Pion-LT Meeting

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HEEP Study

Beam Energy (GeV)	Setting (HeePCoin - 9)	Run Numbers
5.986	HMS_p = -3.271, HMS_theta = 29.170, SHMS_p = 3.493, SHMS_theta = 27.495	13058, 13059, 13061, 13062, 13128
6.395 (s1)	HMS_p = -4.752, HMS_theta = 18.595, SHMS_p = 2.412, SHMS_theta = 37.970	16277 – 16279
6.395 (s2)	HMS_p = -4.391, HMS_theta = 21.095, SHMS_p = 2.792, SHMS_theta = 34.470	16280 – 16282
6.395 (s3)	HMS_p = -3.014, HMS_theta = 33.350, SHMS_p = 4.220, SHMS_theta = 23.115	16512 - 16517
7.937	HMS_p = -3.280, HMS_theta = 33.645, SHMS_p = 5.512, SHMS_theta = 19.265	14589 - 14600
8.479	HMS_p = -5.587, HMS_theta = 19.560, SHMS_p = 3.731, SHMS_theta = 30.020	16162 – 16165
9.177	HMS_p = -3.738, HMS_theta = 31.645, SHMS_p = 6.265, SHMS_theta = 18.125	11867 - 11879
9.876	HMS_p = -5.366, HMS_theta = 23.050, SHMS_p = 5.422, SHMS_theta = 23.050	13164 - 13169
10.549	HMS_p = -5.878, HMS_theta = 21.670, SHMS_p = 5.539, SHMS_theta = 23.110	14986 - 14993

HEEP Study

- Cuts for HeeP data.

HMS Cuts (Electrons)
-8 < H_gtr_dp < 8
-0.08 < H_gtr_th < 0.08
-0.045 < H_gtr_ph < 0.045
HMS_Cal_etottracknorm > 0.7
H_Cer_npeSum > 1.5
H_hod_goodstarttime == 1.0

SHMS Cuts (Protons)
-10 < P_gtr_dp < 20
-0.06 < P_gtr_th < 0.06
-0.04 < P_gtr_ph < 0.04
Ctime_epCoinTime_ROC1 – Prompt Peak
P_hod_goodstarttime == 1.0

- Cuts for HeeP SIMC.

HMS Cuts (Electrons)
-8 < hsdelta< 8
-0.08 < hsxpfp< 0.08
-0.045 < hsypfp< 0.045

SHMS Cuts (Protons)
-10 < ssdelta< 20
-0.06 < ssxpfp< 0.06
-0.04 < ssypfp< 0.04

HEEP Study

- **Finalized Global In-Plane Offset:**

Global In-Plane Offsets – Momentum and Energy offsets in 0.1% unit, Angle offset in mrad unit			
BE	dBE	Global Offsets for 5.9 GeV to 9.9 GeV	
5984.8	-0.0500	HMS_dtheta	1.5000
6394.7	-0.1500	HMS_dp	0.0000
7937.6	-0.2222	SHMS_dtheta	1.4000
8478.6	-0.1333	SHMS_dp	4.5000
9171.3	-0.0444	Offsets for 10.5 GeV	
9876.9	-0.2222	HMS_dtheta	1.5000
		HMS_dp	-3.2000
10546.8	-1.0000	SHMS_dtheta	1.4000
		SHMS_dp	4.5000

- Implemented Out-of-plane offsets (**HMS = +0.001875rad and SHMS = -0.000155rad**)

HEEP Study

Beam Energy (GeV)	Year	Run Numbers	Data/SIMC Ratio (with MMP Cut < 0.1)
5.986	2021	13058 – 13062, 13128	0.953 +/- 0.005
6.395 (s1)	2022	16277 – 16279	0.940 +/- 0.004
6.395 (s2)	2022	16280 – 16282	0.811 +/- 0.004 (Double Checking this one)
6.395 (s3)	2022	16512 - 16517	1.020 +/- 0.007 (No Dummy)
7.937	2021	14589 - 14600	0.964 +/- 0.008
8.479	2022	16162 – 16165	0.951 +/- 0.006
9.177	2021	11867 - 11879	0.996 +/- 0.013
9.876	2021	13164 - 13169	0.972 +/- 0.012
10.549	2022	14986 - 14993	0.991 +/- 0.009

HEEP Study

- Made HeePCoin comparison plots and calculated Data/SIMC Ratio.
- Calculated errors in ratios properly.
- SIMC and Data are normalized.

$$Effective\ charge = Charge \times Tracking\ Eff \times Detector\ Eff \times Hodo\frac{3}{4}Eff \times EDTM\ Live\ Time \times Boiling\ Corr$$

- In data normalization, Following quantities are included:
  - **Charge (run-by-run)**
  - **Tracking Efficiencies (HMS and SHMS run-by-run)**
  - **Detector Efficiencies (HMS Cer and HMS Cal run-by-run)**
  - **Hodo ¾ Efficiencies (HMS and SHMS run-by-run)**
  - **EDTM Live Time (run-by-run)**
  - **Dummy Target Thickness Correction Applied – (3.527 +/- 0.227 - PionLT)**
  - **Nathan's Boiling Correction Applied (-0.00028)**
  - **Proton Absorption Correction not included**

In progress:

- Started working on physics setting "Q2=3.85, W=2.62, -tmin=0.21 – (2 epsilons)"