

# BigBite Analysis

MWDC 4-pass Stability, 4-pass Production Asymmetries

Matthew Posik

<sup>1</sup>Temple University  
Philadelphia, PA 19122

03/25/2011

- 1 BigBite 4-Pass MWDC Stability
  - 4-pass MWDC Track Residuals
  - 4-Pass MWDC  $t_0$
- 2 4-Pass Production Asymmetries
  - Helicity Sign Convention
  - Target Sign Convention
  - 4-pass Asymmetry Results
- 3 Summary
- 4 What's Next

# 4-Pass MWDC Track Residuals

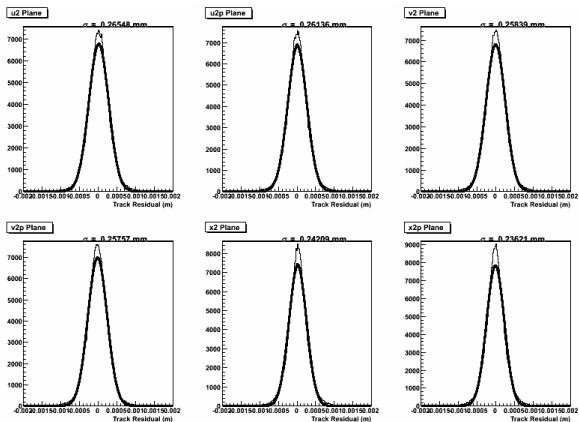


Figure: Typical track-residual for 4-pass run. Plot shows chamber 2 for run 2024.

# 4-pass MWDC Track Residual Stability: Chamber 1

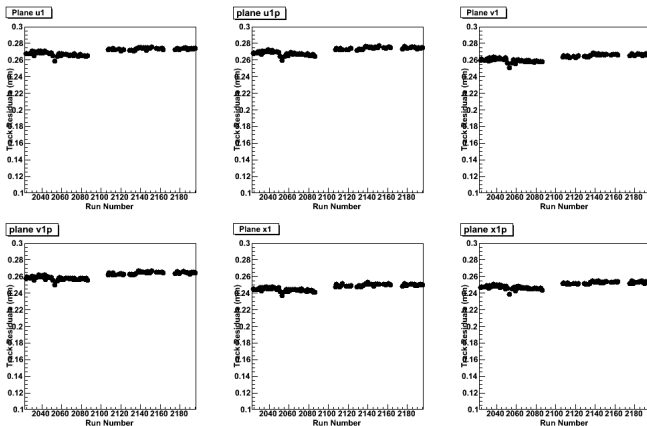


Figure: Chamber 1 track residual stability over all 4-pass  $^3\text{He}$  runs.

# 4-pass MWDC Track Residual Stability: Chamber 2

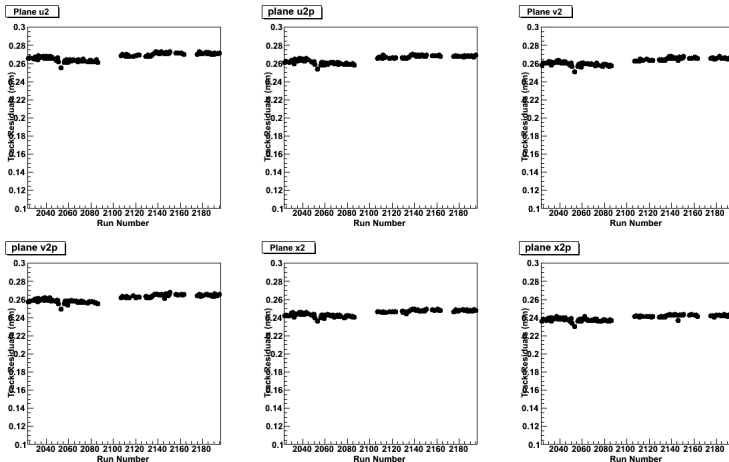


Figure: Chamber 2 track residual stability over all 4-pass  $^3\text{He}$  runs.

