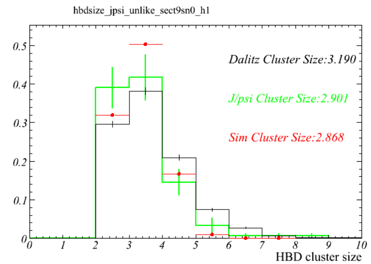
Sect8 North



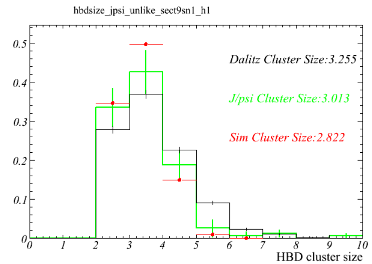
Sect3 North



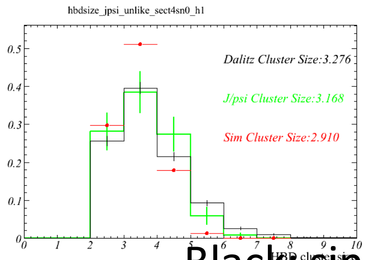
Sect9 South



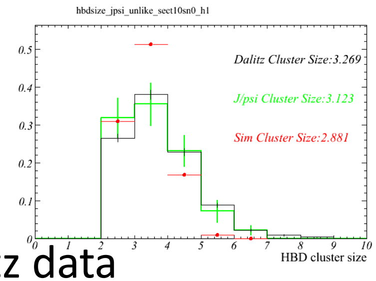
Sect9 North



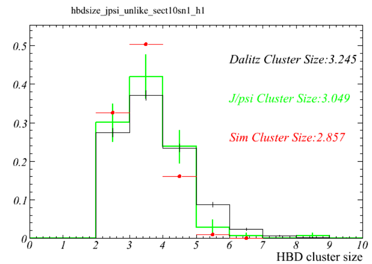
Sect4 South



Sect10 South



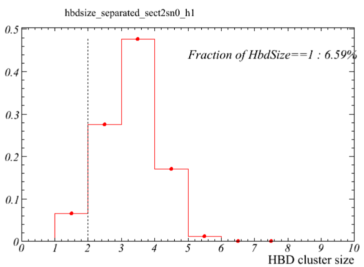
Sect10 North



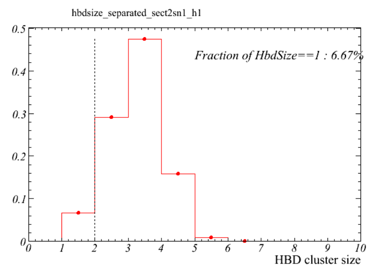
Black: single e clusters from Dalitz data
green: J/psi events in data
Red: simulation

