

# 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 3<sup>rd</sup> arm.

## Status and Timeline

- SHMS carriage, detector hut constructed.
- All detectors installed in detector stack
- HB and Q1 magnet installed. Q2 magnet being commissioned and Q3 and dipole magnet to be delivered in Nov and Dec.
- Beam commissioning in Spring 2017

# 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.

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.
- 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.
- Hall C scalers and EPICS added.
- New decoding for VME FADC and CAEN 1195 TDCs in HCANA.
- New code for SHMS calorimeter and quartz plane is done.
- Using git for version control and Github as repository server.
- SCONS for building code.
- Documentation on Hall C wiki to allow users to get involved.
- Nightly builds

# Progress on 2015 Milestones

In black on promises in 2015, red is current status, green is completed

May 2015: Complete HMS ENGINE/HCANA physics comparison.

Status: In progress

(HMS and SOS ENGINE/HCANA detector comparison done)

June 2015: Complete HMS/SOS ENGINE/HCANA coincidence comparison

Status: In progress

June 2015 : HMS Online histogramming ready

Status: In progress

Aug 2015 : HMS/SHMS Calibration codes ready.

Status: HMS/SHMS hodo and DC codes in progress, based on old versions

Sept 2015 : SHMS Calorimeter Calibration code ready.

Status: HMS/SHMS calorimeter codes done by Sept 2015

Oct 2015: C++ Analyzer ready for SHMS detector package.

Status: Almost complete. FADC250 and CAEN 1195 decode written.

Dec 2015: Analyze cosmic ray data in SHMS

Status: Separate analysis has been done. SHMS DC and calorimeter.

Data with entire stack is planned in Nov 2016- Feb 2017

# Response to Recommendations

## Recommendations

- Clarify for the users the role of timestamps and run numbers. Unless the condition is varying too rapidly, we recommend using run numbers as a primary key for constants. Treat the time as a secondary information to be stored with the collection of constants.

Response:

Hall C uses run number as primary key for constants in HCANA.

# Personnel

Task	Personnel
Comparison of HMS physics quantities	Ioana and Gabriel Niculescu, JMU
HMS and SHMS histogramming	Eric Pooser, Hall A postdoc
Optics calibration	Ed Brash and students, CNU Jure Berecic, Hall C postdoc
Comparison of HMS/SOS coincidence	Dipangkar Dutta, MSU
SHMS calorimeter	Simon Zhamkochian, Yerevan Vardan Tadevosyan, Yerevan
HMS/SHMS Hodoscope calibration	Mark Jones, Anashe Bandari from W&M
HMS/SHMS DC Calibration	Deb Biswas from Hampton U. Carlos Yero from FIU Mark Jones

# Deep Dive Session

- “Hall C: Deep Dive”, Dipangkar Dutta , MSU