Status Report for E01-012

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Hall A Collaboration Meeting
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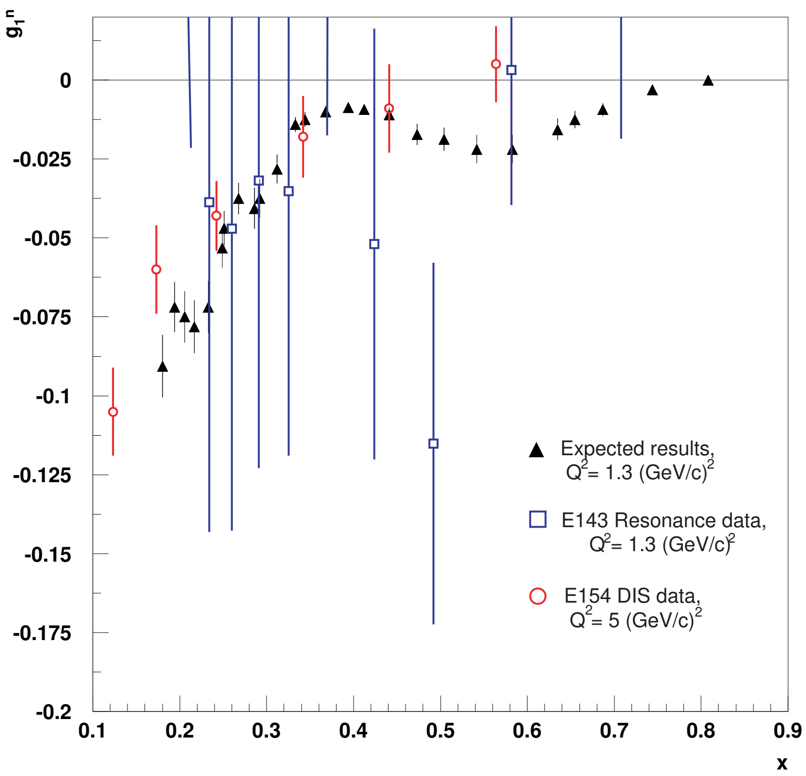
Outline:

- Physics goal
- Run situation
- Some on-line results
- Target performance
- PID detectors performance
- Summary and future