HBD cluster size in simulation

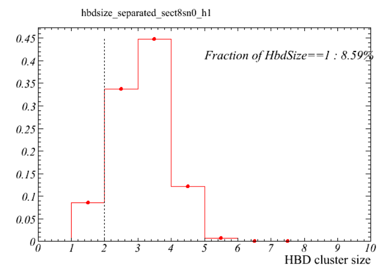
Sect2 South



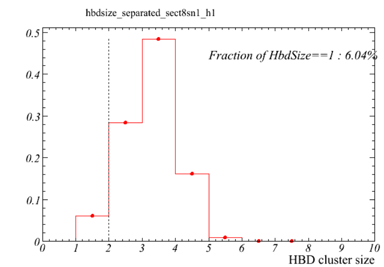
Sect2 North



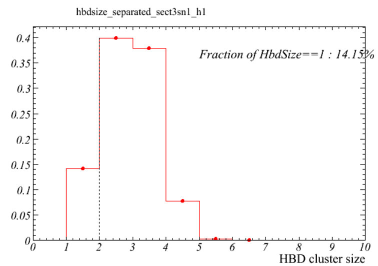
Sect8 South



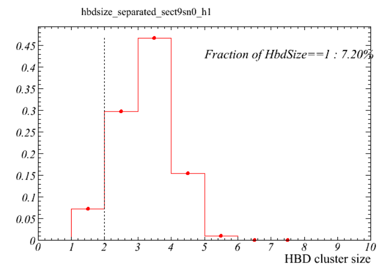
Sect8 North



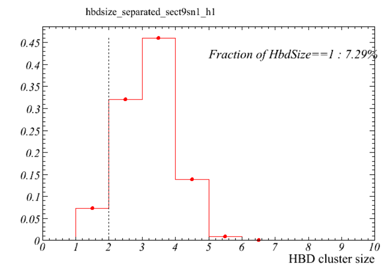
Sect3 North



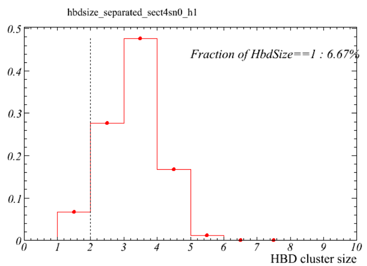
Sect9 South



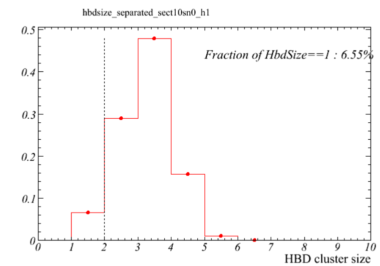
Sect9 North



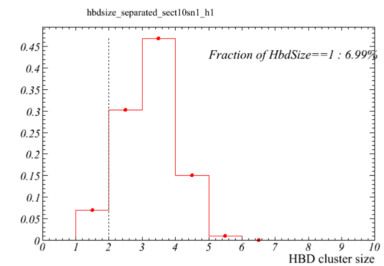
Sect4 South



Sect10 South



Sect10 North

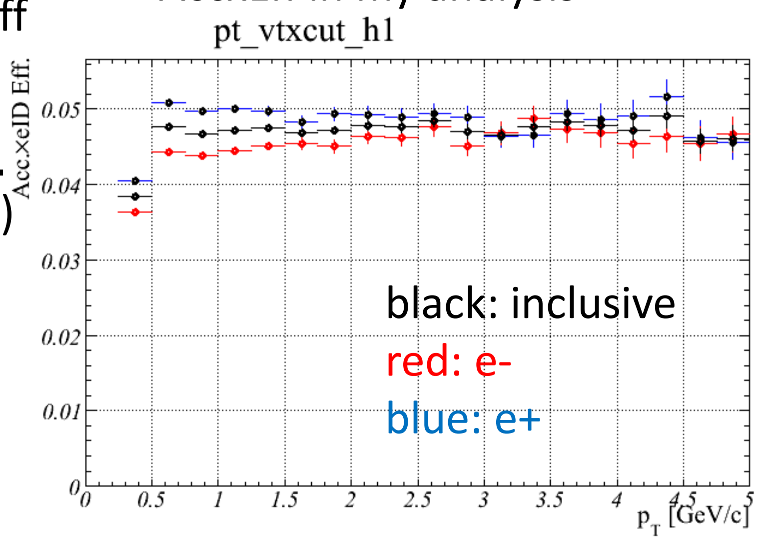


updated

acceptance x reconstruction eff.

