Pi+ and Pi- Ratio using SHMS Delta Distribution with Simulation and Fit Function

Cuts used to select pions

Pi+ : 0.8<pbeta<1.3 && -10<Pdelta<20 && HcernpeSum>1.5 && PaeronpeSum>1.5
-8<Hdelta<8 && -1<ctime<1 (ns) && **PhgcernpeSum>1.5**

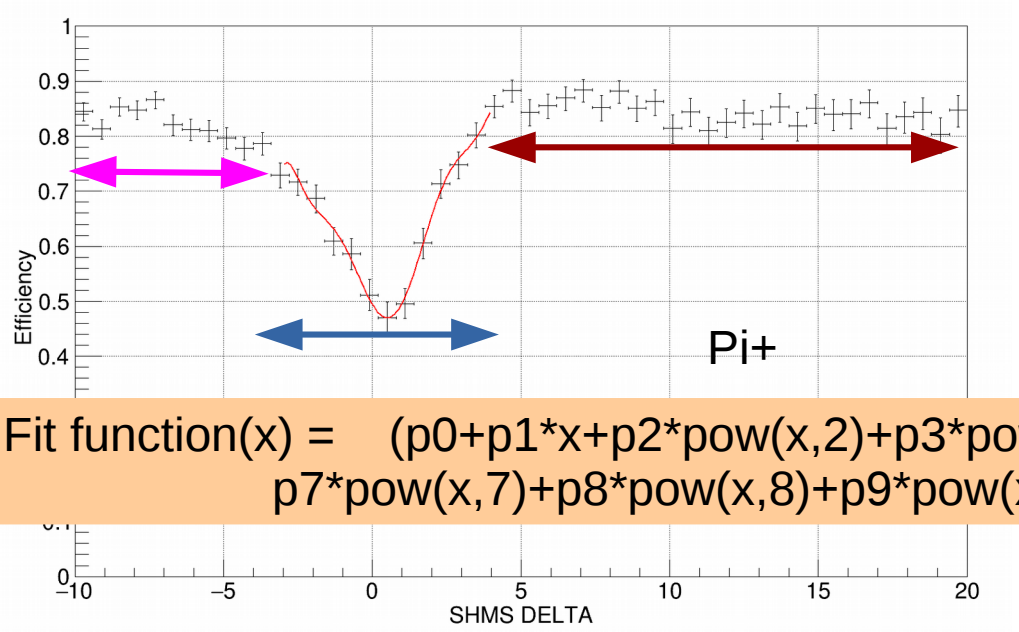
Pi- : 0.1<cal<0.4

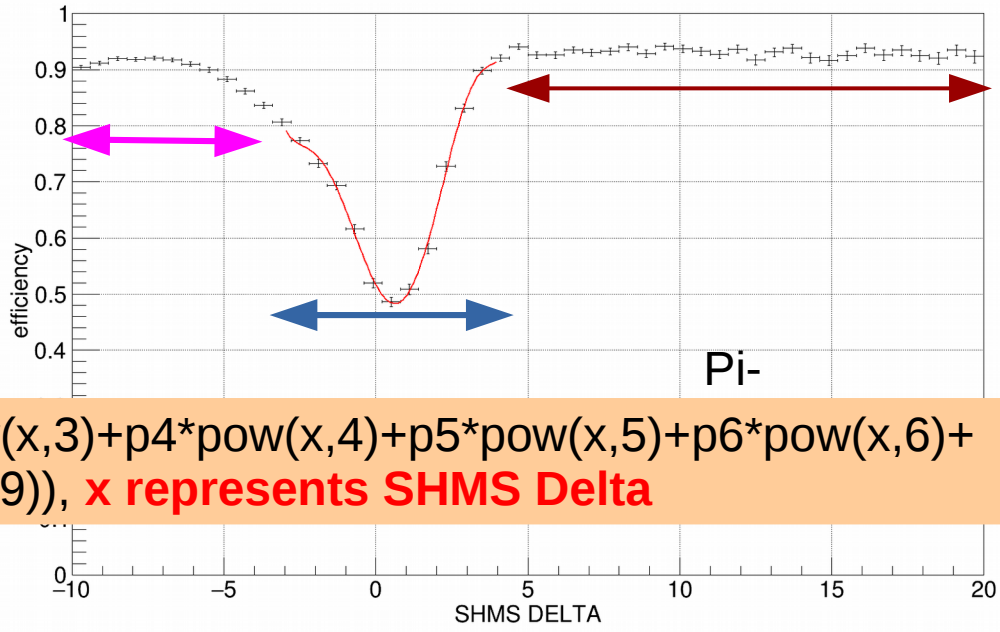
Pi+ : SIDIS Runs 5415, 5417
Pi- : 5648, 5649, 5650

Delta = -10 to -3 : value of fit function at delta = -3

Delta = -3 to 4 : fit function

Delta = 4 to 20 : value of fit function at delta =4





Fit function(x) = (p0+p1*x+p2*pow(x,2)+p3*pow(x,3)+p4*pow(x,4)+p5*pow(x,5)+p6*pow(x,6)+ p7*pow(x,7)+p8*pow(x,8)+p9*pow(x,9)), **x represents SHMS Delta**

