

BigBite Analysis

5.89 GeV Pion/Electron Pre-Shower and E/p, Cut Stability, Charge and Raw Asym.

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Outline

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Pion Contamination by x-Bin

- Plot the pre-shower energy for pion and electron selections
- Take ratio of pion/electron that have pre-shower energy larger than 200 MeV
- **Pion** Selection:
 - $E/p < 0.7$
 - $0.5 * BB.ts.ps.e < 150$
 - $BB.s.maxADCHit < 450$
 - $Ndata.DBB.BBcerT == 0$
- **Electron** Selection:
 - $|E/p - 0.985| < 0.182$
 - $0.5 * BB.ts.ps.e > 200$
 - $BB.s.maxADCHit > 500$
 - $CerCuts$

5.89 Gev x-Bin Pre-Shower PID

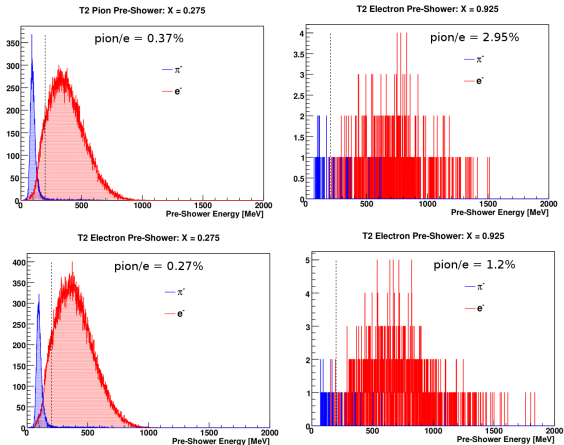


Figure: Top are two x bins from the run set 1530-1552. While the bottom are two x bins from the run set 1702-1719. The blue histogram shows the pions, while the red histogram shows the electrons in the pre-shower. The dashed line shows the 200 MeV location. The percentage shown is the ratio of the blue to the red events that are larger than 200 MeV.

5.89 Gev x-Bin E/p PID

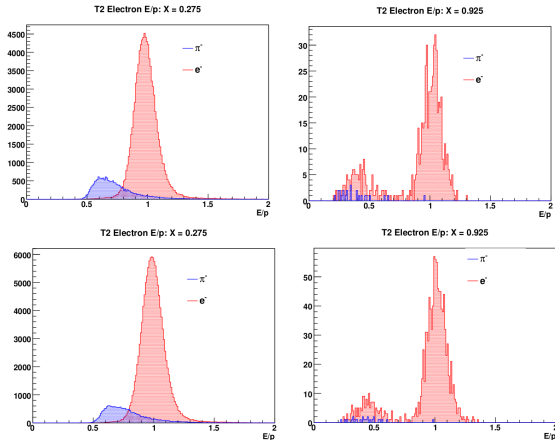


Figure: Top are two x bins from the run set 1530-1552. While the bottom are two x bins from the run set 1702-1719. The blue histogram shows the pions, while the red histogram shows the electrons in the pre-shower.

5.89 GeV Charge by Run

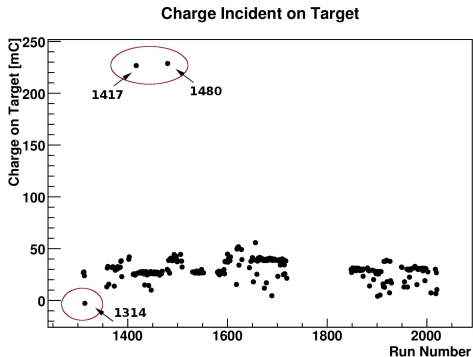


Figure: Incident charge on target for 5.89 GeV data set. There are a few odd charges.

Total 5.89 GeV Charge Accumulations

Target Spin	4.74 GeV Total Charge (C)	5.89 GeV Total Charge (C)
0°	0.690	1.086
90°	0.804	4.177
270°	1.879	3.847

Table: List of total charge incident on target. Left out bad charge runs.

S = 0° Cut Stability: Basic Cuts

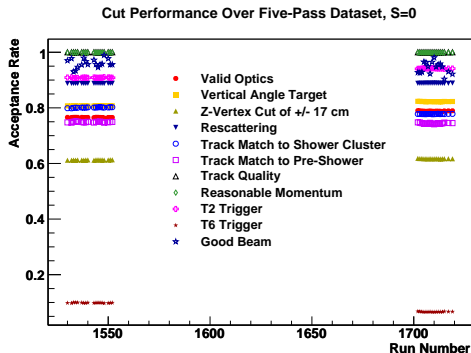


Figure: Shows basic cuts for the target spin of 0° for runs 1530-1552 and 1702-1719.

S = 0° Cut Stability: Basic Cuts

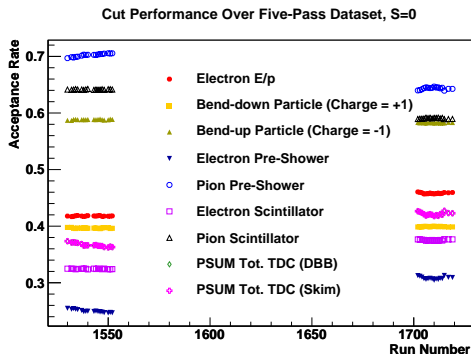


Figure: Shows PID cuts for the target spin of 0° for runs 1530-1552 and 1702-1719.

