

Subject: [EXTERNAL] evaluating status of Hall D hardware and electronics

From: "Shepherd, Matthew" <mashephe@indiana.edu>

Date: 1/10/22, 6:25 PM

To: Richard Jones <richard.t.jones@uconn.edu>, Alex Somov <somov@jlab.org>, Naomi Jarvis <nsj@cmu.edu>, Lubomir Pentchev <pentchev@jlab.org>, "Zisis Papandreou" <zisis@uregina.ca>, Mark Macrae Dalton <dalton@jlab.org>, "Paul Eugenio" <peugenio@fsu.edu>, Mark Ito <marki@jlab.org>, Justin Stevens <jrstevens@jlab.org>, Sergey Furletov <furletov@jlab.org>, Hovanes Egiyan <hovanes@jlab.org>, Fernando Barbosa <barbosa@jlab.org>, Beni Zihlmann <zihlmann@jlab.org>, Timothy Whitlatch <whitey@jlab.org>

CC: Eugene Chudakov <gen@jlab.org>

Hi all,

Happy New Year! As noted previously, we'd like to have a dedicated session to evaluate hardware status at the February meeting. Eugene, Justin, and I have put together some notes and a charge below to help drive the discussion. We'd like to ask workings (and individuals where necessary) to discuss and evaluate these things over the next month or so prior to the February meeting. Please feel free to suggest modification to the the list of people as needed. The critical thing is that we get all the relevant systems covered.

Cheers,

Matt

Introduction

At the 2021 S&T visit, a plan was presented for future operations of the Hall D beamline and detector systems up to 2030. Significant down time is tentatively planned in 2023 and 2025 for equipment changes in the hall. As of about 2025 most hall equipment will be at least ten years old; therefore, it is important now to assess the projected lifetime of detector equipment and electronics to help ensure smooth operation into the future.

For the sake of this evaluation, let's make the assumption that "standard running conditions" and "typical detector performance" are defined by those we usually experience in what is called "GlueX-II production running." (We understand that other experiments are approved to run during this time but we don't anticipate the radiation environment or detector performance demands to be significantly different from GlueX-II production.)

Subsystems

At the February 2022 collaboration meeting, we would like to ask each of the following technical working groups to provide responses (in the form of a 15-minute presentation) to the applicable items in the charge.

- beamline and tagger instrumentation: diamond radiators, TAGH, TAGM, PS, TPOL, and TAC [R. Jones and A. Somov]
- tracking: FDC, CDC, and TRD [N. Jarvis and L. Pentchev]
 - (Question: Does the muon chamber provide interesting capability for experiments beyond CPP that should be considered in planning?)
- calorimetry: BCAL, FCAL, FCAL2, and COMPCAL [Z. Papandreou and M. Dalton]
- timing: SC and TOF [P. Eugenio and M. Ito]
- DIRC [J. Stevens]
- online: DAQ, online computing, trigger, controls [S. Somov, S. Furletov, H. Egiyan]
- JLab-specific electronics and VXS crates [F. Barbosa]
- solenoid and associated cryogenic infrastructure [B. Zihlmann and T. Whitlatch]

Charge

1. Are there elements of the detector that will show degradation of typical performance due to aging or radiation damage before 2025? Can the level of degradation be estimated? Are there remediation measures that could be taken to restore performance?

2. Is there any evidence of an accelerated failure rate of electronics? (Here "electronics" can mean not just front-end boards, but also things like voltage supplies for detectors.) Are the spare pools of electronics sufficient to operate the current equipment through 2030? If the need for additional spares are anticipated, can you describe the prospects for procurement, e.g., is it a commercial product where there is a supply available or is it a custom board that depends on legacy components that are no longer available?

3. What is the schedule and scope for any planned upgrades to the system? To what extent will the upgrades mitigate aging discussed in item 1 above, e.g., is the solution to an aging component to replace it with an upgraded component? How might upgrades improve the capability of the detector?

4. Briefly describe the results of and future plans for R&D that may be ongoing to either assess lifetime or inform the design of future upgrades.