Comments from the Slack Channel

- Elton Smith: “We found that all the posters were of very high quality and it was difficult to select the top two.”

- Dustin McNulty: Thanks for all the lively discussions and great posters! I enjoyed this session much more than expected. Cheers!

- Ciprian Gal: I am really getting into this .. the videos are really well done!

- Lorelei Carlson: Lots of great videos! The judges have their work cut out for them!
Special thanks to:

**OUR JUDGES**

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<tr>
<th>Scott Barcus</th>
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<td>Mark Dalton</td>
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<td>Doug Higinbotham</td>
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<td>Yordanka Ilieva</td>
<td>Justin Stevens</td>
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**OUR PLANNING COMMITTEE**

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<th>Amy Schertz</th>
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<tr>
<td>Lorelei Carlson</td>
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<td>Susan Schadmand</td>
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...and our sponsor JSA!

This project is supported by the JSA Initiatives Fund Program ([http://www.jsallc.org/IF/IFProjects.html](http://www.jsallc.org/IF/IFProjects.html)), a commitment from the JSA owners, SURA and PAE Applied Technologies. Initiatives Funds support programs, initiatives, and activities that further the scientific outreach, promote the science, education and technology of the Jefferson Lab and benefit the Lab’s extended user community in ways that complement the Lab's basic and applied research missions.
Top 8 Finalists

Pierre Chatagnon
Brandon Clary
Brandon Kriesten
Murchhana Roy
David Ruth
Iresha Harshani Senevirathne
Utsav Shrestha
Sajini Wijethunga
Measurements of the Magnetic Field Penetration into Superconducting Thin Films

Iresha Harshani Senevirathne
Old Dominion University
Precision Magnetic Field Direction Measurements for Neutron Spin Structure Studies

Murchhana Roy and Wolfgang Korsch (for the A2/A4 Collaboration) University of Kentucky

NUCLEON SPIN STRUCTURE

The experiments carried out at CERN and SLAC in the 80’s on the isoglu of the proton polarized structure function g2 showed that the three valence quark account for only a fraction of the proton’s total spin.

This discovery has raised to multiple profound experimental and theoretical research endeavors. Current understanding of the nucleon spin is described using various quantum, nucleon, quark, and gluon contributions. Due to the non-perturbative nature of strong interactions, it is extremely difficult to make absolute predictions. However, on how the nucleon spin is distributed among all the components. Measurements of nucleon spin structure functions g2 and g3 can be understood in terms of naive Quark Parton model but g3 is one of the cleanest higher twist observables that contains information on quark-gluon correlations.

The total number of linear combination of g2 and g3 is the cleanest to the quark-gluon correlations.

THE EXPERIMENT: NEUTRON g2 AND g3

The experiment E133-90-1211 (Neutron g2, and g3) aims to do a precision measurement of neutron g2, and g3 at high Q2.

THE NEED FOR PRECISION

If the target polarization direction is a little different from 60°/23°, the longitudinal asymmetry (A_L) contributes to the total asymmetry in a manner as the transverse asymmetry (A_T), i.e., A_L = 2A_T. In the measurement of polarization direction is limited to the Hall C coordinate system. A novel approach was developed and built as the commercially available compasses cannot achieve the desired level of precision.

RESULTS

- Holding magnetic field directions were determined along the target length in the absolute Hall C coordinate system by analyzing the survey data.

- All angles were computed with the beam direction (n=1).

- All the systematic uncertainties were propagated and added in quadrature to get the total uncertainties associated with each data point.

SYSTAMATIC UNCERTAINTIES

- 1. Error in determining the angle (θ) and magnetic field in the beam line: 0.05° (0.005)

- 2. Error from the compass mirror alignment: 0.05° (0.005)

- 3. Laser beam spot size: 0.03°

MEASUREMENTS IN HALL C

- The magnetic field direction was scanned in three different directions along the target length for all polarization directions (θA, θB, θC) and for two kinematic settings of the experiment.

- The incident and reflected laser light spots for each measurement were marked on a transparent screen.

COMPASS DESIGN

- The compass operating at a maximum magnetic field of 0.25 T, 2” (long) mounted as a floating disk was constructed at the University of Kentucky.

- A cylindrical magnet was placed inside a shaped groove to ensure the beam passes through the center.

- The compass magnet has two mirrors and circular scales mounted on both sides. The circular scales had markings every 0.1°.

- Field direction was measured by reflecting a laser beam off the compass mirrors, aligned perpendicular to the magnetic axis of the magnet as precisely as possible.

COMPASS MIRROR ALIGNMENT

- The geometric and magnetic axes of the compass were not coaxial.

- Reflecting laser beam from the compass mirror produced an ellipse on a screen as a result of an offset between the mirrors.

- The compass mirrors were aligned parallel to the magnetic axes of the compass magnet to minimise the horizontal error by rotating the ellipse to a straight line.

- The compass mirror alignment data were fitted with a straight line and the horizontal error was determined.

ACKNOWLEDGEMENT

This work is partially supported by the US Department of Energy Office of Nuclear Physics under Contract No. DE-SC00268413.
Pierre Chatagnon

IJC lab/ Université Paris-Saclay

Timelike Compton Scattering with CLAS12