# 4-pass MWDC Track Residual Stability: Chamber 3

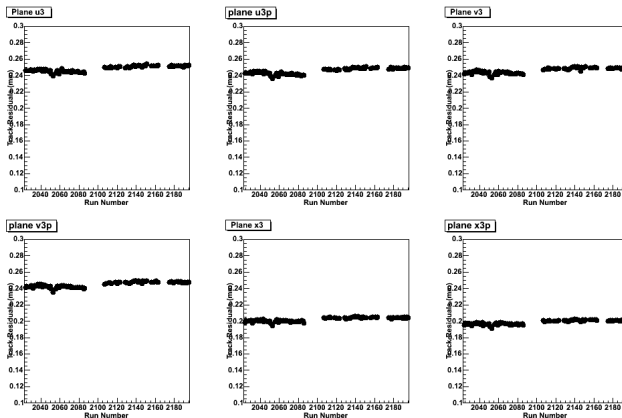


Figure: Chamber 3 track residual stability over all 4-pass  $^3\text{He}$  runs.

# 4-Pass MWDC Drift-Time

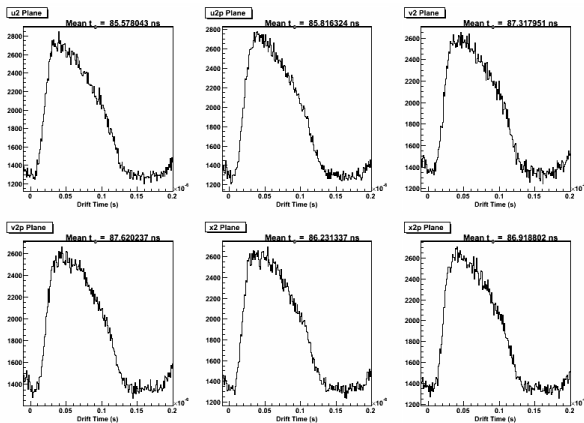


Figure: Typical Drift-time for 4-pass run. Plot shows chamber 2 for run 2024.

# 4-pass MWDC $t_0$ Stability: Chamber 1

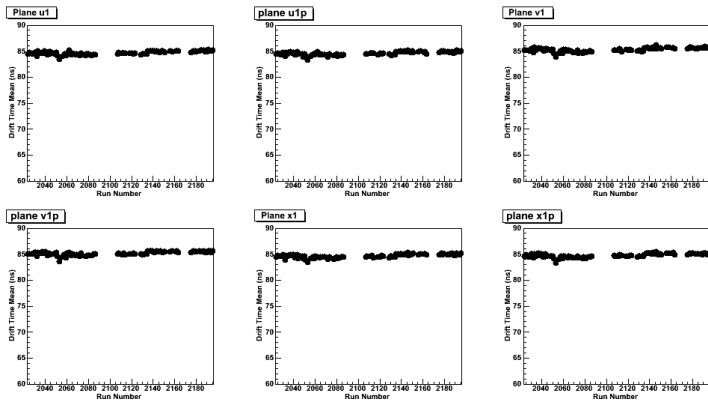


Figure: Chamber 1 drift time over all 4-pass  $^3\text{He}$  runs.



# 4-pass MWDC $t_0$ Stability: Chamber 2

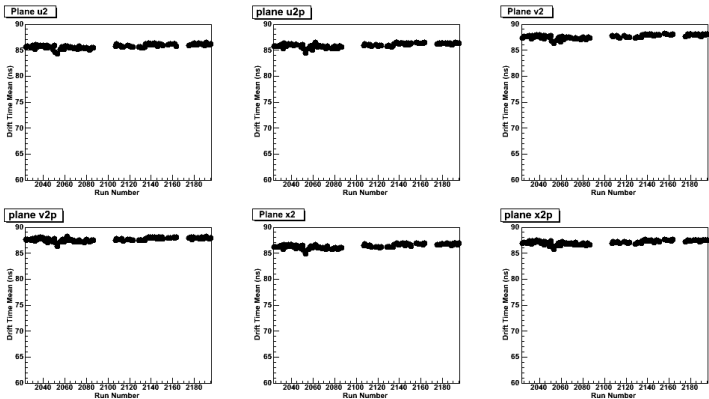


Figure: Chamber 2 drift time over all 4-pass  $^3\text{He}$  runs.

