

Two Recommendations:

1. The schedule for WBS2 should be updated to reflect the realities as presented, namely the change in CDet to a scintillator based detector, and the effects of financial constraints on the DAQ (need to use Fastbus instead of FADC). The revised schedule should be submitted to DOE by February 15, 2015.

Response: *Revised the PMP with new schedule for the CDET shifted by one year to 1/29/2017. Submitted revised PMP with Jan 15, 2015 report. To answer the question about financial constraints on DAQ will produce a short response outlining the FASTBUS and other DAQ hardware available for CDET and other systems.*

2. The collaboration should test the continuous thermal annealing in a realistic radiation environment with constant monitoring of the detector response, before finalizing the design of the detector.

Response: *Test successfully completed.*

Comments

1. Theoretical efforts could be stimulated by organizing workshops on this topic (like at the Institute for Nuclear Theory [INT]) focusing on the high Q2 range.

Response: *Bogdan, Ian Cloet, Dave Hamilton and Seamus Riordan submitted proposal to the Seattle INT. Proposal was rejected, but the letter encouraged the proposers to resubmit with a focus on WACS. Submitted proposal to Trento for a workshop.*

2. Systematics

- A good understanding of many systematic effects will be essential.

Response:

- The issue of higher-order radiative corrections was not discussed.

Response

- The effect of dead time losses on the physics results is unclear. It would be desirable to investigate the effects if it has not yet been done.

Response:

- The precision of the magnetic field needs to be known for different experimental aspects:
 - i. Tracking of particles through the spectrometer in order to discriminate signal from background processes.
 - ii. Tracking the spin rotation angle of particles through the spectrometer in order to be able to extract the transverse polarization of the nucleon.
 - iii. Residual magnetic field (and more importantly field gradients) from the SBS magnet at the target location and its effect on the degree of target polarization
 - iv. The effect of the magnetic field on the exit beam line.
- While simulation tests of the exit beam pipe magnetic field compensation scheme meet the integral field requirement there is a concern about components which may affect

the beam "size/shape"; beam transport calculations may be useful to ensure that any such effects are under control.

Response: *Integral of the field gradient is small so no effect on beam size. Will show plots and table of integral of field and field gradient in Robin Wines' talk.*

3. It is strongly suggested that at full field, the region near the pole tip adjacent to the slot be well measured.
4. It is important to extend the Monte Carlo simulations to understand the impact of the trigger cuts on the physics results. The experimental simulations to date do not include analysis of minimum bias events.
5. In the context of designing the DAQ, simulations need to have a more realistic approach to event generation, including effects of "room backgrounds" and multiple particle events, in the time window of the trigger.
6. The panel strongly suggests the generation of a data event flow analysis for each of the 3 experiments that identifies bytes per detector (average and extremes) going onto storage for offline analysis, specifically to look for any bottlenecks.
7. CDET
 - The collaboration should consider having a reflecting surface on the non-MAPMT end of the CDET fibers.
 - The plan for shimming the scintillator slats could be quite labor intensive as it involves getting the mylar wrap flat and applying the tape for shimming. Workforce availability should be considered carefully
 - The proponents should consider using the mechanical prototype to develop a simpler technique for achieving the projective geometry, such as rotating entire groups of slats by mechanical means in the mounting structure.
8. GEMs
 - Concerning the gain variation across the chamber that is reduced with increased gas flow, the team may wish to add water and oxygen monitors to the exit gas stream.
Response:
 - As modules are completed and delivered to JLab suitable personnel will need to be identified to carry out the testing at JLab. The team may find it beneficial to keep the present 5 production modules at UVa for a more detailed evaluation that may indicate improvements in fabrication for future modules.
Response: Nilanga has grad students which can work
 - Consideration needs to be given to the acquisition of adequate spare components. Spare modules and readout will not only provide backup in case of failure but will also allow reconfiguration or expansion for future physics programs. 10% is considered a minimum; the panel encourages the collaboration to consider increasing the number of spare modules. The provision of a complete spare plane (four modules, and including electronics) is strongly encouraged.

Response: *Rolf has allowed contingency in WBS3 to be used for 5 more modules which enable the construction of a spare plane. The modification of the contract needs to be completed. The electronics contract included electronics for a spare plane.*

- The production workflow indicates that most of the module fabrication is carried out by two people, leaving the production flow vulnerable to illness or personnel turnover. Mitigation is encouraged by having other personnel capable of performing fabrication and QA processes.

Response: *Hired a new technician for GEM construction. This leaves trained graduate students and senior staff available for short term replacement.*

- The desired production rate of 2 modules per month has been achieved only in the past month. Production rate for the next set of modules should be carefully monitored.

Response: *Monitor in monthly report and with spreadsheet which tracks QA on the GEM foils and readout boards along with QA on the chambers.*

- The X-ray test set up should be completed expeditiously so that the early production modules can be tested under extreme rates, as similar to those expected in the experiments.

Response: *The X-ray test set-up was completed in Jan 2015 and testing has begun.*

9. HCAL

- With module HCAL assembly scheduled to start in March 2015 it is important that the “design review” expected to be held in December serve also as a module mass production review.

Response: *December reviewed focused on the subassembly structures. Did not see need for production review.*

10. 3He target

- The He-3 target is critical to the neutron form factor measurements. Monitoring progress in this dependency is essential. Some technical milestones in this project would be helpful to keep the SBS program on track.

Response: *Funding for the 3He target is part of Rolf's capitol spending plan. Gordon is working on a new set of milestones for 3He.*