# Wave-Plate and Time Variation Asymmetries

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# Outline

# Current Asymmetries

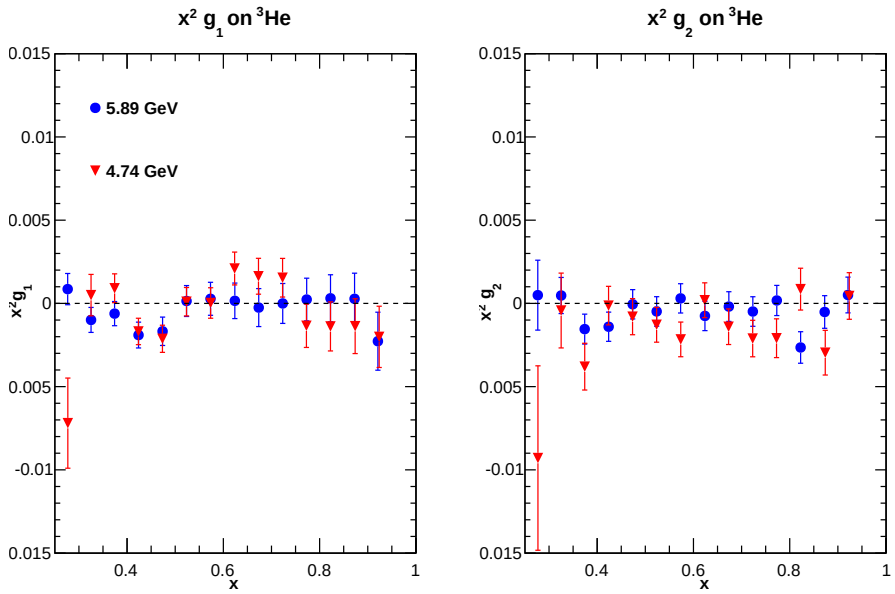
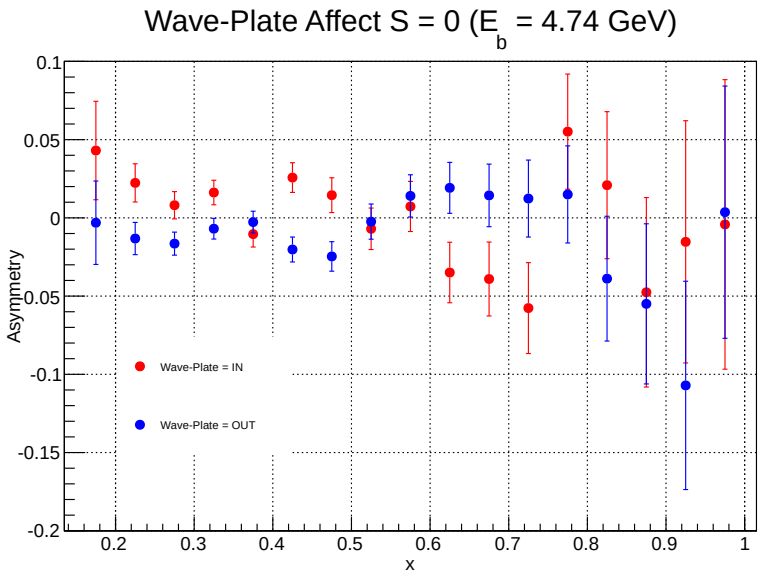



Figure: Preliminary $g_1$ and $g_2$ structure functions for 4.74 and 5.89 GeV data sets.

