The GlueX PWA Meeting
GlueX Collaboration Meeting, April 2006

Curtis A. Meyer

Department of Physics
Carnegie Mellon University

April 28, 2006

Meeting Purpose and Participants

The original plan was to try to hold a GlueX physics meeting in February at CMU. Due to both conflicts and Curtis being busier than expected, the plan was modified to have a smaller meeting where only PWA issues were discussed.

Doug Applegate (CMU), Matt Bellis (CMU), Volker Crede (FSU), Joe Dudek (JLab), Paul Eugenio (FSU), Zeb Krahn (CMU), Curtis Meyer (CMU), Ryan Mitchel (IU), Matt Shepherd (IU), Eric Swanson (Univ. Pitt.), Adam Szczepaniak (IU), Scott Teige (IU), and Mike Williams (CMU)

Meeting held at Carnegie Mellon February 10 and 11, 2006.

Meeting Schedule

Talks Given at the Workshop

Opening/Overview	Curtis Meyer
Analysis of E852 Data	Ryan Mitchel
Flexible Toolkit for PWA	Matt Sheppard
Human Interface Issues	Scott Teige
Databases	Doug Applegate
CLAS Baryon Analysis	Matt Bellis
Tensor Formalism in PWA	Mike Williams
What a user might want	Adam Szczepaniak
The Deck Effect	Jo Dudek

WHERE THINGS ARE GOING

- The meeting was designed as a mechanism to exchange ideas on both what is currently possible and what is needed in the near- and medium-term to continue work.
- Currently CLAS Photo production of Baryons (CMU) and E852 analysis (IU) are the driving forces behind development.
- The tools being developed should be useful for CLEO analysis as well. Both the upcoming $\psi\prime$ program and the current D-meson Dalitz analysis.
- This effort should evolve into the tools needed to carry out physics analysis in GlueX.

WHAT HAS BEEN DONE?

Thinking back to the first GlueX PWA that was done in the summer of 2000, there were a number of open issues at the time. Many of these have now been resolved.

- s-, t- and u-channel can handled simultaneously.
- Fits that run on multiple processors have been done.
- Coupled channel analysis are now the norm.
- An analysis with 3×10^6 events published.
- An analysis with 10×10^6 events underway.
- Control and understanding of systematics crucial.
- Results Databases
- Two packages which will evolve into one set of tools.

DISCUSSION POINTS

Toolkit development — in order to really to able to understand and control systematics, a well tested and vetted toolkit is crucial.

- User friendly interface with little overhead to getting going.
- Vary data selection and cuts.
- Easily change amplitudes.
- Manage large (10s of thousands) of fit results.
- Optimized Fit engines with swap-able fitters.
- Turn on and off coupled channel fits.

A publishable result has to use vetted tools and follow standard procedures for treating systematics.

DYNAMIC AMPLITUDES

Many amplitudes can be computed once and then the results used in the fits. However, there are certain types of amplitudes where it would be nice to be able to vary parameters within a fit.

Such a procedure can get **very** expensive in terms of CPU time.

The two ongoing analysis both see a need for this, but it needs to evolve in such a way that it can actually be carried out.

Stay Tuned

DIFFERENT TYPES OF FITS

- Data binned in mass bins (ala E852, CLAS)
- Data binned in both mass and t.
- Moments
- Dalitz Plots

Follow-up Meetings

As more results come out of the current efforts, a follow-up meeting to continue our discussions and identify needed tools should be held.

Visualization is a crucial issue that did not get a lot of discussion in this meeting.

Tentatively suggest late Fall of 2006 for the meeting.
CMU Material at:

<div align="center">http:/www-meg.phys.cmu.edu/pwa</div>

CMU PACKAGES

- Amplitude Calculators using tensor formalism.
- Most fit elements are precalculated.
- Fitter package that handles any number of channels.
- Efficient methods to systematically change data cuts.
- Database for managing fit results.
- Root-based tools for displaying results.
- Well documented classes and C++ code.
- Easily expandable to any experiment or data set.
- Web based interfaces being completed.

IU PACKAGES

- Code runs over multiple processors.
- Most fit elements are calculated at the start of a fit.
- Web tools to setup fits.