Hall C

Mark Jones , Hall C Staff

Overview

- In first 3 years of running, experiments will use the existing High Momentum Spectrometer (HMS) and the new Super High Momentum Spectrometer (SHMS). SHMS replaces the Short Orbit Spectrometer (SOS).
- HMS and SHMS have similar detector packages: Drift Chambers, Scintillator hodoscope, gas Cerenkov, Aerogel, Lead-glass calorimeter.
- After 2018, several experiments use new apparatus: neutron polarimeter, neutral meson spectrometer, backward angle hodoscope as 3rd arm.

Status and Timeline

- SHMS carriage, detector hut constructed. Calorimeter installed.
- Installation of hodoscope soon with other detectors to follow.
- Q1 magnet installed. HB to be installed in March. Construction of other magnets on schedule.
- Beam commissioning in Fall 2016 (Shift from Feb 2016)

Goal of Hall C 12 GeV Software

Main goal is to have online/offline software ready for start of experiments.

To achieve this goal decided:

- Develop a Hall C specific standalone C++ library that utilizes the existing Hall A PODD C++ library. Use the existing well-tested Fortran code (ENGINE) as basis for the C++ library.

Management Structure

Activity	Person	Institute
Software Manager	Mark Jones	Jefferson Lab
C++/ROOT Analyzer	Gabriel Niculescu	James Madison University
Calibrations	John Arrington	Argonne National Lab
Online histogramming	Pete Markowitz	Florida International Univ.
Simulation (SIMC)	David Gaskell	Jefferson Lab

HMS and SHMS comparison

HMS detector	SHMS detector	Comment
Front X-Y scintillator plane Rear X-Y scintillator plane	Front X-Y scintillator plane Rear X scintillator plane Rear Y quartz plane	Same code Same code New code
Drift Chamber	Drift Chamber	SHMS DC based on Hall C SOS DC design
Gas Cerenkov	Noble Gas Cerenkov Heavy Gas Cerenkov	Same code
Aerogel	Aerogel	Same code
Lead Glass Calorimeter 4 columns oriented perpendicular to central ray	Pre Shower Column “Fly’s Eye” Arrangement of Calorimeter	New code. SHMS is similar to Hall A Calorimeter

Test new HMS code against original Fortran code (ENGINE) using 6 GeV HMS data

Test new SHMS code against original Fortran code (ENGINE) using 6 GeV SOS data

Present Status

- HMS Drift Chamber tracking code is working. Added best track selection and tracking efficiency code. In depth comparison of tracking efficiency in progress.
- HMS hodoscope, gas Cherenkov, aerogel and calorimeter coding and comparisons completed.
- SOS (Same as SHMS) drift chamber tracking working with comparisons completed.
- Hall C report templates added to code.
- PODD updated Event Decoder and added new Event Handler. Working to implement Hall C scalers and EPICS into HCANA.
- Using git for version control and Github as repository server.
- SCONS for building code. (Still have Make available. Hope to phase out)
- Documentation on Hall C wiki to allow users to get involved.
- Nightly builds

2014 Milestones Status

Jan: Hall C specific BPM/Raster code. Hall C report templates Completed

Mar: Implement Hall C scalers. Work in progress

June: Complete documentation of Fortran code. Work in progress

July: HMS Calibration codes ready.

Calorimeter and drift chambers done.

Optics and hodoscope just starting.

Aug: HMS Online histogramming ready Work in progress

Oct: Test software for SHMS calorimeter with FADC.

Code compatible with PODD in place. Need to integrate in HCANA.

Dec : Full analysis of HMS data with C++ Analyzer verified by comparison to Fortran analyzer.

Completed HMS detector comparison.

Working on physics comparison.

Dec: Nightly builds Completed

Updated Milestones

2015

May: Complete HMS ENGINE/HCANA physics comparison

June: Complete HMS/SOS ENGINE/HCANA coincidence comparison

June: HMS Online histogramming ready

Aug: HMS/SHMS Calibration codes ready.

Sept: SHMS Calorimeter Calibration code ready.

Oct: C++ Analyzer ready for SHMS detector package.

Dec : Analyze cosmic ray data in SHMS

Response to Recommendations

Recommendation	Response
Adoption of code evaluation tools	1) Cppcheck is part of SCONS build. 2) Using Valgrind intermittently.
Consider code reviews	Rely on Hall A experts to review code. Use PODD as example and framework.
Software workshops and tutorials	Annual workshops. Wiki pages.
Looking at TagFS as a potential tool for file metadata and data discovery	Decided not to use.
Provide a generic mechanism to capture the available monitoring histograms and other output at the end of a data acquisition run.	Standard practice.
Effort should be made to identify personnel capable of extending the Hall C Software migration to full tracking, calibration, and physics calculations.	See next slide

Personnel

Task	Personnel
Comparison of HMS physics quantities	Ioana and Gabriel Niculescu, JMU
HMS and SHMS histogramming	Pete Markowitz and student, FIU
Optics calibration	Ed Brash and students, CNU
Tracking Efficiency	Ahmed Zafar, Regina
Comparison of HMS/SOS coincidence	Dipangkar Dutta, MSU
SHMS calorimeter	Simon Zhamkochian, Yerevan Vardan Tadevosyan, Yerevan
HMS/SHMS Hodoscope calibration	Ahmed Zafar, Regina

Deep Dive Session

- “Hall C: Deep Dive”, Gabriel Niculescu, JMU
- Users available for questions:
    - Ed Brash, CNU
    - Simon Zhamkochyan, Yerevan
    - Dipangkar Dutta, MSU