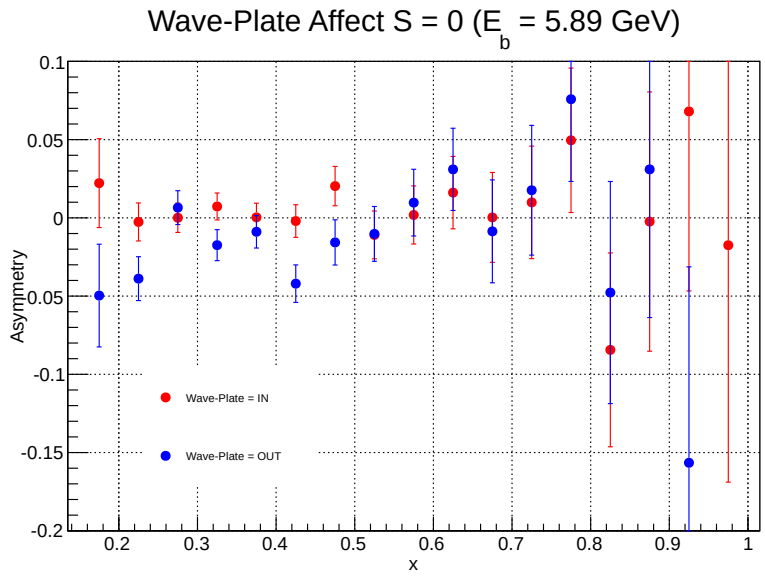
- Why the asymmetry smaller for the 5.89 GeV data set?
- Could the wave plate status be wrong in the 5.89 GeV data?

# Total Wave-Plate Asymmetries

## Target Spin = 0°




(a) E = 4.74 GeV




(b) E = 5.89 GeV

Figure: Corrected physics asymmetries (except for pair-production) for each wave plate configuration for 4.74 and 5.89 GeV data sets.

# Wave-Plate Asymmetries

## Target Spin = 0°, x = 0.275

- Compare run by run wave-plate asymmetries
- X-bin x = 0.275 shown here
- Asymmetries are small

Figure: E = 4.74 GeV

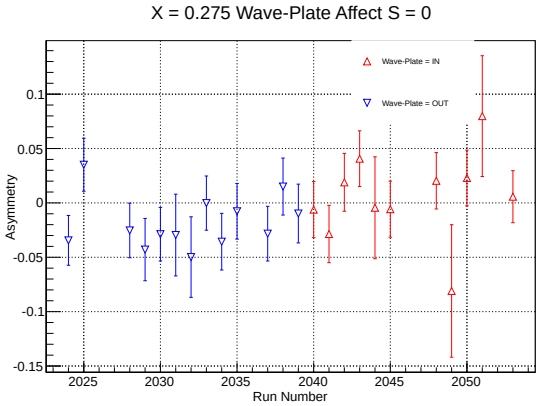



Figure: E = 5.89 GeV, Runs 1532-1552

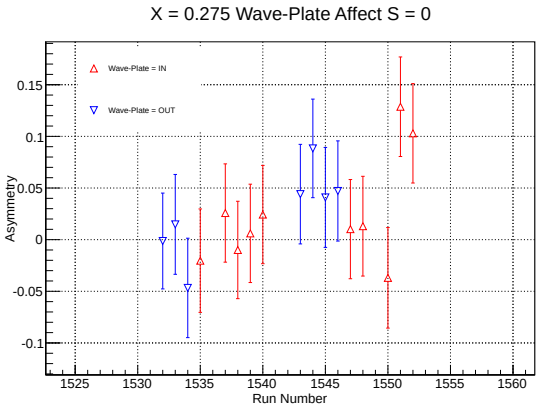
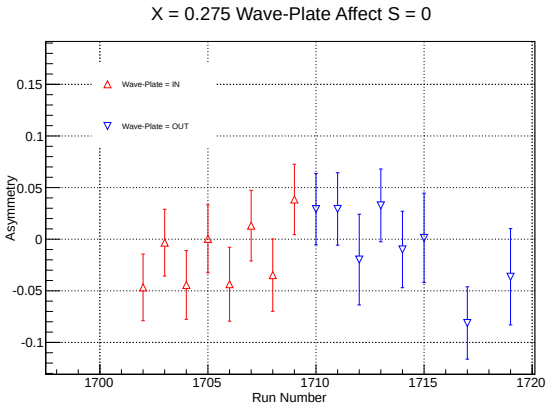



