



Heavy Photon Search Review Closeout Report July 11, 2013

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Charge Points-I

- Standard HEP Merit Review Criteria:

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1. The quality and impact of the research by the HPS collaboration in the recent past;
2. The scientific significance, merit, and feasibility of the proposed research;
3. The competence and future promise of the HPS collaboration for carrying out the proposed research;
4. The adequacy of resources for carrying out the proposed research, and cost-effectiveness of the research investment;
5. The quality of the support and infrastructure provided by the participating laboratories.

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- *We welcome all of your comments, but we are also willing to stipulate that the well-established HPS scientific team would rate highly on these points.*

Charge Points-II

- Specific to this review:

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1. Did the HPS collaboration successfully demonstrate the technical feasibility of its detector design in its 2012 test run at the TJNAF?
2. Has the HPS collaboration developed technical designs and construction and commissioning plans for its components (SVT, SVT DAQ, ECAL, muon detector, trigger, beam line, beam monitoring, DAQ, online and offline software) that are consistent with readiness to begin taking data in FY15 in the low energy beam (2.2 GeV, 1.1 GeV and if available 6.6 GeV) in Hall B at TJNAF?
3. Has the HPS collaboration identified and costed for the appropriate manpower and other resources consistent with readiness to take data in FY15?
4. Has the HPS collaboration presented estimates of cost and schedule that are consistent with readiness to take data in FY15?
5. Has the HPS collaboration developed a credible staging plan for installation of detector components that will allow for data taking in FY15?

- *Please give special attention to the above.*

General Findings and Comments

- **Findings:**

1. Management from both SLAC and JLAB were present at the review. JLAB management is actively involved in coordinating HPS and the 12 GeV upgrade.

- **Comments:**

1. A Technical Coordinator may be needed during the installation and operation phase of the HPS experiment.
2. HPS could potentially produce the first physics publication from the upgraded Hall B at TJNAF.

1. ***Did the HPS collaboration successfully demonstrate the technical feasibility of its detector design in its 2012 test run at the TJNAF?***

▪ Findings:

1. HPS clearly had a successful test run in many ways. Without such a Test Run, it would have been hard to consider the tight HPS schedule credible.

▪ Comments:

1. HPS needs to fully analyze the test data and publish in peer-reviewed journals. This will help uncover possible problems. This is particularly true for the SVT alignment.
2. If you have 30k photoelectrons/GeV in the ECAL, is an APD upgrade going to help overall resolution?
3. The DAQ was only tested at 10% of final expected rate. HPS should consider high-rate tests of the full system before the full run.

▪ Recommendations:

1. None

2. Has the HPS collaboration developed technical designs and construction and commissioning plans for its components (SVT, SVT DAQ, ECAL, muon detector, trigger, beam line, beam monitoring, DAQ, online and offline software) that are consistent with readiness to begin taking data in FY15 in the low energy beam (2.2 GeV, 1.1 GeV and if available 6.6 GeV) in Hall B at TJNAF?

▪ Findings:

1. The design for the full experiment is based on the existing successful design from the Test Run.
2. Upgrades and modifications are evolutionary and modest, and several members of the collaboration are involved with software.
3. Given the experience at JLAB, the beamline monitoring and operation are clearly in good shape.

▪ Comments:

1. Commissioning plans are not detailed enough, especially given the apparent short timeline for installation, commissioning and running. Doing this all on nights and weekends will require a very tight run plan with close cooperation and communication with JLAB and Hall B managers (daily contact).
2. Online software development should continue so that they are able to quickly monitor and analyze data online during data taking. They could add a monitoring stream to the DAQ, for example.
3. A mock data challenge before running would be useful.

2. Has the HPS collaboration developed technical designs and construction and commissioning plans for its components (SVT, SVT DAQ, ECAL, muon detector, trigger, beam line, beam monitoring, DAQ, online and offline software) that are consistent with readiness to begin taking data in FY15 in the low energy beam (2.2 GeV, 1.1 GeV and if available 6.6 GeV) in Hall B at TJNAF?

▪ Comments (continued):

1. A high rate full system test as soon as possible is crucial since the Test Run was performed at only 10% of the expected rate
2. Consider techniques, like using extra targets and off-axis beam, to assist with aligning the SVT which will be crucial for needed vertex resolution
3. Offline software for the muon system was discussed, but muon ID using the ECAL might be a higher priority.
4. The collaboration should consider adding additional design reviews for the ECAL, DAQ, etc.

▪ Recommendations:

1. None.

3. Has the HPS collaboration identified and costed for the appropriate manpower and other resources consistent with readiness to take data in FY15?

- Comments:

1. A schedule which showed both hours and durations by task would have been most helpful in assessing the appropriateness of resources.
2. Essentially the same team that executed the successful 2012 HPS experiment will be responsible for the proposed experiment, which lends a level of confidence to the cost and schedule estimated.

- Recommendations:

1. Create (or maintain) a resource loaded schedule which includes the non-costed scientific time.
2. Add “off-project” interface milestones related to Jlab’s 12 GeV schedule to the HPS schedule.

4. Has the HPS collaboration presented estimates of cost and schedule that are consistent with readiness to take data in FY15?

- Findings:

1. Estimated costs and schedule by task were presented.

- Comments:

1. Schedule slack is not specifically identified within task lines, which makes it difficult to assess overall schedule contingency.
2. It may be informative to make a copy of the schedule and perform a “what if” analysis, removing float from tasks and determining the earliest possible finish date.
3. A critical path analysis was not presented. It would be very helpful for reviewing and managing the project.

- Recommendations:

1. None.

5. Has the HPS collaboration developed a credible staging plan for installation of detector components that will allow for data taking in FY15?

▪ Findings:

1. It has recently been proposed that the location for the HPS experiment be changed from an upstream position to a downstream position in JLAB's Hall B.

▪ Comments:

1. A detailed staging schedule was not shown for either upstream or downstream option.
2. No ES&H milestones or reviews were mentioned.

▪ Recommendations:

1. Additional integration planning with JLab 12 GeV personnel relating to Hall B progress (regardless of the upstream/downstream decision) is crucial to HPS success. The HPS project team should clearly identify a technical coordinator to address these issues.