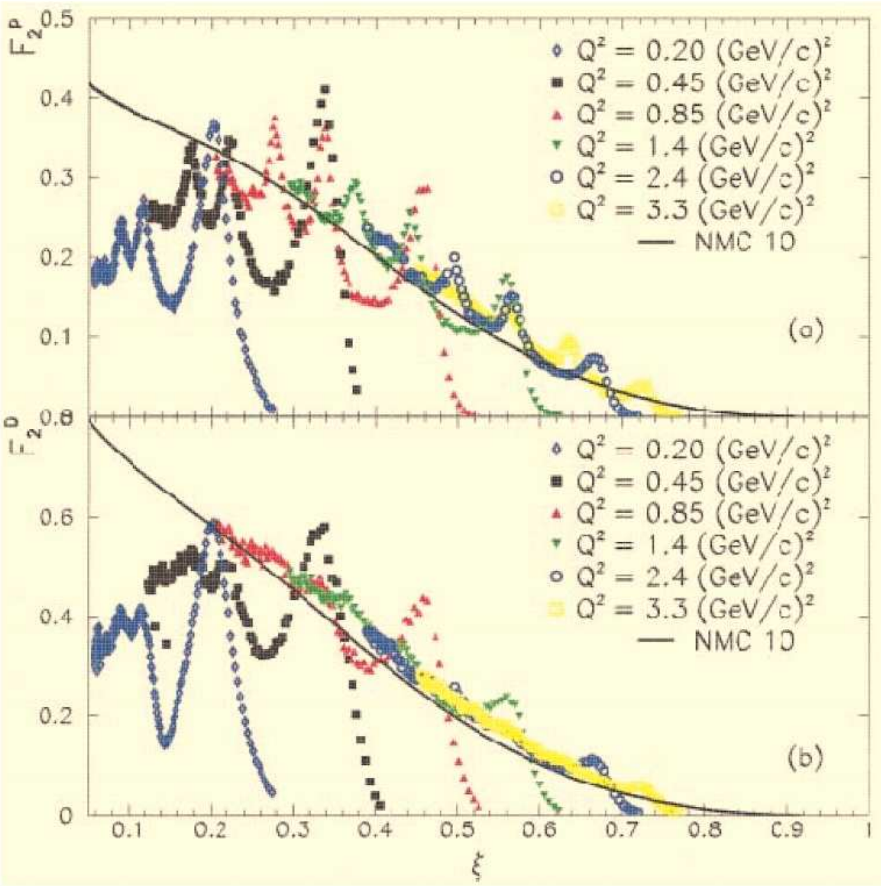
Physics goal

- E01-012 measured g_1^n and A_1^n in the resonance region up to $Q^2 = 4$ GeV^2.
- Test quark-hadron duality in spin structure functions.
- In the same x region, the integral of the structure functions in the resonance region and in DIS are equal.
- Quark-hadron duality will help us to study the higher twists.
- Powerful tool to study very high x behavior.



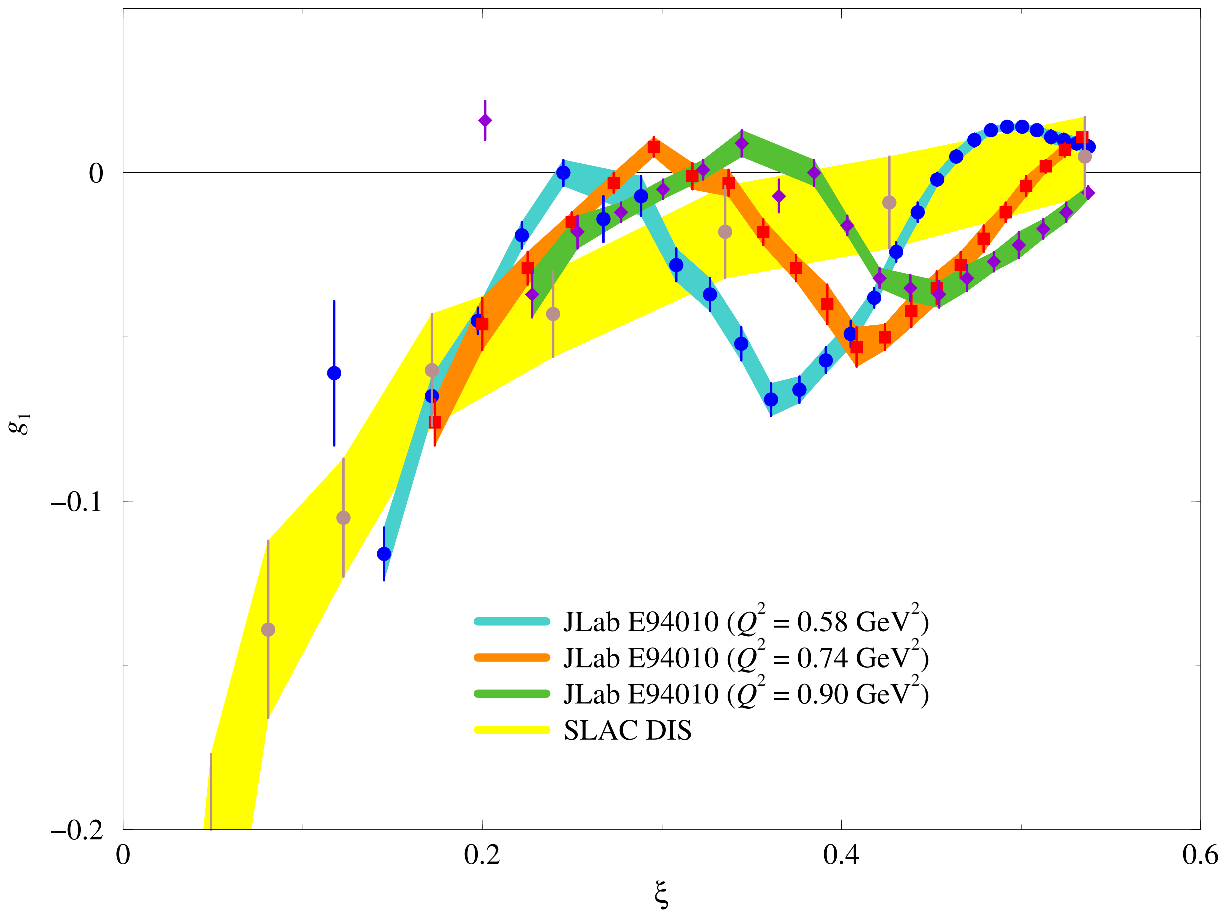
Existing data:

- Bloom-Gilman duality was first observed at SLAC in the 70's on spin independent structure functions.