Figure: E = 5.89 GeV, Runs 1702-1719



# Compton Wave-Plate Asymmetries

## Sub Set of Runs

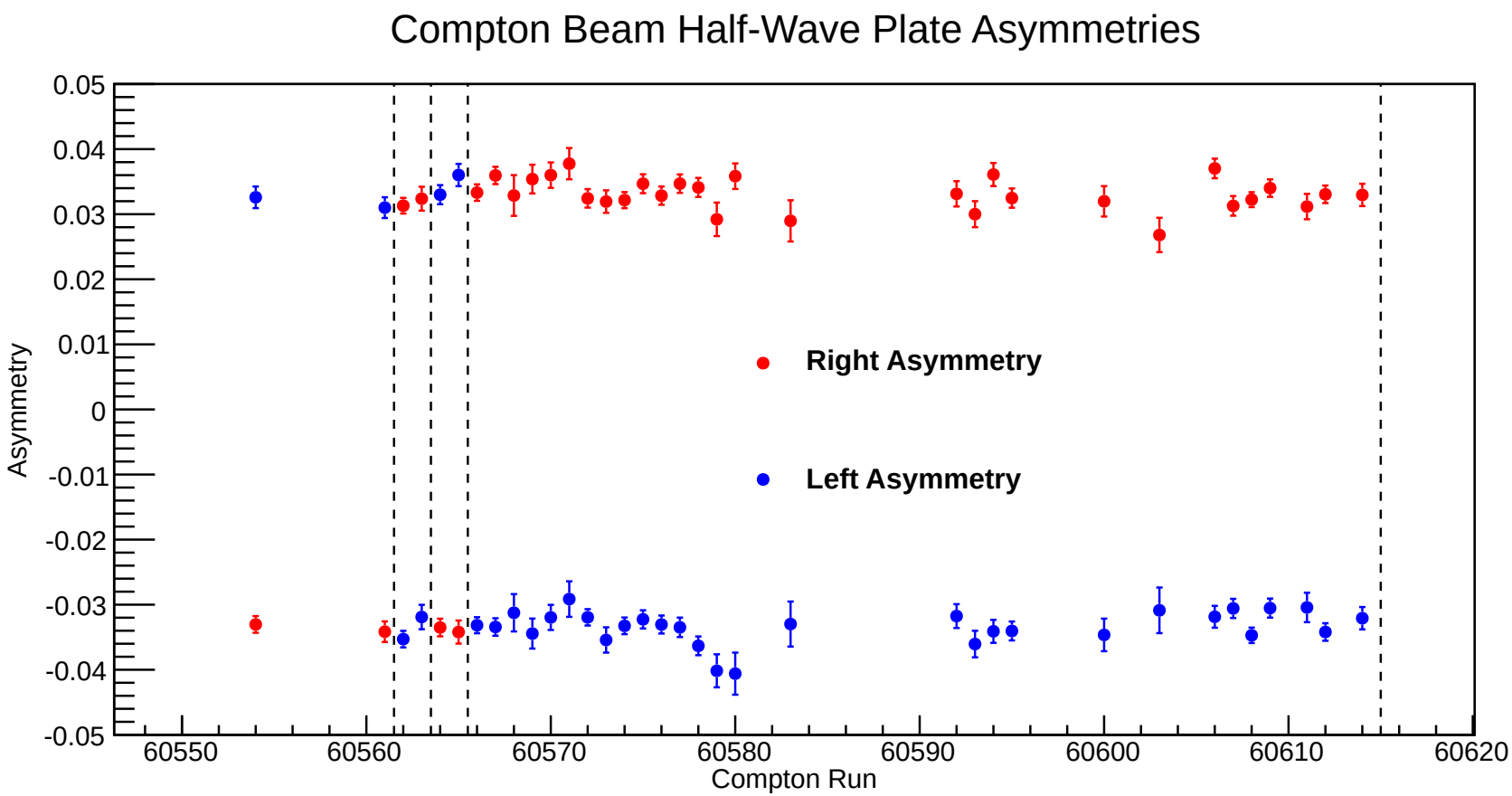



Figure: Sub set of the Compton half wave plate asymmetries. 5.89 GeV S = 0$^{\circ}$ runs approximately correspond to Compton runs 60560-60570 (BB runs 1532-1552) and 6010-6020 (BB runs 1702-1719). Dashed lines show when BigBite has wave-plate change.

