

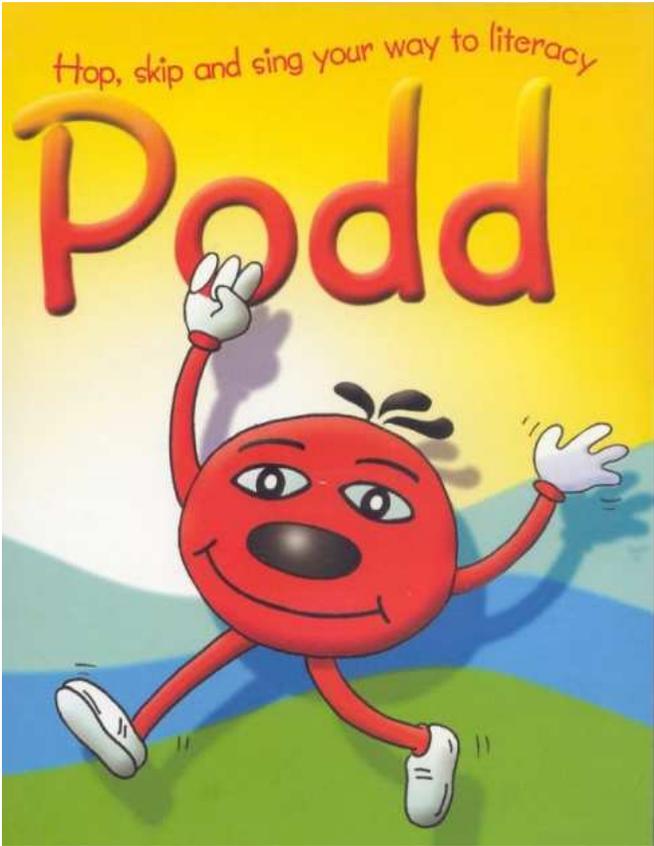
Analysis Software Update

Ole Hansen
Hall A Collaboration Meeting
16 December 2004

Development Team

Rob Feuerbach
Ole Hansen
Bob Michaels

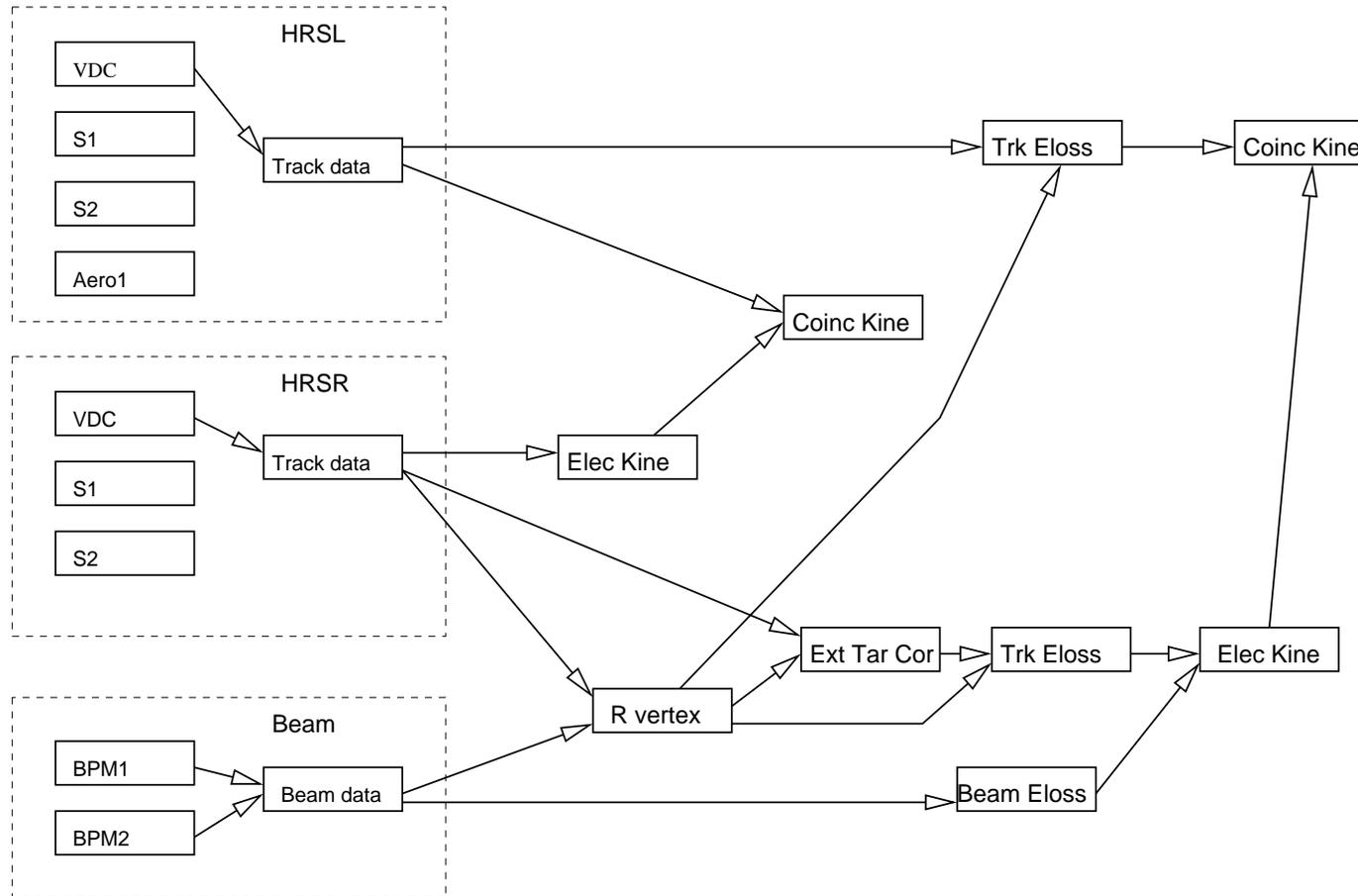
Meet our new friend



Podd - The C++ Analyzer

- Official Hall A data analysis software, replaces ESPACE
- Developed from scratch. Ready for use in Fall 2003
- Object-oriented. Built on top of ROOT
- Almost all capabilities of ESPACE available
- **Toolbox** of analysis modules. Easily extensible.