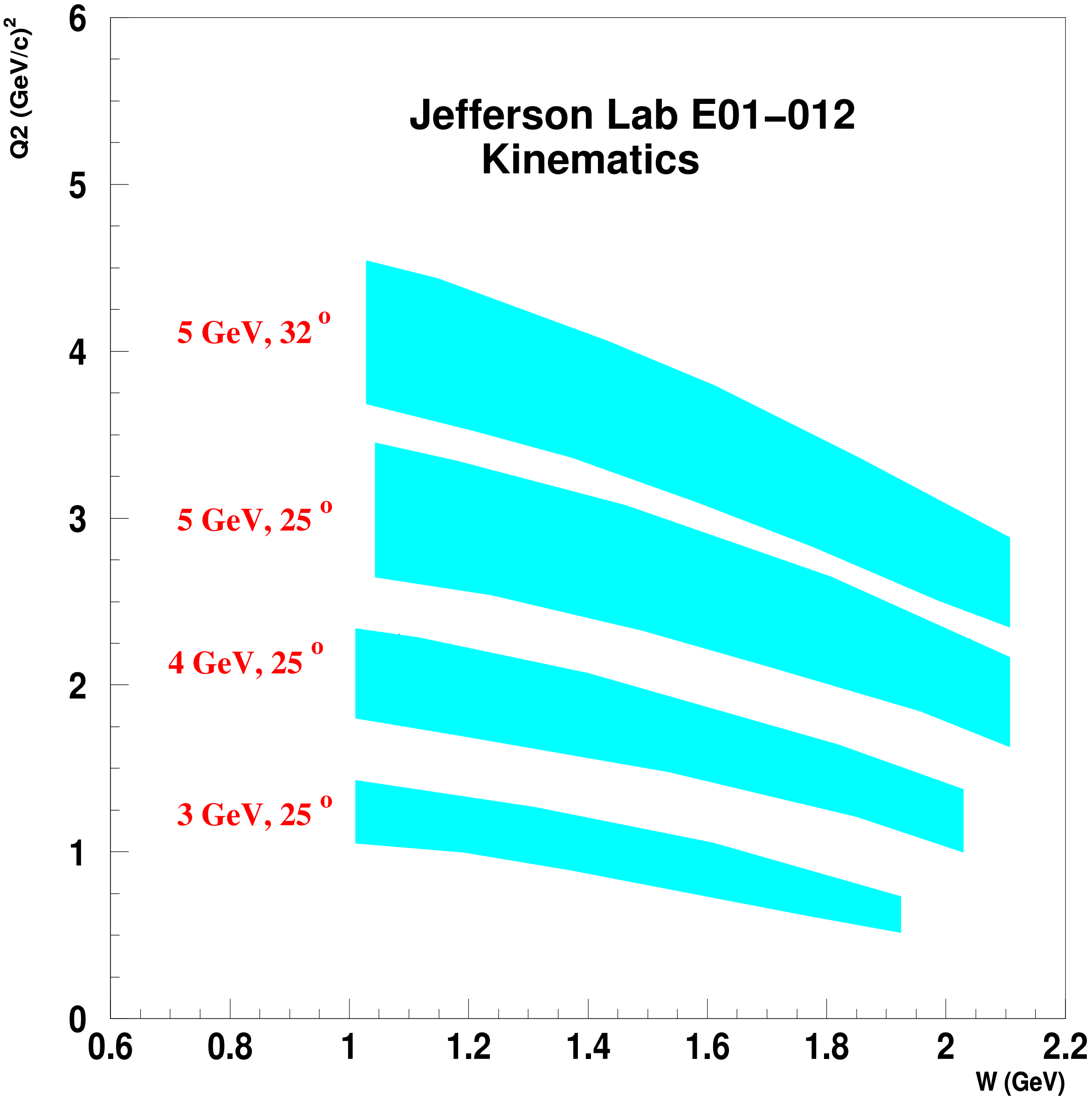
- Duality is observed when the higher twists are suppressed.