# 4-pass MWDC $t_0$ Stability: Chamber 3

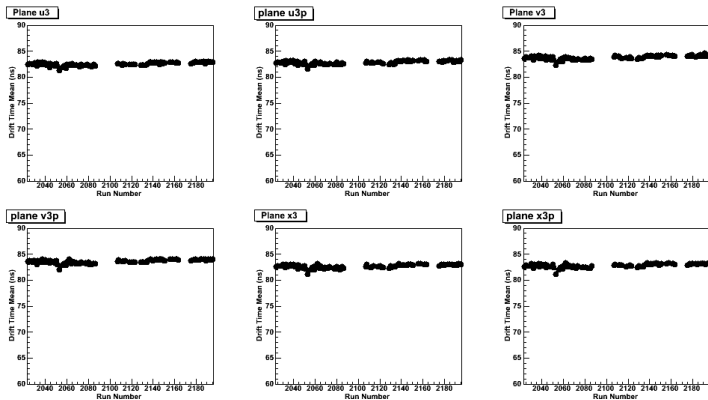


Figure: Chamber 3 drift time over all 4-pass  $^3\text{He}$  runs.

# Helicity Sign

- Asymmetry is defined as:  $A = \frac{N^- - N^+}{N^- + N^+}$  (wave-plate OUT)
- $N^-$  Negative helicity electrons
- $N^+$  Positive helicity electrons
- Asymmetry with wave-plate IN  $A = -\frac{N^- - N^+}{N^- + N^+}$
- After target S=90 running, above helicity convention flips due to unbalanced beam (affects S=270)

# Target Sign

- Target spin  $S=270$  (BB side) is defined as **positive**
- Target spin  $S=90$  (LHRS side) is defined as **negative**
- This can be seen in the NMRs...

S=90

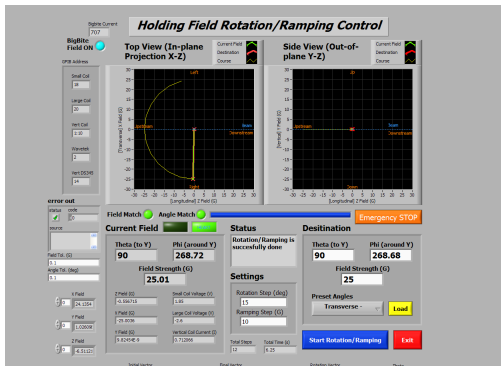


Figure: Field rotation to have holding field at 270 deg. and target spin at 90 deg.

# S=90 NMR Signal

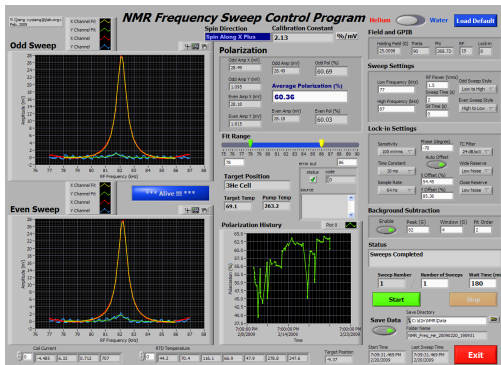


Figure: NMR signal for target spin of 90 degrees.

S=270

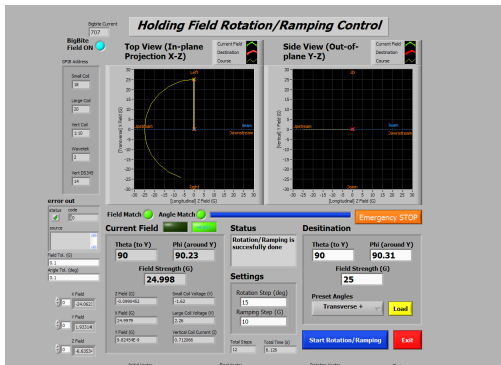


Figure: Field rotation to have holding field at 90 deg. and target spin at 270 deg.

# S=270 NMR Signal

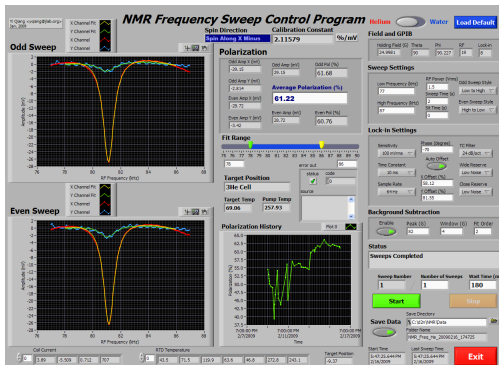


Figure: NMR signal for target spin of 270 degrees.