# Compton Wave-Plate Asymmetries

## Full Run Set

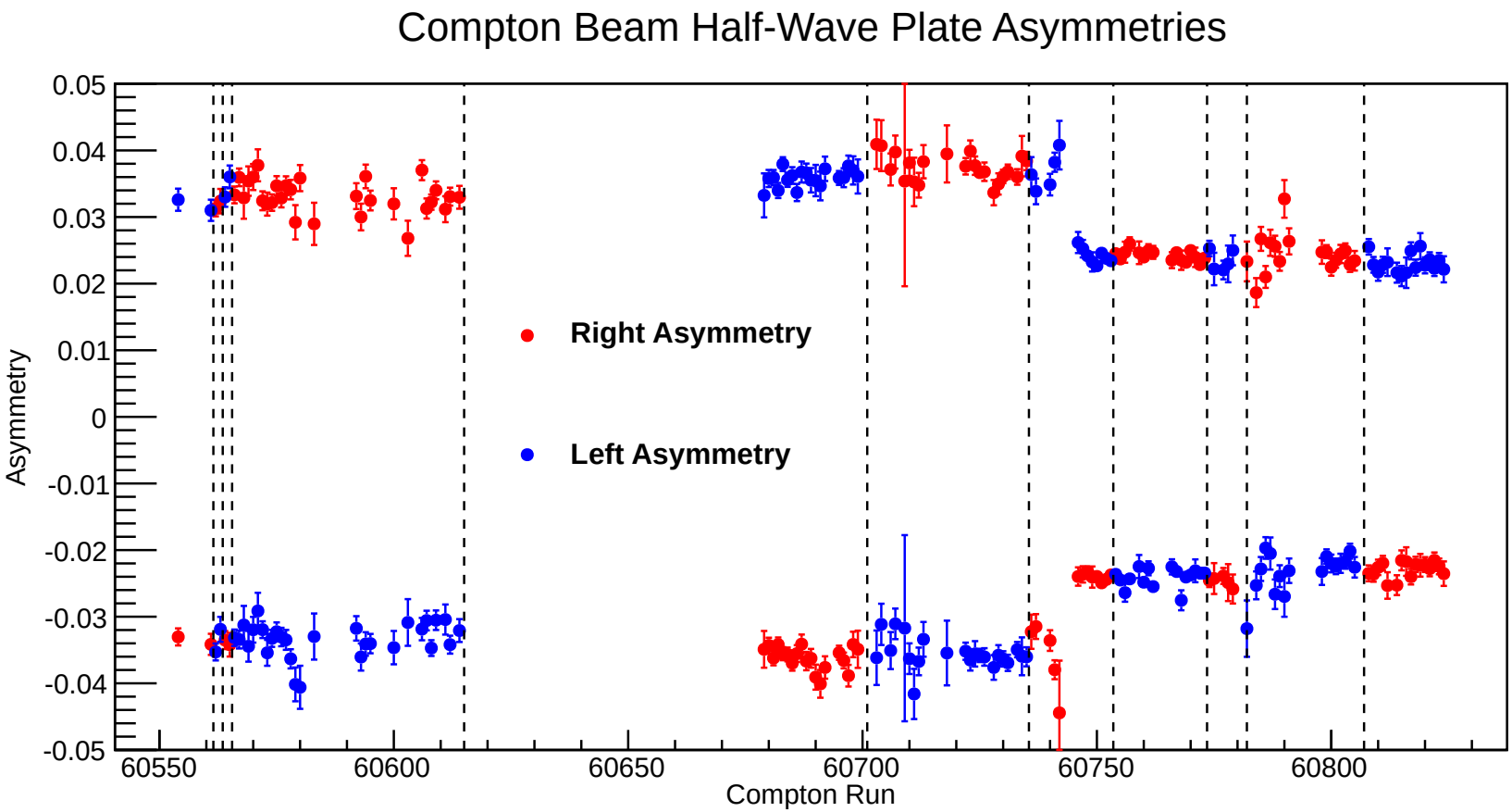



Figure: Full set of the Compton half wave plate asymmetries. Dashed lines show when BigBite has wave-plate change.