- E94-010 data approaches duality at $Q^2 < 1.0$ GeV^2:



Run situation

- Ran from January 7th to February 13th, 2003.
- Inclusive experiment: $^3\overrightarrow{He}(\vec{e}$,e')X.
- Used polarized ^{3}He target as an effective polarized neutron.
- Collected about 90% of planned data.
- 0.5 TeraBytes of data.
- Kinematic coverage from $1 < Q^2 < 4$ (GeV/c)^2 in the resonance region up to W=2 GeV.

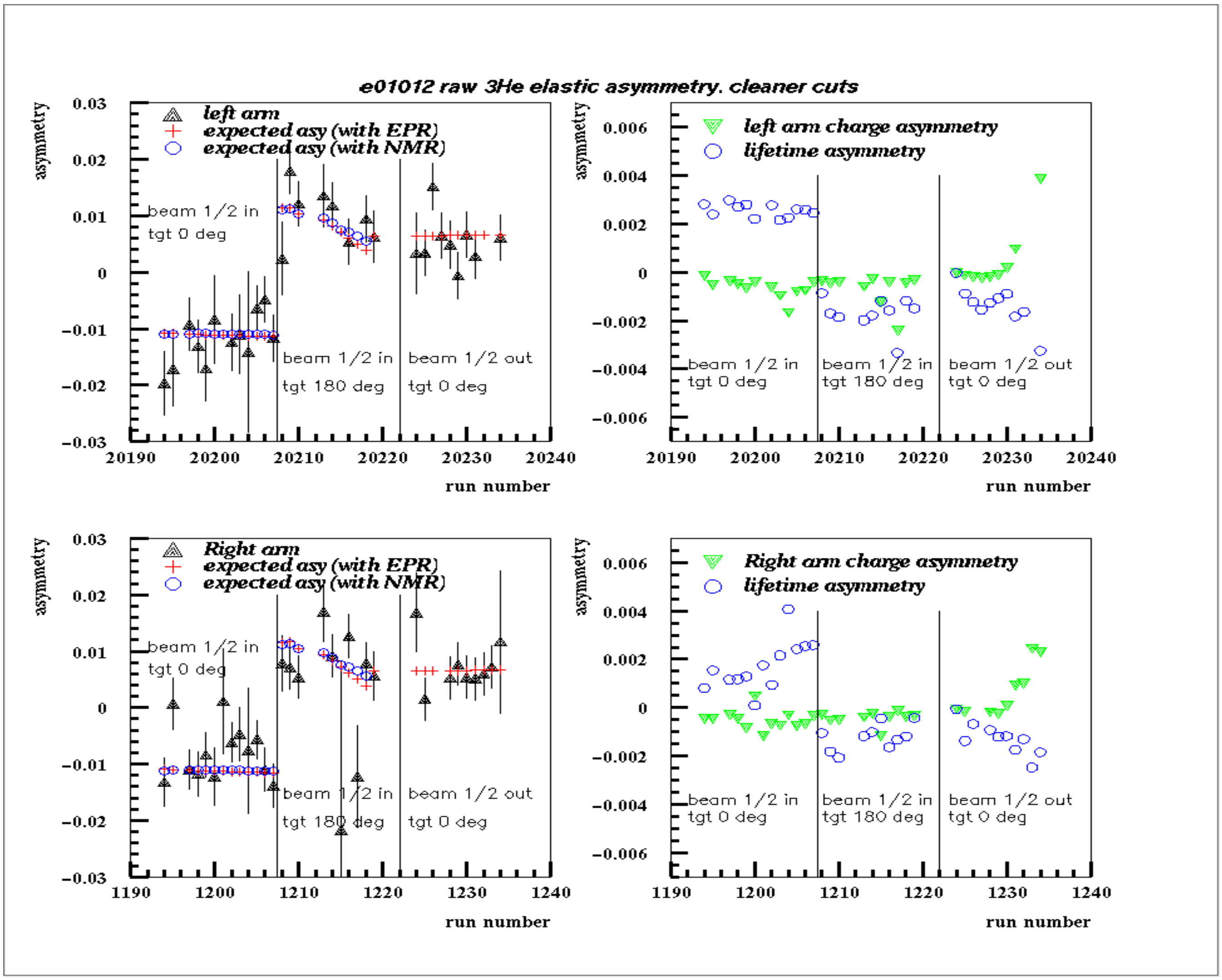

Q2 (GeV/c)^2
6
5
4
3
2
1
0
Jefferson Lab E01−012
Kinematics
5 GeV, 32 o
5 GeV, 25 o
4 GeV, 25 o
3 GeV, 25 o
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
W (GeV)

Difficulties encountered:

- First experiment running at the same time as Go.
- Intensive debugging of helicity decoding due to Go helicity scheme.
- Compton polarimeter ran for a short time due to the poor beam quality.
- Arc and EP didn't work.

