

GlueX Calorimetry/PID Workshop

<http://www.jlab.org/Hall-D/meetings/calorimetry-jul2007/index.php>

Preliminaries

The workshop will be held July 26-27 (Thursday-Friday) at JLab. GlueX-docs relevant to the workshop should be completed and posted by Monday, July 23. Participants should have read documents before the start of the workshop. Workshop talks will be brief and will highlight material in the GlueX-docs. There should be plenty of time for discussions.

Organizing Committee: Matt (workshop chair), Beni, and David

Attendees: Currently, we expect the following people to attend:

- Curtis, Matt – *CMU*
- Richard – *UConn*
- Paul – *Florida State*
- Alex, Beni, Matt, Mihajlo – *Indiana*
- Dan, David, Elliot, Elke, Elton, Eugene, Simon – *JLab*
- Blake, George, Zisis – *Regina*

Workshop Goals

The goal is review where we are and what needs to be done to prepare for the DOE-mandated PID Review that should take place sometime this Fall. We have agreed that PID includes the ability to detect and measure decay photons from and to reconstruct π^0 's and η 's and to separate charged π 's from K 's and p 's. The specific needs are driven by GlueX physics and that includes measuring branching fractions into combinations of π^\pm , K^\pm , K_S , π^0 and η final states. PID along with kinematic fitting is also required to reduce backgrounds as we attempt to isolate exclusive reactions for the amplitude analyses.

As a reminder, in May two key high level milestones were discussed:

- Using hit level Monte Carlo, demonstrate that the GlueX detector is capable of separating, with high purity, explicit rare final states that are key to hybrid study from more copiously produced backgrounds in order to validate intrinsic detector resolution, detector material choices, and global PID.
- For a specific pure final state, generate Monte Carlo with exotic resonances and use an amplitude analysis package to extract these resonances to validate detector acceptance.

In order to achieve these milestones we dedicated the May workshops to identifying particular detector level studies and software development that must be completed to on the way to doing these higher level studies. Therefore, the two key components of the July workshop are:

- Assess the progress and status of detector level work. Completed tasks should be presented in the form of GlueX documents (posted by July 23) and also reviewed in brief talks at the workshop.
- Discuss and outline the procedure for carrying out a series of specific high level studies that build on the summer’s work and address milestones mentioned above.

Workshop Deliverables

The status of the following topics should be presented in a series of technical notes posted to the GlueX portal by July 23 and will form the basis for the “progress report” portion of the agenda:

1. **BCAL Test Beam Analysis:** Blake, Zisis, Alex, and Christina
 - gain calibration
 - z and angle dependence of energy and time difference resolution
 - mean time resolution for photons and cosmics
 - analysis of Pb converter runs
 - demonstration of consistency between TRIUMF, cosmic, and JLab studies
2. **BCAL Reconstruction:** Matt S. and Mihajlo
 - algorithm overview
 - tuning
 - performance
3. **Global Neutral PID:** Mihajlo
 - overlap region
 - detector material issues
 - DPhoton interface
 - π^0/η reconstruction
4. **Kinematic Fitting:** Matt B.
 - π^0/η fits (tied to Global Neutral PID)
 - full event fits
 - software interface
5. **ToF Reconstruction:** Beni
 - status of ToF digitization
 - connecting hits to tracks
 - estimate all contributions to ToF resolution (path length, vertex, etc.)

6. **Generic Physics Generator:** Eugene, Alex, and Elke

- evaluate how suitable pythia is for generating generic photoproduction backgrounds

7. **Electromagnetic Backgrounds:** Matt S.

- rate calculations with improved geometry
- rate in Čerenkov detector

Additional Status Reports

While internal technical notes on the following items are not necessary by the time of the workshop, it would be beneficial to review the status of the following things since their state may affect future studies.

1. **CDC dE/dx :** Curtis and Alex

- suitability of dE/dx as a means for identifying curling particles in the CDC
- status and remaining issues of dE/dx hardware work and implementation in the reconstruction

2. **Tracking:** David

- pattern recognition
- track fitting

3. **UPV:** Paul

- efficiency and resolution of UPV in simulation

Agenda Outline

The agenda will be developed further. We should spend the first day reviewing status and progress of the items listed above. At the end of the day let's try to summarize not only the progress that has been made, but key items that fell through the cracks that need immediate attention. The second day should be devoted to a structured discussion of issues leading up to the PID review.

Some general issues include:

- What are the priority studies to have done before a PID review?
- What is going to be presented and who will present it at the review? (May be too early to tackle this one.)
- The possibility of an NSF MRI to fund a PID device.

Based on the progress as presented in technical notes and first day talks, we will certainly want to tailor and expand this agenda on the second day. Suggested items for discussion are welcome!