

Experimental Readiness Review for The Primakoff Experiment in Hall D

Review Date: June 7, 2017

Final Report: June 9, 2017

Review Committee:

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Observers:

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The PrimEx-D Experiment E12-10-011, *A Precision Measurement of the η Radiative Decay Width via the Primakoff Effect*, has been approved for running in Hall D. The goal of the experiment is to perform a precision measurement (at the 3% level) of the $\eta \rightarrow \gamma\gamma$ decay width via the Primakoff effect on both proton and ^4He targets using the standard GlueX experimental setup in Hall D augmented with an additional calorimeter downstream of the FCAL calorimeter to control systematics.

The committee would like to thank the presenters for organizing the materials for the review and for the preparation and presentation of the talks. We would also like to acknowledge our appreciation of the open and frank discussions that were had. The agenda and list of talks presented during the meeting is given in the Appendix.

In this report, we answer the questions posed in the charge point by point, and then provide general feedback in the form of findings, comments, and recommendations as defined here:

FINDINGS: describing the major relevant points presented to the committee or observations made during the presentations.

COMMENTS: Suggestions or other remarks that do not rise to the level for inclusion in the formal recommendations.

RECOMMENDATIONS: Describing more definite statements that must be addressed in the future.

Response to the elements of the review charge

1. What are the experimental conditions needed in order to successfully run the experiment? In particular, the following points should be discussed:
 - Timeline for the completion and testing of CompCal
 - Backup solution for CompCal and the decision date
 - Status of the He target
 - Full beamline configuration

FINDINGS:

- The experimental conditions needed in order to successfully run the experiment are well understood and achievable given the schedules presented. This includes relevant details for the CompCal, target, and beamline.

COMMENTS:

- The committee is impressed by the significant progress on the solution for the combined H/He target in a technical and cost-effective manner.
- The solution for the Compton Calorimeter is considered wholly satisfactory and a convincing schedule for procurement, assembly, and testing was presented.
- A liaison physicist for Hall D (Lubomir Pentchev) has been identified.
- The beamline configuration is felt to be mature and reasonably well studied including plans for mounting the CompCal.

RECOMMENDATIONS:

- Given the transfer of emphasis from separate control of target thickness and of flux to a measurement of luminosity via the absolute atomic-Compton rate in the CompCal, the PrimEx-D Collaboration should provide definite estimates for the separation of Compton events from backgrounds, such as beam halo in the air between the target and the CompCal.
- A plan for how the Be target will be employed in the analysis to achieve the desired systematic uncertainties should be presented.

2. Have all jobs that need to be done to safely mount the equipment been identified and defined adequately?

FINDINGS:

- Given the significant developments and progress on the experimental target and the CompCal, the committee is satisfied that the work steps

related to the completion and mounting of the equipment have been adequately defined at this stage.

- The costs for the remaining experiment equipment and infrastructure were presented and seemed acceptable to Hall D.

COMMENTS:

- None

RECOMMENDATIONS:

- None

3. Has the equipment ownership, maintenance, and control been defined during beam operations?

FINDINGS:

- The ownership, maintenance, and control of the target during beam operations is completely accounted for by the JLab Target Group.
- The ownership, maintenance, and control of the CompCal is completely accounted for by the experiment spokespersons and the NC A&T group.
- The GlueX Collaboration will support the baseline equipment in Hall D for the PrimEx-D experimental period.

COMMENTS:

- None

RECOMMENDATIONS:

- A list of tasks related to online monitoring of the experimental data needs to be identified and manpower should be assigned to complete the development in a timely manner.

4. Are the responsibilities for carrying out each job identified, and are the manpower and other resources necessary to complete them on time in place?

FINDINGS:

- The responsibilities of work related to the target and the CompCal have been reasonably well identified.

COMMENTS:

- A final understanding of who will be responsible for the assembly of the individual CompCal modules should be worked out between the PrimEx-D Collaboration and the Hall C personnel.

RECOMMENDATIONS:

- A high-level schedule of the experiment from hardware preparation and testing, to installation, to calibrations, to analysis should be prepared, as well as a list of the manpower required for each step.
 - The size of the PrimEx-D Collaboration is not fully clear. At least a count of the collaborators should be assembled in order to ensure that experiment preparation, shift staffing, calibrations, and analysis can be established.
 - We recommend that the schedule for assembly and testing of the CompCal be reconsidered to provide more schedule float given that the current schedule includes only ~ 1 month.
5. Are the radiation levels expected to be generated in the hall acceptable? Is any local shielding required to minimize the effects of radiation in the hall equipment?

FINDINGS:

- The radiation levels expected to be generated were presented and are acceptable for Hall D operation. No additional local shielding is required.

COMMENTS:

- None

RECOMMENDATIONS:

- None

6. What is the status of the specific documentation and procedures (ESAD, RSAD, ERG, OSP's, Operations Manuals, etc.) to run the experiments? This includes demonstrated readiness for expedient analysis of the data.

FINDINGS:

- The specific documentation to run the experiment was not prepared or shown, but templates are known to exist to serve as a basis for preparation. A specific individual (Lubomir Pentchev) has been identified to be responsible for preparing the final documentation.

COMMENTS:

- None

RECOMMENDATIONS:

- The PrimEx-D Collaboration should provide a plan for calibrations and analysis in order to ensure expedient analysis of the data. It is expected that this recommendation will be satisfied by the high-level schedule mentioned in the recommendations for charge item #4.

The Eta Primakoff Experiment Readiness Review

Agenda

June 7, 2017

8:30 – 8:45 a.m.	Executive Session	
8:45 – 9:00 a.m.	Eta-Primakoff Experiment (10+5)	Ashot Gasparian (charges 1, 2)
9:00 – 9:30 a.m.	Status of the 4He Target (20+10)	Chris Keith (charges 1, 2, 3)
9:30 – 10:10 a.m.	Status of CompCal (20+20)	Lipang Gan (charges 1, 2, 3)
10:10 - 10:30 a.m.	Coffee Break	
10:30 – 11:10 a.m.	Stability Control, Beamline, and Trigger (20+20)	Alexander Somov (charges 1, 3, 5)
11:10 – 11:30 a.m.	Manpower, Responsibilities, Documents (15+5)	Ashot Gasparian (charges 4, 5, 6)
11:30 a.m. – 3:30 p.m.	Executive Session (Including Lunch)	
3:30 p.m.	Closeout	