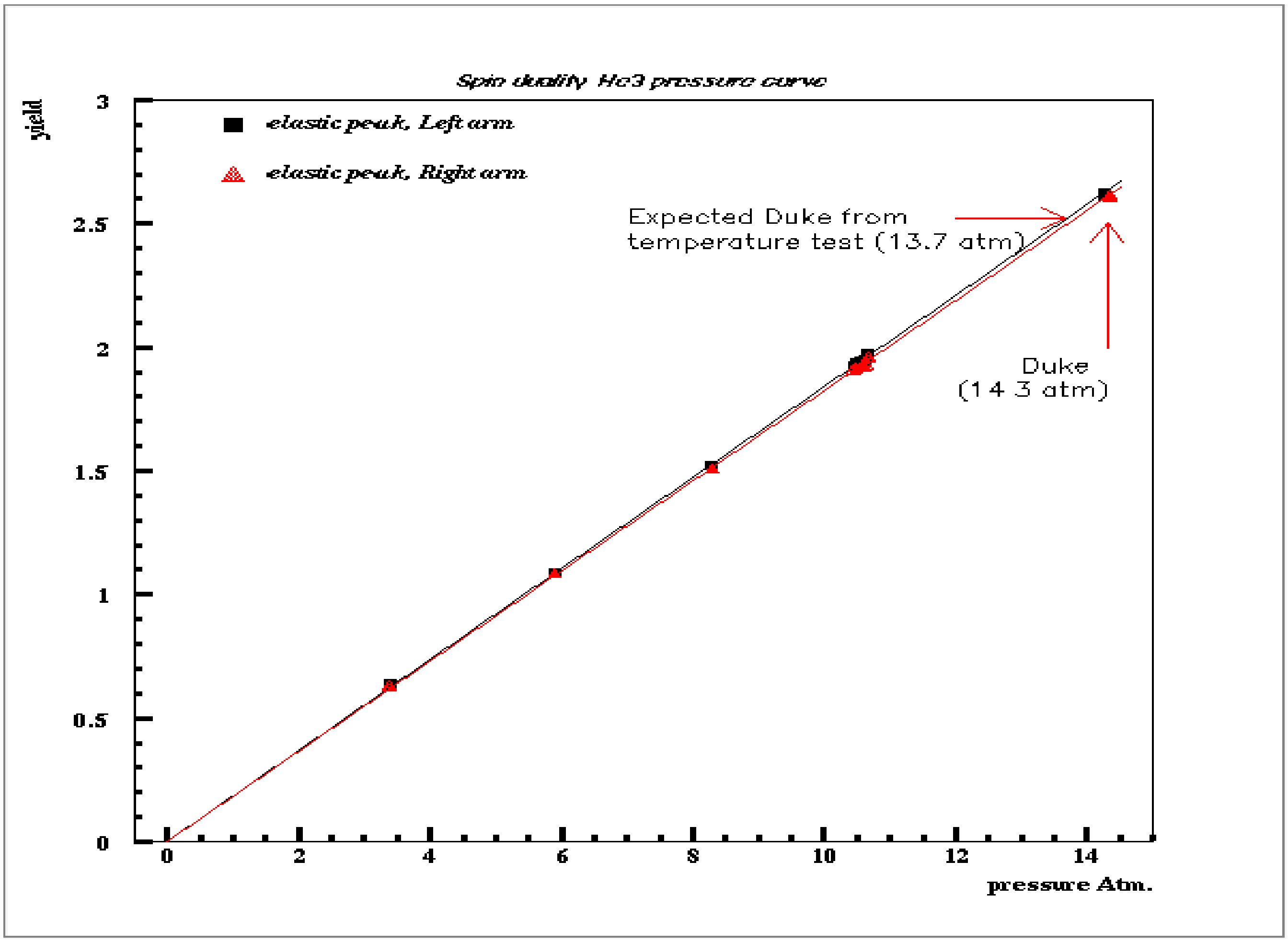
On-line results

Elastic asymmetries:



- Elastic asymmetries agree very well with the simulation.
- Provides confirmation of the polarimetry values.