# Wave-Plate Summary

- Wave plate configuration has been thoroughly checked for all runs
- Asymmetries have the correct wave plate configuration applied
- 5.89 GeV asymmetries are not small due to wave plate configuration

# Asymmetry Varitaion With Time

- Could asymmetry be changing with time leading to a dilution?
- Track E = 5.89 GeV and Target spin = 0° as a function of time

# Electron Asymmetry

## S = 0 Time Variation

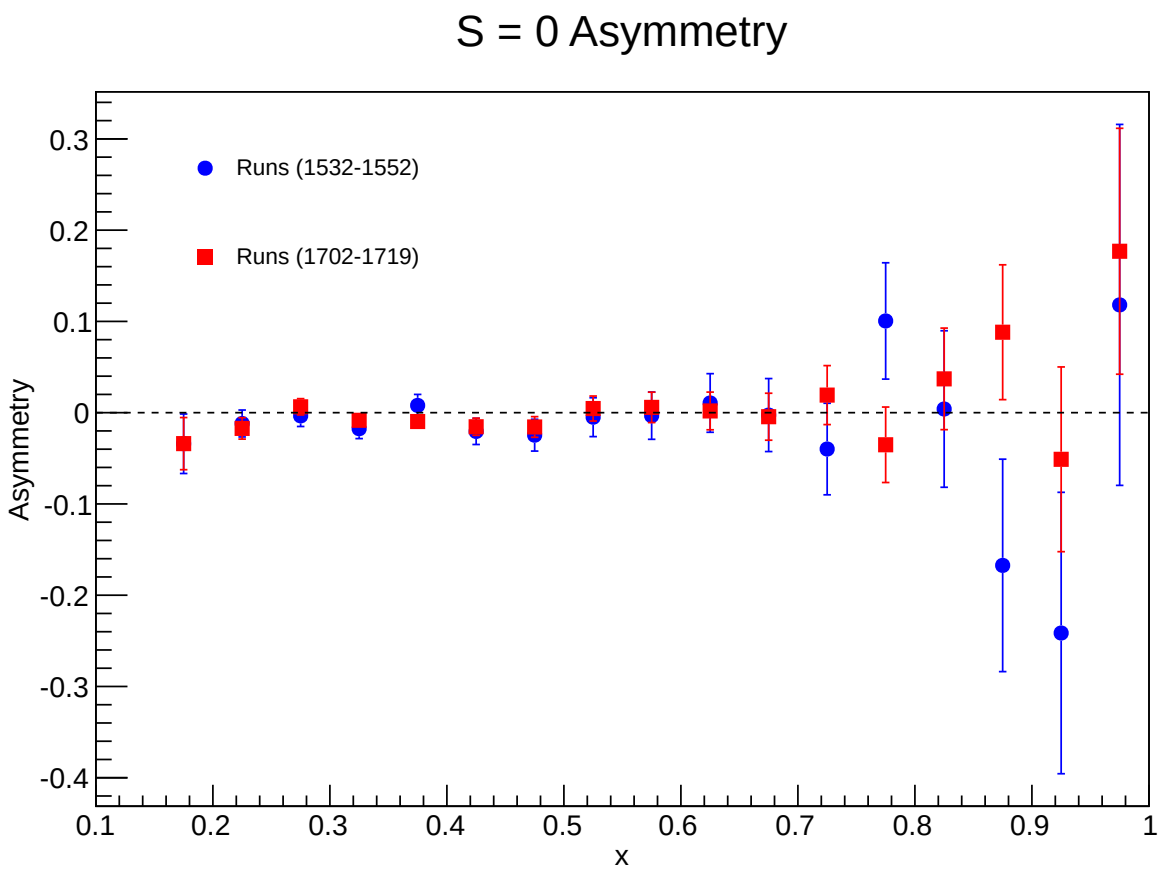



Figure: S = 0 Electron asymmetries for 5.89 GeV beam energy. Nitrogen, beam and target polarizations corrections applied.