acc eff $= \dfrac{\text{reconstructed e}}{\text{yielded e } (\Delta\eta=1)}$

AccxEff in my analysis



AccxEff in run5 analysis

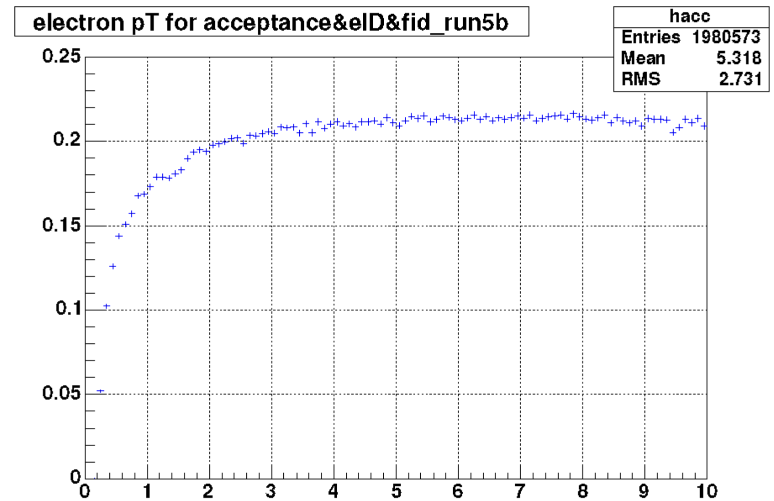


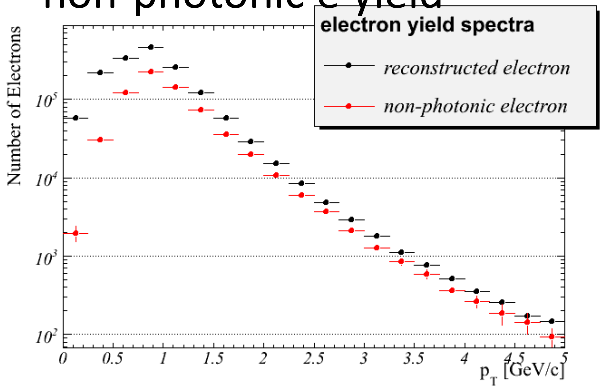
Figure 19: Combined acceptance curve for e^+ and e^-.

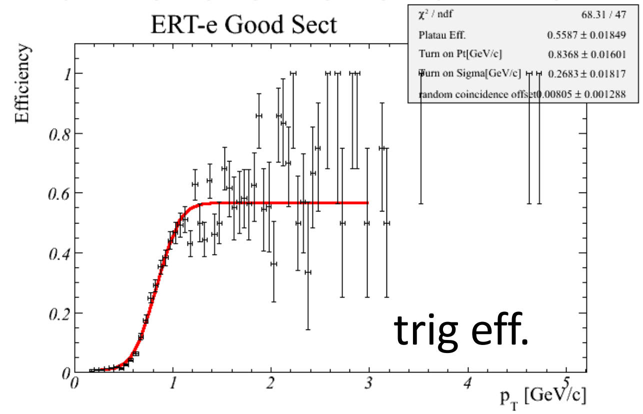
- including smearing effect
- AccxEff is about ¼
  - DC and EMC acceptance and cut is about ½
  - HBD acceptance and cut is about ½