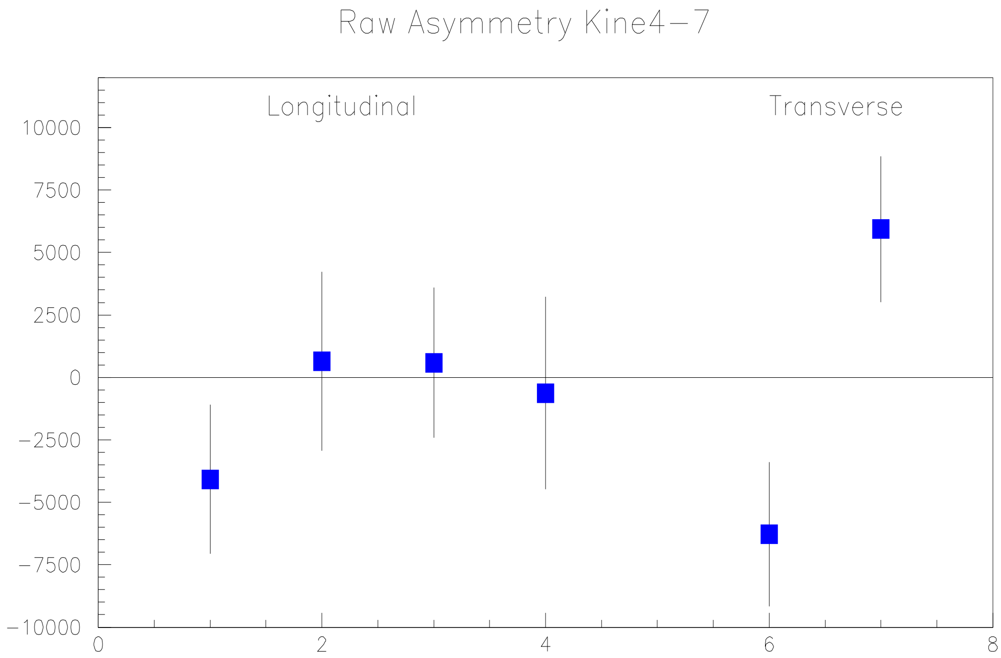
Pressure curve:



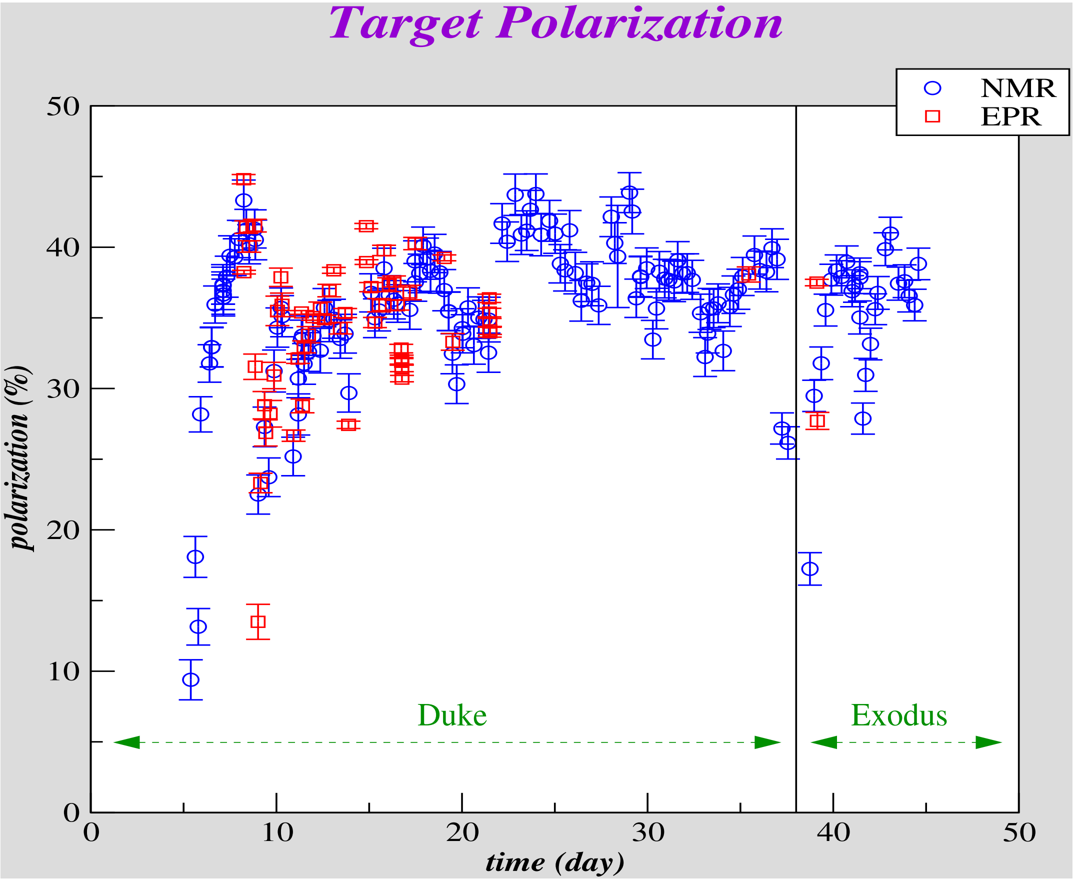
- Very good on-line result from the pressure curve.
- 4% discrepancy between pressure curve analysis and temperature test results.