# Electron Asymmetry: Zoomed In

## S = 0 Time Variation

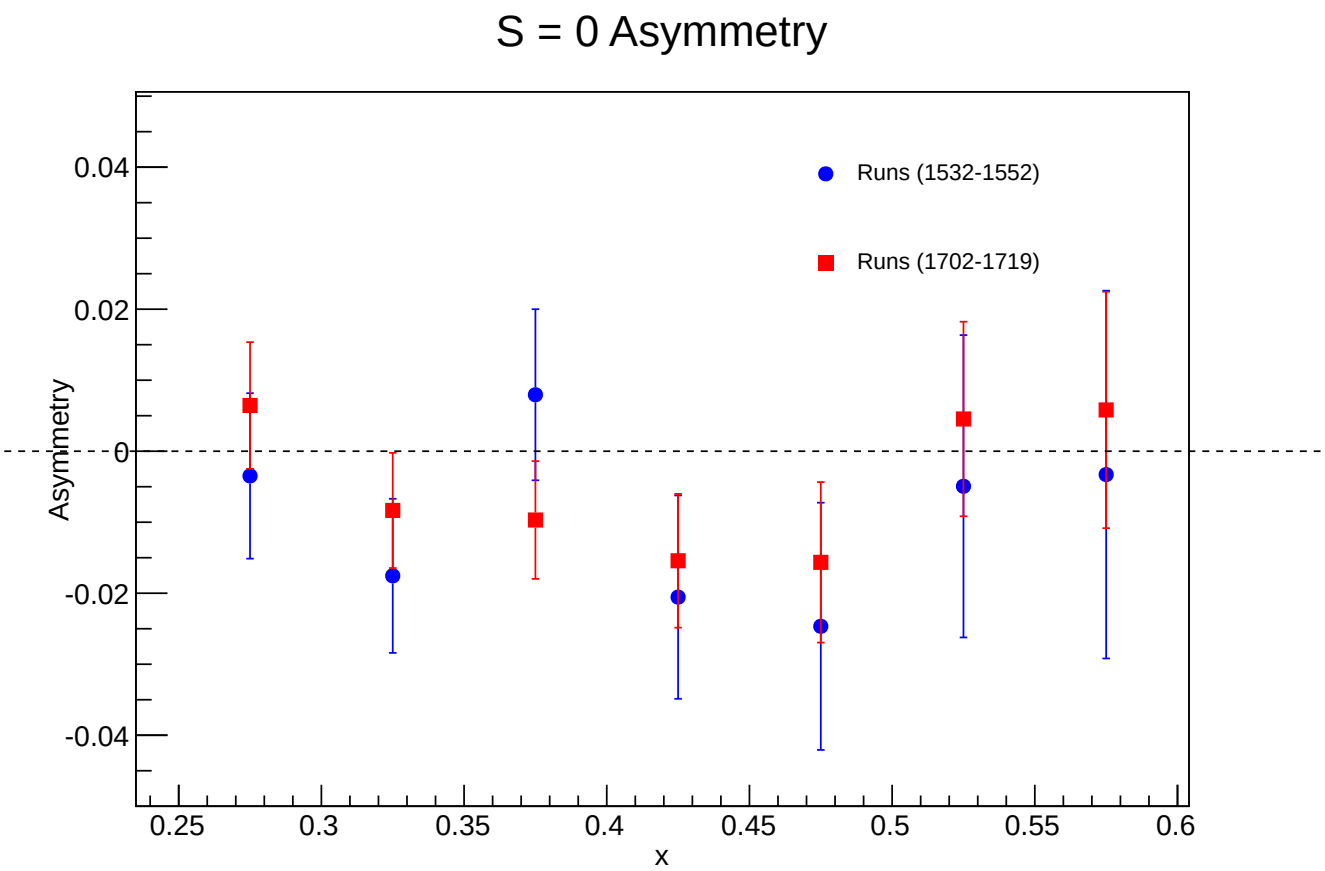



Figure: S = 0 Electron asymmetries for 5.89 GeV beam energy. Nitrogen, beam and target polarizations corrections applied.

