# Minutes of Polarized $^3$He Collaboration Meeting Held on July 22, 2005

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September 2, 2005

## 1 Welcome and General Remarks - K. de Jager

Kees discussed the status of the current schedule. The Hall C HKS experiment, which started six weeks ago, is still commissioning. The group has asked for a four week extension that will probably occur during the accelerator down in September. Hall A should not be affected by the extension. The installation for $G_E^n$ will begin as scheduled after Thanksgiving.

Kees mentioned that the 12 GeV Lehman review went extremely well, and CD-1 is expected to be signed in September.

The long term experiment schedule for Hall A is as follows:

- FY06: Standard experiments ($^3$He and $^4$He FF)
- FY07: $^3$He BigBite experiments (Transversity, (e,e'd), $A_y$)
- FY08: Pb parity, Pentaquark and DIS-Parity

## 2 Papers

### 2.1 GDH $^3$He Paper - K. Slifer

Karl did not have an updated version of the PRL. He plans to have one either the second or third week of August. Karl has rewritten the introduction and motivation sections and has worked on changing the figures.

Karl has looked closer at the elastic tail subtraction and hopes to improve its systematic understanding.

### 2.2 GDH Long Paper - R. Gilman

So far the paper is about 83 pages long with 79 figures. Gordon has still not found time to work on the introduction. After the introduction is included, Ron wants to reduce the size of the paper by at least a factor of two. Karl offered to help reduce his contribution. Zein-Eddine is waiting until then to write the conclusion.

### 2.3 $g_2^n$ Paper - T. Averett

Since the last meeting, the paper has been submitted and received positive comments from the referees. The first referee asked the collaboration to check how sensitive the conclusions were depending on the NLO analysis. Wolfgang is currently working on a comparison of the data with AAC03.

The comments from the second referee were also discussed. Todd is working on the response to the referee and hopes to get a new version of the paper out soon.

## 3 saGDH Analysis

### 3.1 Optics and Acceptance - V. Sulkosky

Vince gave an overview of the optics database prescription used at 6° and 9°. The second version of the optics technical note was released and is currently being revised.

Vince started working on the acceptance for the second run period. Xiaodong's code was modified to use J. LeRose's transfer functions for the septum magnet. Comparison between sieve slit data and simulation shows reasonable agreement. White spectrum data shows some discrepancies with the simulation. He is currently working to address these issues.

### 3.2 Septum field correction - T. Holmstrom

Tim discussed the 9° shift corrections. They are based off the carbon foil runs taken throughout the 9° run. Corrections are available for $z_{\rm react}$ and $\phi_{\rm tg}$. Vince will implement the corrections in the module he wrote for the 6° corrections. Then they will need to be tested. Tim and Vince are considering a similar correction for the 6° data.

Tim created a good/bad run list and will write a Perl script that will interface with Jaideep's EPICS database.

### 3.3 PID and 1st period plan - Y. Ye

Professor Yunxiu Ye gave an overview for the first period analysis. To gain experience with the analysis, Hai-jiang Lu has been working on the PID calibration by checking Jing Yuan's analysis. A comparison between Jing and Hai-jiang's shower PID constants shows agreement typically within 5%. However there are a few constants that differ by 20-30%. Jing's constants also show a clear problem with the pedestals.

Hai-jiang has obtained four sets of calibration constants for the five beam energies at which data were acquired for 9°. The shower detector efficiency is typically greater than 99.8% with a cut efficiency greater than 99%.

The efficiency of the gas Cherenkov was also presented and found to be greater than 99.9%. Hai-jiang will also look at the calibration for the 6° data.

### 3.4 First Period Optics - N. Liyanage

Nilanga discussed the work on the first period optics. The student that was working on the optics is in Pakistan. There are some small loose ends to wrap up, and Nilanga hopes the student will have them done by the end of August. Then he will give the optics to Alexandre to test in his Monte Carlo.

### 3.5 Discussion

Seema is currently in India and has received a job offer from FIU. She will try to finish the VDC study she started in the spring.

There is also a new student, Xiaohui Zhan, that will begin work on the nitrogen dilution analysis. For the first period, a Monte Carlo is needed for the ice cone cell background analysis. Nilanga mentioned that he has a student that could work on it.

## 4 Spin Duality Analysis - P. Solvignon

Patricia showed the nitrogen cross sections. For the missing kinematics, she either used a scaled QFS model or a polynomial fit. She then presented the technique she used to determine the radiative corrections by using data from E94-010 for the lowest energy and Duality data for the higher energies.

She then showed the polarized and unpolarized cross sections and $A_1$, $A_2$, $g_1$ and $g_2$ for $^3$He. In the unpolarized cross sections, she noticed a bump where the target cell switched from Duke to Exodus. She will check the density. She then presented a list of things to check and do, before she finishes the analysis (see slides for details).

## 5 Target Progress and Status

### 5.1 JLab Target Status - A. Kolarkar

Investigating source of "double" peak in NMR signal: Discovered the effect might be caused by a gradient in the holding field. By using the gradient coils, Ameya was able to reduce the separation in the peaks to zero. The transversity students will take over investigation of NMR signal.

Setting up optics in the new lab. A new laser interlock box is being made, so we can have two operational target labs. Conducting 5-to-1 combiner tests to compare spin-up and losses with new and old optics setup. Laser fiber temperature interlock box is configured and working. Two lasers were shipped back to Coherent and had their diodes replaced.