Analysis Module Configuration Example



Users

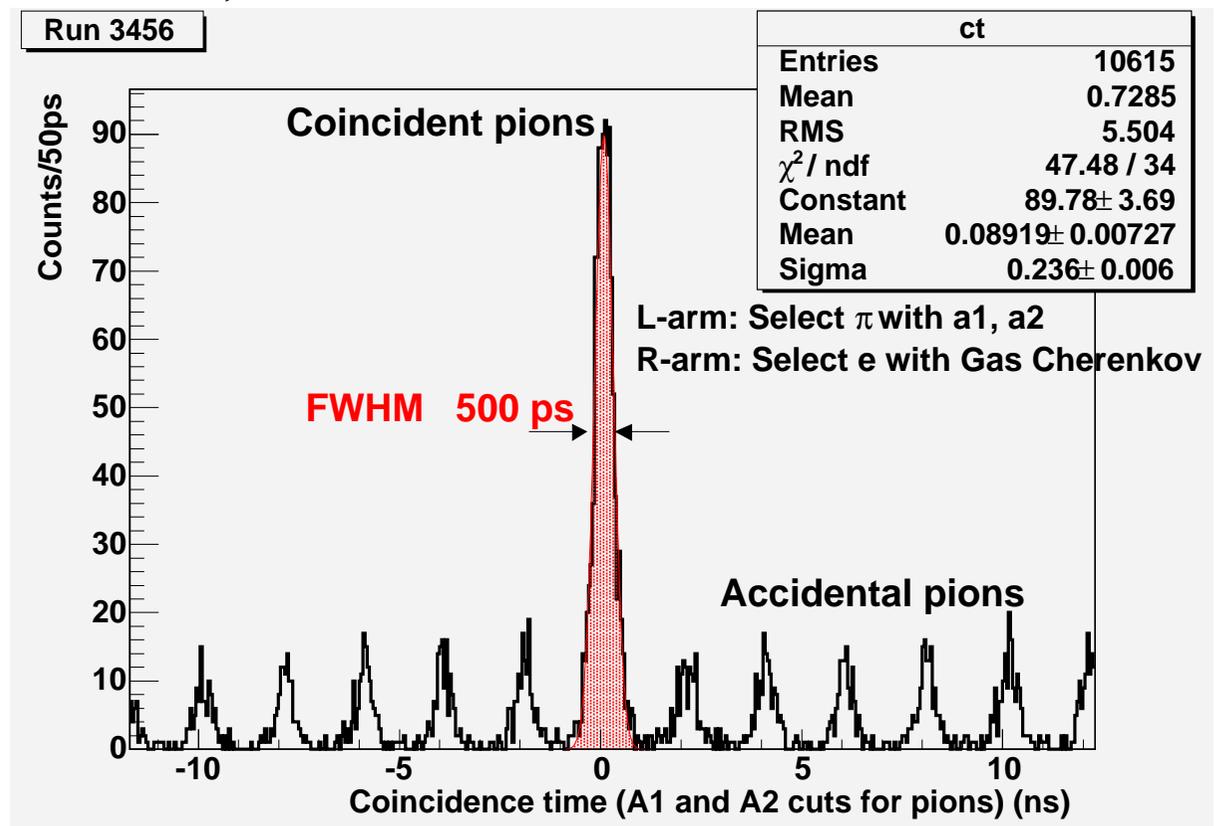
Successfully employed by all experiments this year:

- Hypernuclear Spectroscopy (E94-107)
- Pentaquark Partners (E04-012)
- HAPPEX (spectrometer analysis)
- DVCS (E00-110, E03-106)

Analysis software of upcoming BigBite/SRC and G_E^n experiments is based on Podd as well → full commitment to new analysis software

Coincidence Time – May 2004

(from Rob Feuerbach)



Recent Developments (since June 2004)

- Support for ROOT 4
- Energy loss corrections (simple version)
- Event-by-event beam parameters can be input of kinematics modules
- Dead-time and normalization analysis (Bob)
- Improved helicity analysis (in-time version) (Bob)
- Support for new hardware:
 - synchronous scalers (DVCS)
 - pipelined TDCs (BigBite)
- Support for EPICS string data (Bob)
- Support for arbitrary ROOT objects in output (Rob)
- Optics optimization now done using Podd (Vince)

VDC database

Optics matrix elements from ESPACE gave different results in Podd.