# Electron Time Variation Asymmetry (1)

## By X-Bin

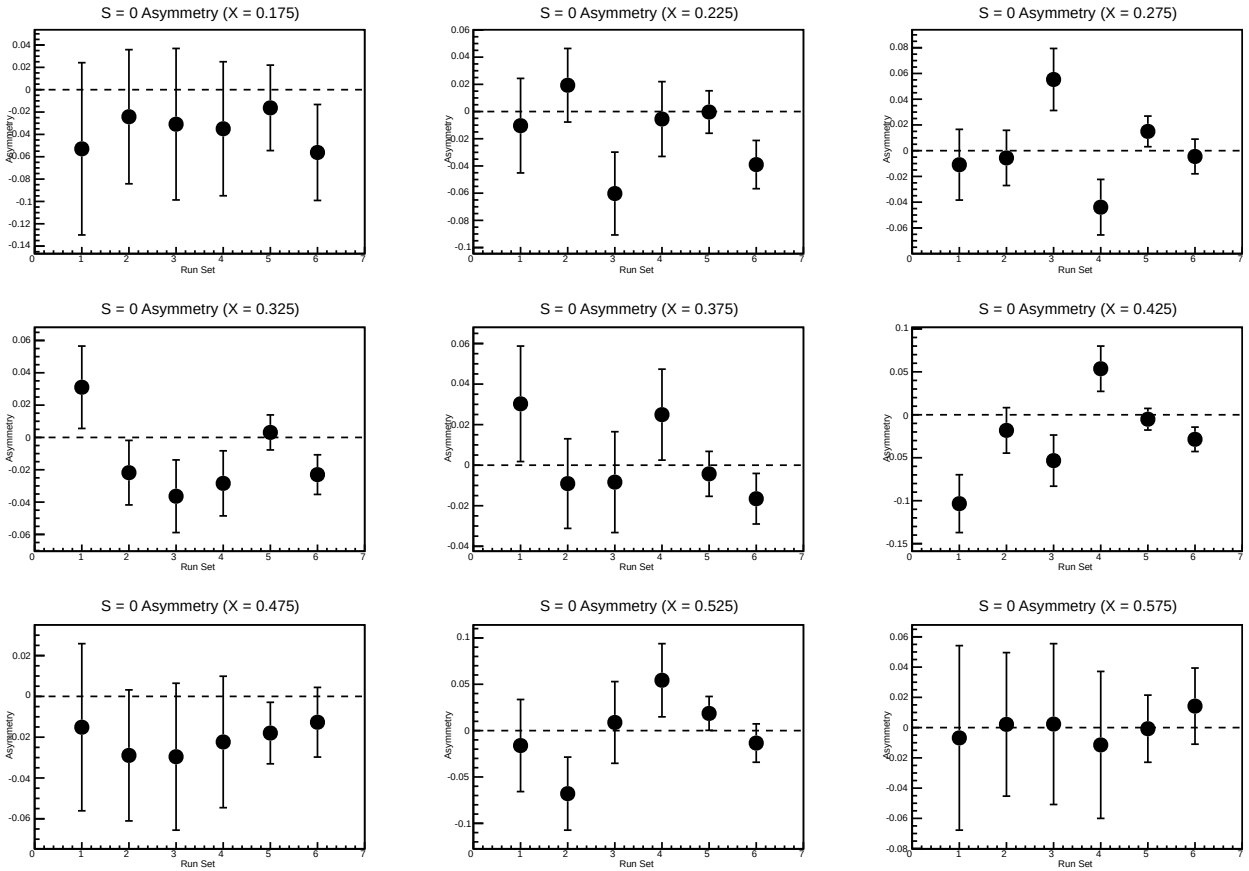



Figure: S = 0 Electron asymmetries for 5.89 GeV beam energy. Nitrogen, beam and target polarizations corrections applied. Each of the 6 asymmetries corresponds to a set of runs.