# Wave-Plate Dependent Raw Asymmetries

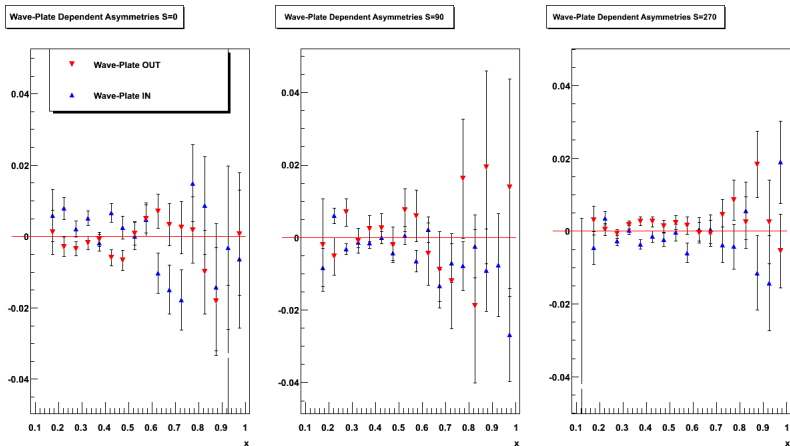


Figure: Asymmetries with wave-plate IN/OUT. Definition of wave-plate IN/OUT changed for S=270, not accounted for here. Cuts are same as those found in talk from March 10, 2011

# Raw Asymmetries

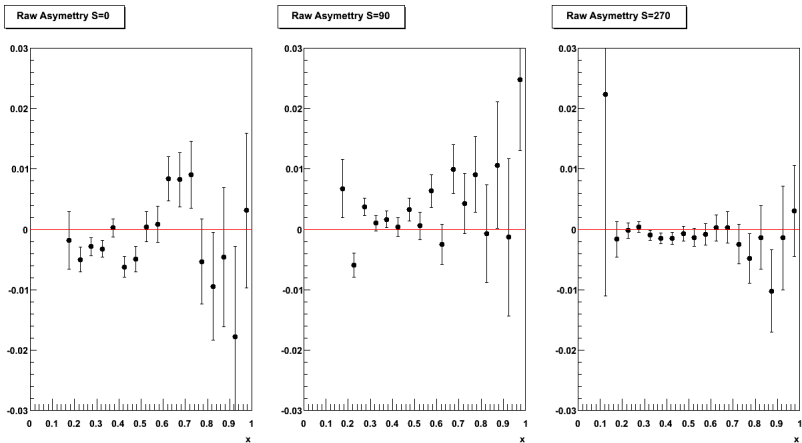


Figure: Asymmetries with wave-plate IN/OUT Combined. Definition of wave-plate IN/OUT changed for S=270 is accounted for. Cuts are same as those found in talk from March 10, 2011

# Physics Asymmetries (No N2 Dilution Corrections)

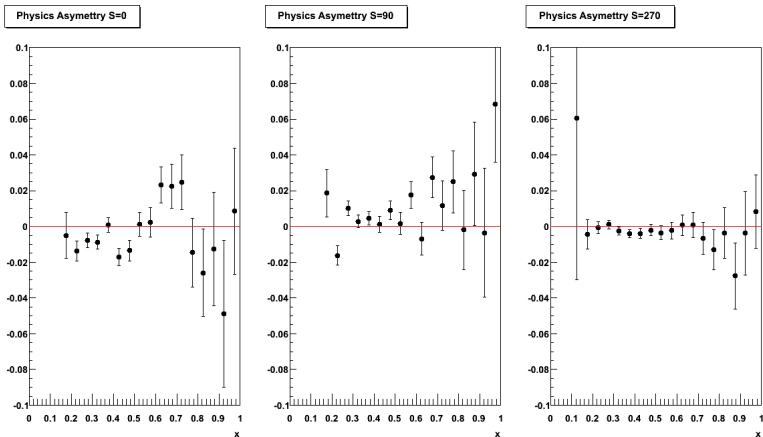


Figure: Asymmetries with wave-plate IN/OUT Combined. Definition of wave-plate IN/OUT changed for S=270 is accounted for. Cuts are same as those found in talk from March 10, 2011

# Summary

- 4-pass MWDC track residuals/drift times seem good
- 4-pass transverse asymmetry seems to be negative
- 4-pass asymmetries seem consistent with Diana's

# For Next week

- Continue working towards getting g1 and g2 on 4pass data
- Reproduce Diana's A1 and A2
  - Add N2 dilution factors
- Look at "mis-aligned" electrons in ps vs sh in x-bins
- Finish BB Čerenkov HV1 calibration