S = 0° Cut Stability: Basic Cuts

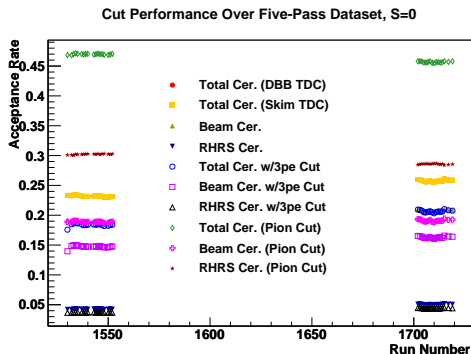


Figure: Shows PID cuts for the target spin of 0° for runs 1530-1552 and 1702-1719.

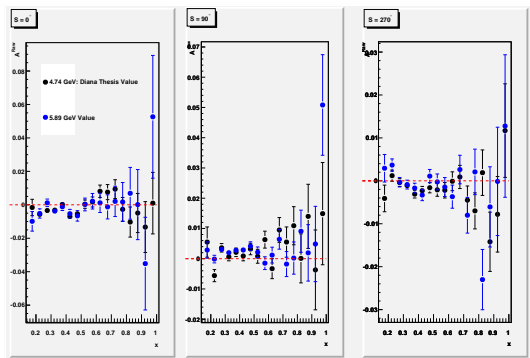
Raw 5.89 GeV ^3He Asymmetries

Figure: Shows raw ^3He asymmetries at beam energies of 4.74 and 5.89 GeV. The Black points are values from Diana's thesis at a beam energy of 4.74 GeV. The blue points are asymmetries at a beam energy of 5.89 GeV.

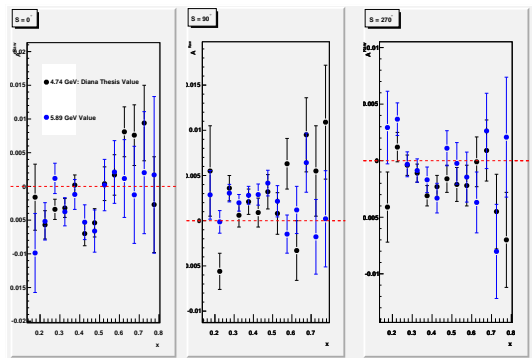
Raw 5.89 GeV ^3He Asymmetries (Zoom)

Figure: Shows raw ^3He asymmetries at beam energies of 4.74 and 5.89 GeV. The Black points are values from Diana's thesis at a beam energy of 4.74 GeV. The blue points are asymmetries at a beam energy of 5.89 GeV.

S = 0° Error Comparison

x	4.74 GeV Error	5.89 GeV Error	Difference (%)
0.175	0.0049	0.0059	20.41
0.225	0.0021	0.0028	33.33
0.275	0.0015	0.0023	53.33
0.325	0.0014	0.0021	50.00
0.375	0.0015	0.0022	46.67
0.425	0.0018	0.0026	44.44
0.475	0.0021	0.0031	47.62
0.525	0.0025	0.0038	52.00
0.575	0.0030	0.0047	56.67
0.625	0.0037	0.0058	56.76
0.675	0.0045	0.0072	60.00
0.725	0.0056	0.0091	62.50
0.775	0.0071	0.0116	63.38
0.825	0.0090	0.0155	72.22
0.875	0.0117	0.0210	79.49
0.925	0.0152	0.0277	82.24
0.975	0.0184	0.0367	99.46

Table: Comparison of S = 0° raw asymmetry errors for 4.74 and 5.89 GeV data sets.

S = 90° Error Comparison

x	4.74 GeV Error	5.89 GeV Error	Difference (%)
0.175	0.0050	0.0027	-46.00
0.225	0.0020	0.0013	-35.00
0.275	0.0014	0.0010	-28.57
0.325	0.0013	0.0009	-30.77
0.375	0.0014	0.0010	-28.57
0.425	0.0016	0.0012	-25.00
0.475	0.0019	0.0014	-26.32
0.525	0.0023	0.0017	-26.09
0.575	0.0028	0.0021	-25.00
0.625	0.0033	0.0026	-21.21
0.675	0.0041	0.0033	-19.51
0.725	0.0050	0.0041	-18.00
0.775	0.0063	0.0053	-15.87
0.825	0.0081	0.0070	-13.58
0.875	0.0106	0.0093	-12.26
0.925	0.0132	0.0125	-05.30
0.975	0.0169	0.0166	-01.78

Table: Comparison of S = 90° raw asymmetry errors for 4.74 and 5.89 GeV data sets.

S = 270° Error Comparison

x	4.74 GeV Error	5.89 GeV Error	Difference (%)
0.175	0.0031	0.0032	3.23
0.225	0.0013	0.0014	7.69
0.275	0.0009	0.0011	22.22
0.325	0.0008	0.0010	25.00
0.375	0.0009	0.0011	22.22
0.425	0.0010	0.0013	30.00
0.475	0.0012	0.0016	33.33
0.525	0.0015	0.0018	20.00
0.575	0.0018	0.0022	22.22
0.625	0.0022	0.0027	22.73
0.675	0.0027	0.0033	22.22
0.725	0.0033	0.0042	27.27
0.775	0.0042	0.0053	26.19
0.825	0.0053	0.0070	32.08
0.875	0.0069	0.0093	34.78
0.925	0.0088	0.0126	43.18
0.975	0.0109	0.0166	52.29

Table: Comparison of S = 270° raw asymmetry errors for 4.74 and 5.89 GeV data sets.

- 5.89 GeV statistics seem worse than the 4.74 GeV statistics
- Could be due to inefficiently triggering on electrons
- While more charge was collected during the 5.89 GeV data set, a lot of it was due to non electron events
- 4.74 GeV data set triggered predominantly on electron like events
- Large asymmetry fluctuations will also drive up the asymmetry error
- Need to check Cut and asymmetry stability

What's Next

- Look more into in-plane angle shift
- Finish cut stability checks
- Compute physics asymmetries
- Get 5-pass N2 runs for dilution correction
- Get EPR Polarizations