Ameya will also work with Wolfgang to get EPR setup in the new lab. There was a discussion about having Wolfgang make a spare PI feedback box for JLab. Ameya is also preparing to test the opto-magnetic compass.

## 5.2 JLab Target Status and $G_E^n$ Update - A. Kelleher

Discussed the aluminum oven tests. The oven was able to reach necessary temperatures for the hybrid cells. The new laser building had its final safety checkout. The building has a nearly complete target system.

For the oven, support tubes and heater lines have been installed. Until the new oven arrives, Aidan will conduct tests with an old oven and bad target cell, Vega. The August 1st milestone is approaching and requires that a cell be polarized in the new magnet box. However the oven will not arrive until around July 29th.

After the milestone, plenty of work remains to get the target operational: getting laser light from the top of magnet box, polarization and calibration of target cells, EPR system, and test of NMR coils in the new target ladder.

Aidan gave a brief summary on the detector status. Discussed the BigBite test run at the beginning of HAPPEX with two wire chambers and a Pb glass trigger. The BigHand neutron detector is one month behind schedule and slipping. Only 1% of the wiring for the detector is done. Six people per month are needed to get back on schedule. $G_E^n$ also needs construction help for 2–3 months.

## 5.3 UVA Target Status - J. Singh

Jaideep presented the cell inventory for $G_E^n$. There are four usable $G_E^n$ geometry cells with polarization >= 38%. However the measurements were not optimized at UVa, so the maximum polarizations could be higher. By September 1st, the goal is to have six usable cells for the experiment.

Jaideep discussed the RF frequency shift he sees during EPR, when the RF field is turned on and off. The extra shift depends on the RF frequency and decreases at higher frequency. At 56 kHz, no shift is seen. The good news is it doesn't appear to be $^3$He polarization dependent. He will continue investigating the effect.

## 5.4 W&M Target Status - T. Averett

Todd gave an update of the target work at W&M. For the frequency sweep NMR, coils with a resonant frequency of 122 kHz were used. The background was subtracted for each sweep, and a water signal was seen. Work will continue to optimize the system.

A new target cell, Bubba, with small pumping chamber was filled. The cell was made by Mike. Bubba has a nominal density of 10–11 amagats due to a problem with the pressure calculation during the fill. The cell reached 46% polarization with two lasers with an uncorrected lifetime of 19 hours. Next Todd will fill a cell from Willie.

Work on the target explosion expansion chamber was discussed. A successful test was conducted where the downstream window of the chamber was blown out and a 1 mil aluminum window sustained a few holes. However the upstream and Be windows were not damaged.

# 6 Transversity

## 6.1 Target Test - H. Yao

Huan has been working with Aidan and Ameya in the target lab. With Aidan and Ameya setting up the $\mathrm{G_E^n}$ target, Huan will take over the target work in the EEL building for Transversity.

## 6.2 BigBite Test - L. Zhu

Lingyan discussed the analysis of the BigBite tests from this past spring. Data were obtained with BigBite at 0 and 550 Amps with various targets. The beam current was kept low due to the high rates. Of the scintillator paddles that were intended to be used to form trigger T6, Lingyan discovered that the auxiliary plane and one of the dE plane paddles were shifted by one paddle.

Lingyan showed the PMT rates from the scalers and TDCs. Some TDC values are higher, but most are consistent with the scalers. She also showed the rates with the magnet on and off. The rate in the auxiliary plane was reduced by a factor of 2–3 with the magnet on. The next step is to compare the results with a simulation that Xin Qian is working on.

## 6.3 GEANT Simulation - X. Qian

Xin is working to simulate the background rates in the BigBite detectors. The plan is to compare the simulated rates to the test runs performed this spring. He presented a comparison of two codes: Comgeant (from E. Chudakov) and P. Degtiarenko's code.

Xin presented his preliminary results on the EM background study. Conclusions: low energy photons should be the major concern for the background. The electron rate is around 100 kHz for momentum $> 200$ MeV. Other charged particle rates are below 10 kHz, though Xin will check the simulation to make sure.

# 7 New and Updated Experiments

## 7.1 SIDIS - $\Delta$(d) - X. Jiang

Xiaodong presented his proposal for a new experiment to measure $\Delta$d with an order magnitude improvement. He also hopes to constrain $\Delta$g, perhaps as good as RHIC-spin promised to deliver. BigBite will be used at $30^\circ$ as the electron arm and the HRS+septum at $6^\circ$ as the hadron arm. The standard polarized $^3$He target will be used.

### 7.2 $^3$He(e,e'd) - D. Higinbotham

Experiment E02-108 is a jeopardy proposal that will be presented at PAC28. Wolfgang has been added as a spokesperson. The experiment will attempt to obtain a better understanding of the $^3$He wavefunction and the contribution of the S' and D states to the wavefunction. A parasitic measurement of $G_E^n$ at low $Q^2$ will has been added to the proposal.

## 8 Conferences

Asian Few Body (Nilanga)
Prach-spin (Zein-Eddine, Karl)
Transversity (JP)
New Trends in HE (JP)
DNP (Tim, Zein-Eddine, Xiaodong, Lingyan)
NStar2005 (Nilanga?)
PANIC05 (Todd)

## 9 Next Meeting

Next meeting will be held on either October 7 or October 21.