Efficiency of HGCER vs SHMS Delta for pi+ and Pi-

fit_function(x) = (p0+p1*x+p2*pow(x,2)+p3*pow(x,3)+p4*pow(x,4)+p5*pow(x,5)+p6*pow(x,6)+ p7*pow(x,7)+p8*pow(x,8)+p9*pow(x,9)), **x represents SHMS Delta**

For Delta < -3, efficiency = value of fit_function at x = -3
For -3<= Delta<=+4, efficiency follows the above fit_function(x)
For Delta>4, efficiency = value of fit function at x = +4

```
p0 = 0.389416;
p1 = -0.0742664;
p2 = 0.0502268;
p3 = 0.0180402;
p4 = -0.00369192;
p5 = -0.00112815;
p6 = 0.000126551;
p7 = 2.94348e-06;
p8 = 5.54197e-07;
p9 = 5.54197e-07;
```

Pi+

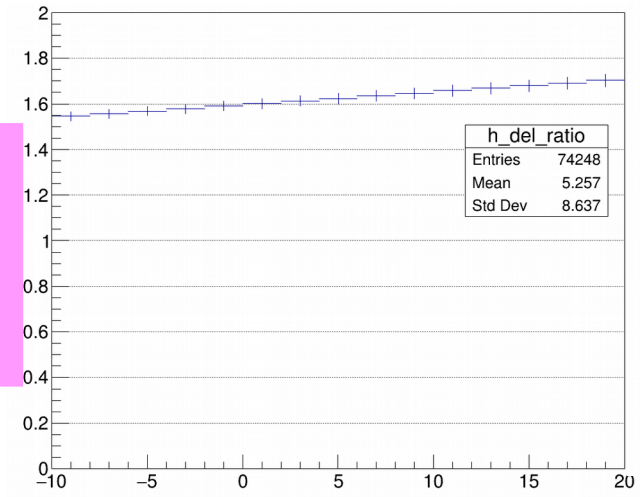
```
p0 = 0.516182;
p1 = -0.0998785;
p2 = 0.0625241;
p3 = 0.0246541;
p4 = -0.00481545;
p5 = -0.00145762;
p6 = 0.00017802;
p7 = 1.94929e-06;
p8 = 5.63655e-07;
p9 = 5.63655e-07;
```

Pi-

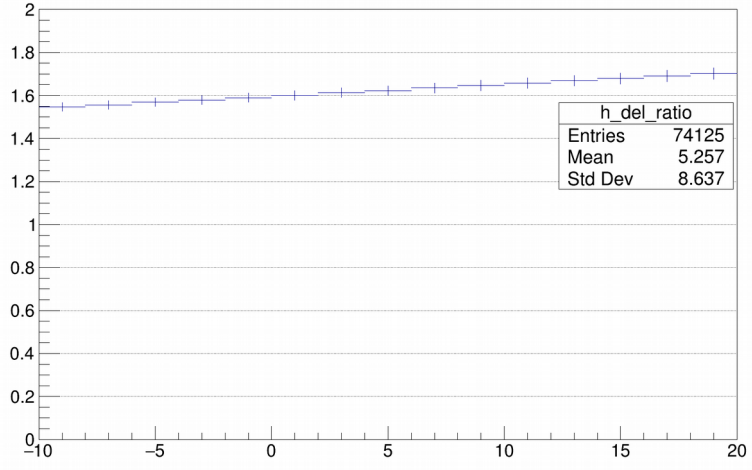
Simc entries = 500K
Wt = **weight from simc leaf*** **(normfac/500K)***efficiency

→ **(1)**

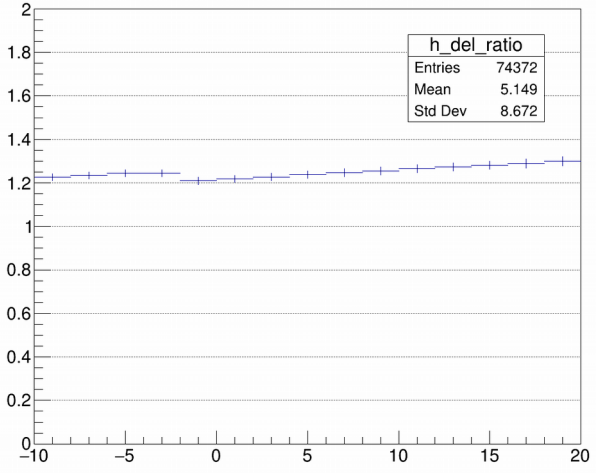
Pi+/Pi-



Using wt from equation (1) with efficiency = 1



Using Wt as in equation (1) And Taking the Fit Parameters from Pi- Runs so that the ratio is same as in fig (1)



Using proper Fit Parameters for Pi+ and Pi- so that we see a significant change in the ratio