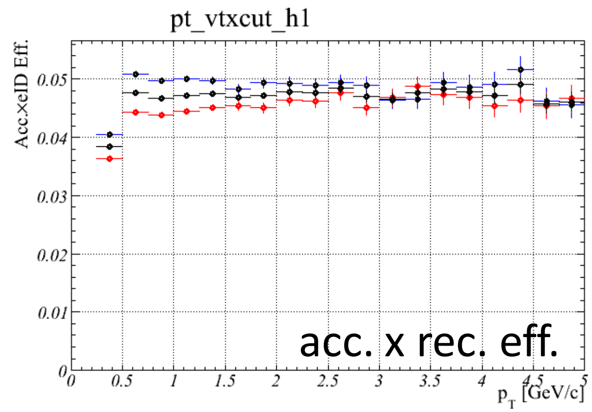
cross section

cross section

non-photonic e yield

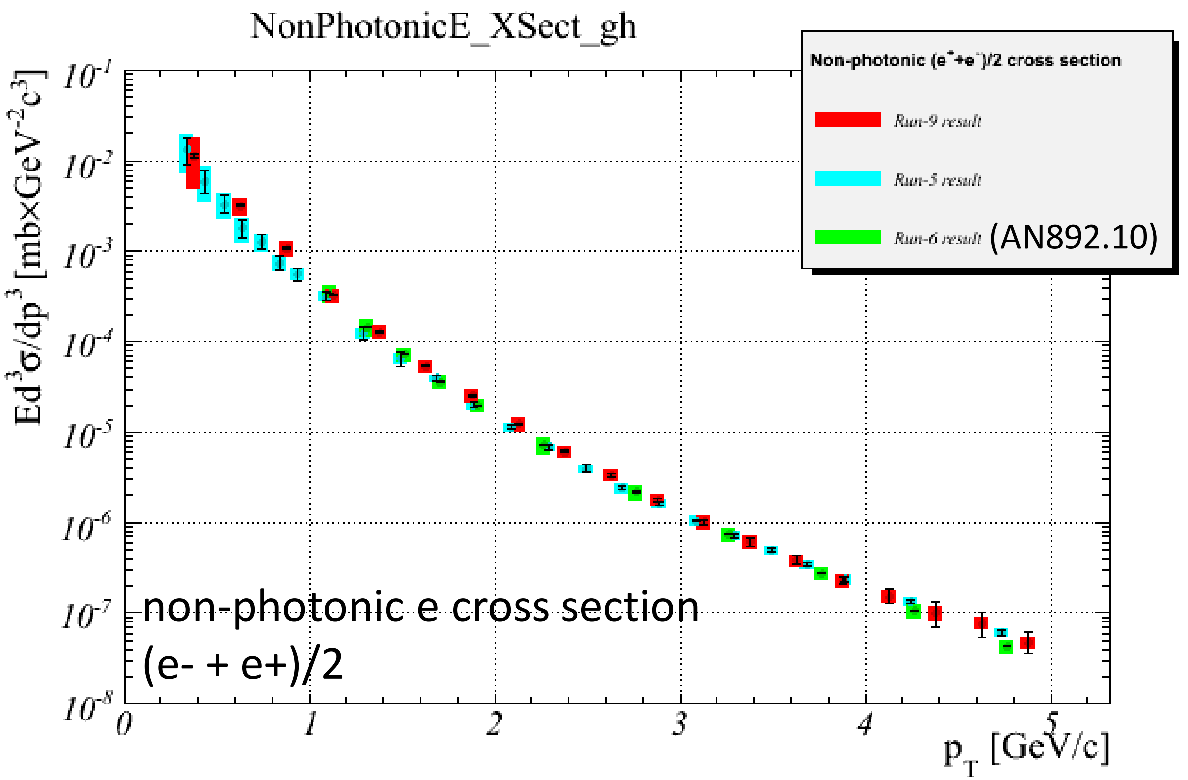






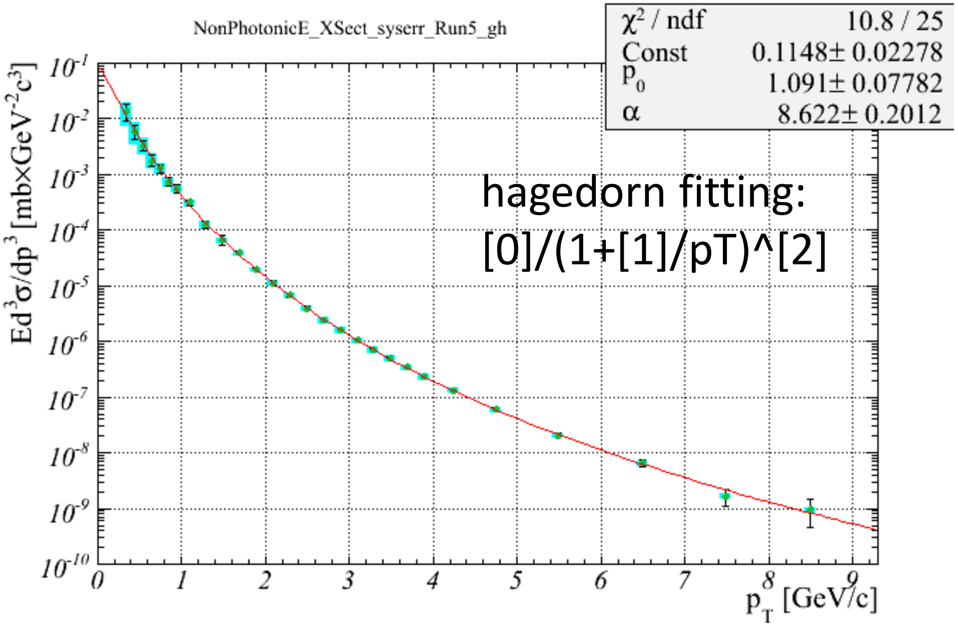
- Used these 3 results to estimate the cross section for the non-photonic electron production
- other parameters
  - used Run3 vernier scan result (AN358)
    - 23.0 (1+-9.7%) [mb]
  - Run9 MB trigger bias value
    - 0.795 +- 0.02
  - systematic errors
    - acceptance … 8%
    - RICH eID cut … 2% (same as run5 analysis)
    - prob cut … 0.5% (same as run5 analysis)
    - e/p cut … 2% (same as run5 analysis)
    - HBD cluster size cut … 3.5%
    - HBD cluster charge cut … 3%
    - syst. error from Ring Charge Fitting Method
    - Trigger Efficiency … 3.3% x (1 + (0.90GeV/c)^3/pT^3)