Other on-line work:

- Good database established at the beginning of the experiment.
- Intensive on-line asymmetry check to confirm helicity scheme: scaler analysis, false asymmetries and production asymmetries.



Target performance



- Used two cells: Duke (τ = 52 hours) and Exodus (τ = 47 hours).
- Average polarization in beam: $\sim 37\%$.
- Big loss of polarization at the beginning of the experiment due to optics mis-alignment.
- Because of masing, EPR was not continuously used but used it to cross-check NMR.

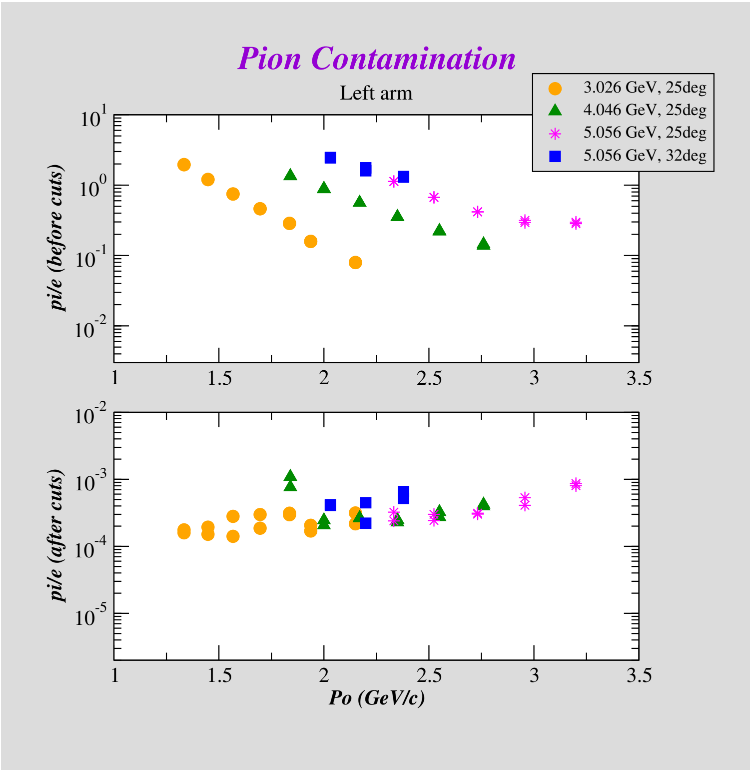
Off-line analyis: PID Detectors

→ After calibration, both arms cerenkov detectors show a detection efficiency of 99.9%.

→ Right arm preshower detector contains two blocks that had problem during the experiment. Still investigate how to deal with it.

→ Before this problem appeared both arm shower detectors had an efficiency better than 99.5%.

→ maximum $\pi/e \sim 3$. After PID cut: $\pi/e \sim 10^{-3}$.



Summary

→ Good performance of PID detectors.

→ Good performance of the target: average polarization in beam about 37% .

→ On-line elastic analysis shows a good agreement between data and simulation.

→ Poor beam quality while Go was running.

Future

→ Finalize detector analysis.

→ Target analysis.

→ Extract asymmetries.

→ Extract cross-sections.

→ Radiative Corrections.

→ Extract g_1^n and A_1^n.