# Electron Time Variation Asymmetry (2)

## By X-Bin

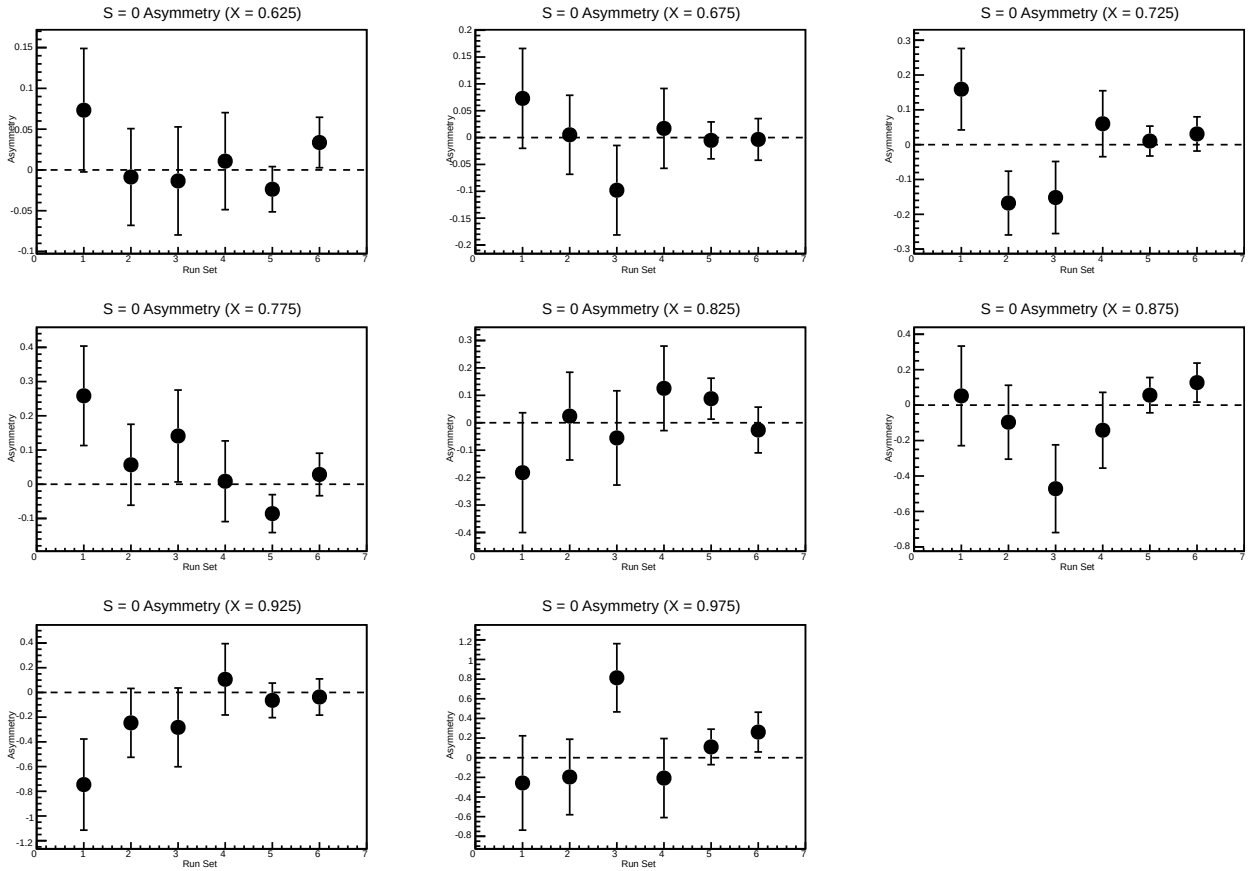



Figure: S = 0 Electron asymmetries for 5.89 GeV beam energy. Nitrogen, beam and target polarizations corrections applied. Each of the 6 asymmetries corresponds to a set of runs.

# Time Variation Summary

- There may be a variation in the asymmetry with time, but hard to tell with measured percision

# What's Next

- GEANT4
  - Look into bend-up e- to bend-down e+
  - Look at GEANT4 distributions when cutting on bad preshower block
- $d_2$
  - Use DSSV to extract neutron from $^3$He data