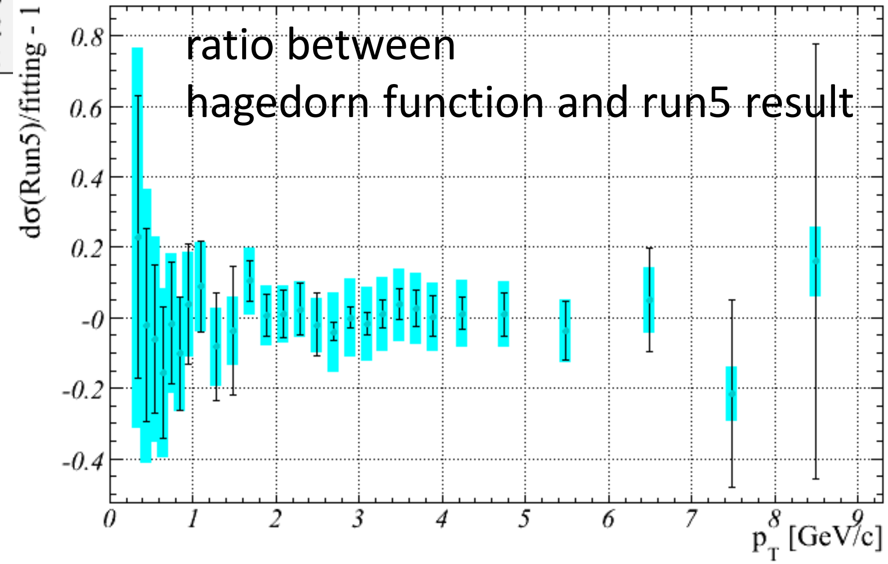
cross section result

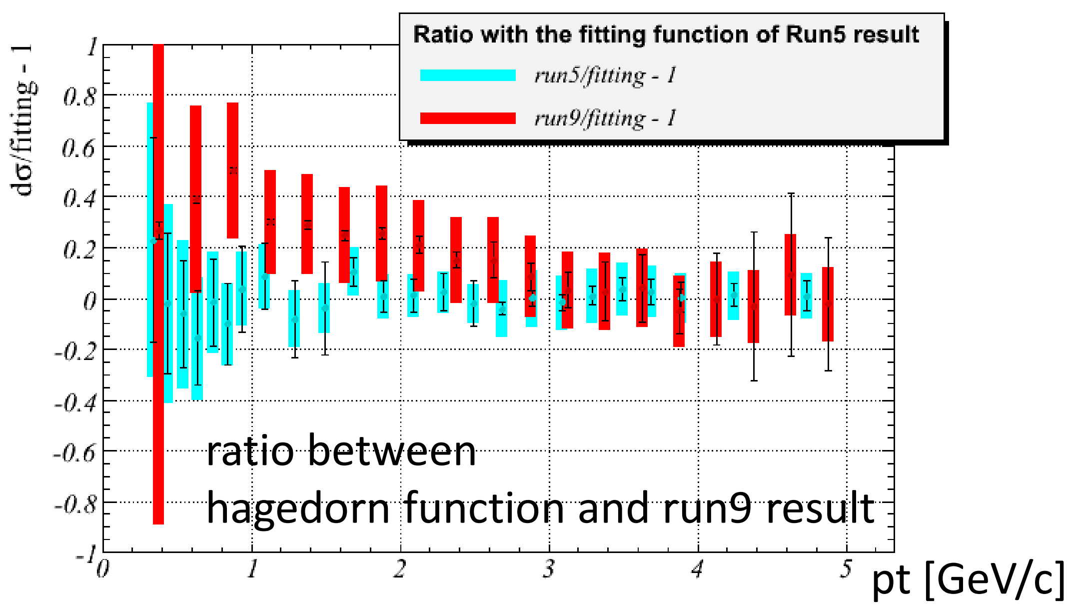


- looks good

Comparison with run5 result







backup slides