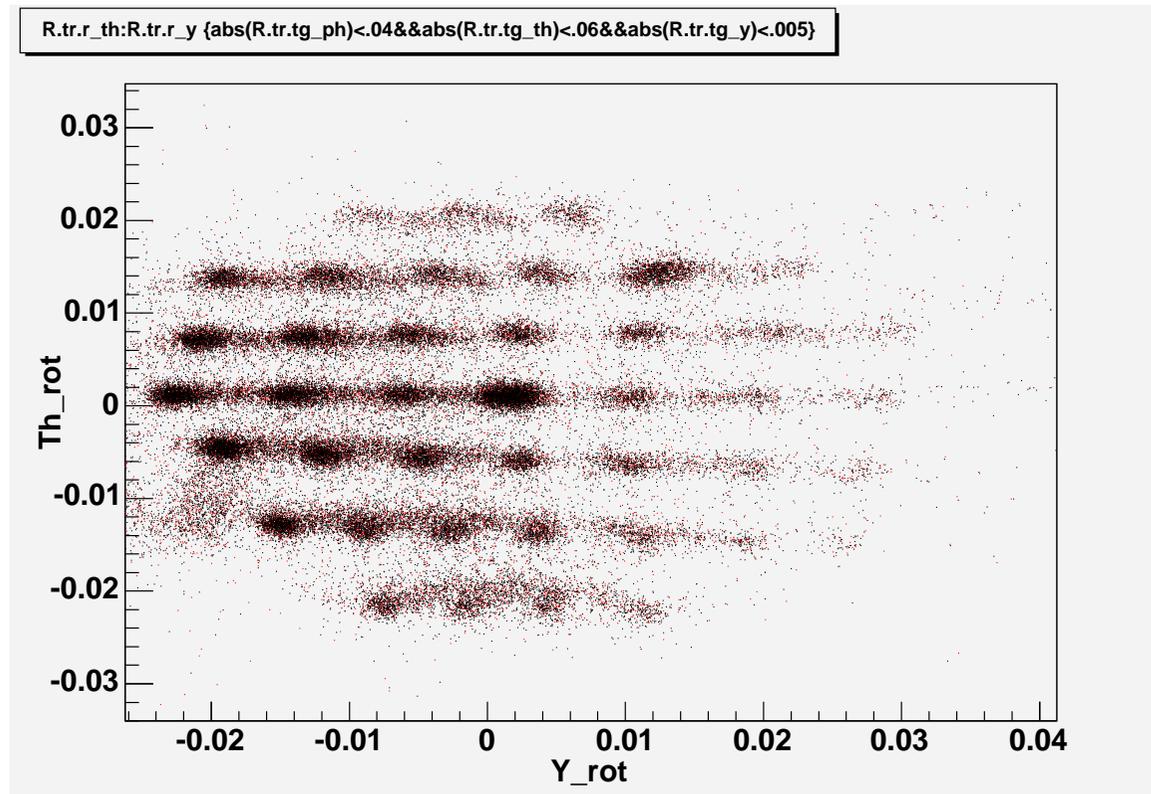
Certain geometry parameters were switched between right and left arm databases starting with 2001.

Correct numbers (from Vince):

| Arm | Plane Spacing (u1-u2) | u1 wbeg | v1 wbeg | u2 wbeg | v2 wbeg |
|-----|-----------------------|---------|---------|---------|---------|
| R | 0.3327 | 0.77852 | 0.77852 | 1.02718 | 1.02718 |
| L | 0.3348 | 0.77852 | 0.77852 | 1.02793 | 1.02793 |

Septum Optics Optimization

(from Vince Sulkosky)



Status of RICH code

(from Guido Urciuoli)

Algorithm:

- Find clusters (= photon hits)
- Calculate Cherenkov angle for each cluster
- Calculate average Cherenkov angle for each ring
- χ^2 test of angle distribution for 3 particle hypotheses
- If χ^2 tests are inconclusive, attempt noise reduction

Pion rejection factor of 1000 achieved

RICH plus aerogels in HRS-L result in excellent kaon identification

Work in progress

Nearly done:

- Scaler code simplification; scaler database (Bob)
- Simulation interface (custom decoder)

Open problems:

- Some STL does not work in Podd scripts, though fine in ROOT — understood but not yet fixed
- Slow if many output histograms defined
- Low VDC tracking efficiency (sometimes)

To Do

- **User's Guide**
- Improved VDC analysis
 - Include timing offset (t_0) in multi-cluster analysis
 - Exploit multi-hit capability of TDCs to identify noise and overlapping clusters
 - superior to ESPACE
- Finish event display and simulation input module
- Advanced PID
- FPP
- Metadata (i.e. replay configuration) in output
- Investigate problems

Resources

- Podd documentation at:

<http://hallaweb.jlab.org/root/>

- ROOT User's Guide at:

<http://root.cern.ch/>

- Pre-installed Podd on adaq machines.
Login as adaq and type `analyzer` (soon: `podd`).
See `$ANALYZER` directory.
- Example scripts in `$ANALYZER/examples`
- Online analysis setup for E04-012 and DVCS (adaq account)