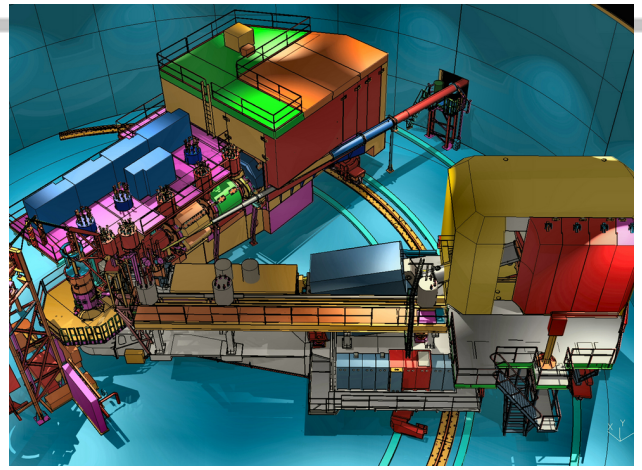
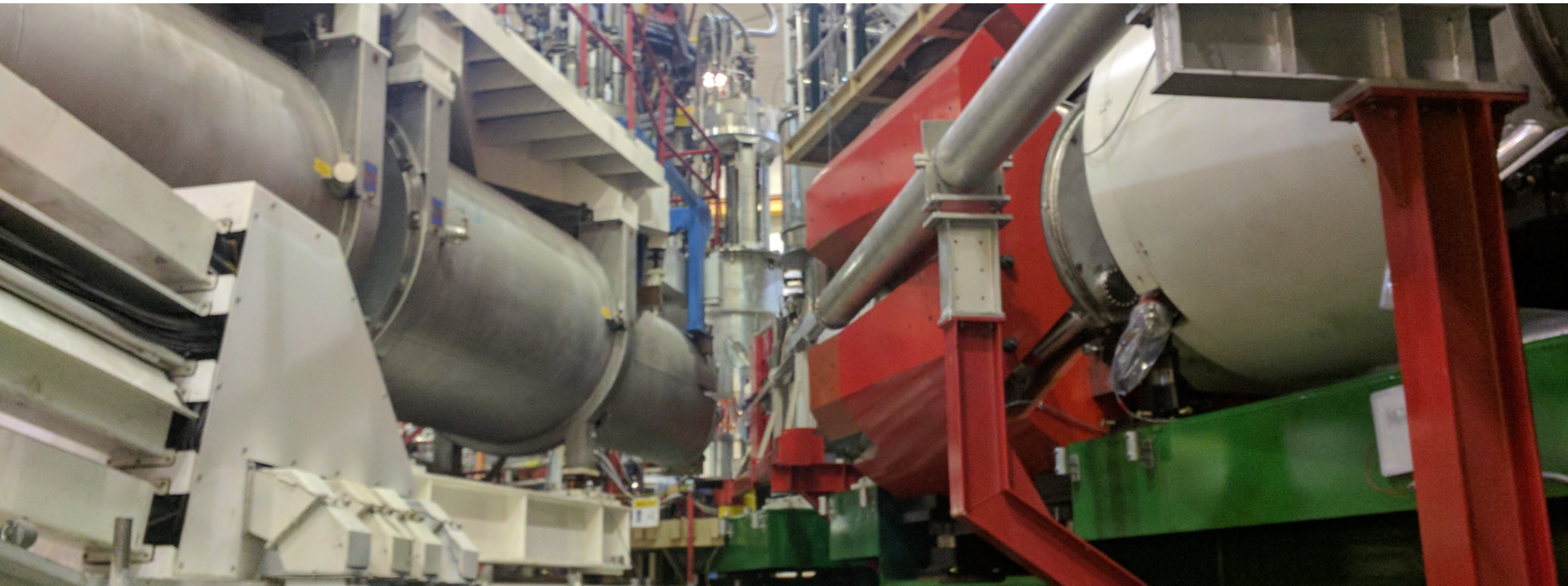


# Hall C
# Users Meeting
# January 22-23, 2018

Stephen Wood



# Publications and Students

**Publications:**

GEp-III – GEp-2γ archival paper – improved GEp-2γ error bars

Phys Rev C 96, 055203 (2017)

Comparison of Moller and Compton electron-beam polarimeters

Phys Lett B 766, 339 (2017)

Qweak result – submitted to Nature

Encouraging feedback from referees

Hypernuclear (HKS) technical paper – submitted to NIM (arXiV:1709.05682)

Kaon form factor from 6 GeV data paper submitted – (arXiv:1801.01536)

E00-002 – FL at low Q2 – submitted to PRC (arXiv:1606.02614)

**Graduated Students:**

Qweak: Wade Duvall, Valerie Gray, Martin McHugh, Michael Moore, Hend Nuhait

Kaon Electroproduction: Marco Carmignotto

Meson production: Samip Basnet, Wenliang Li

# Commissioning Experiments

December 2017

SHMS (and HMS) commissioning at 1-pass

January-March 2018

Continue commissioning at 3-pass

~25 PAC days – Commissioning "Experiment"

Started!

E12-06-107 search for color transparency

A(e,e'p) only – "easy" coincidence measurement

E12-10-002 $F_2^{p,d}$ structure functions at large x

Momentum scans help understand acceptance

2 days E12-10-108 EMC Effect

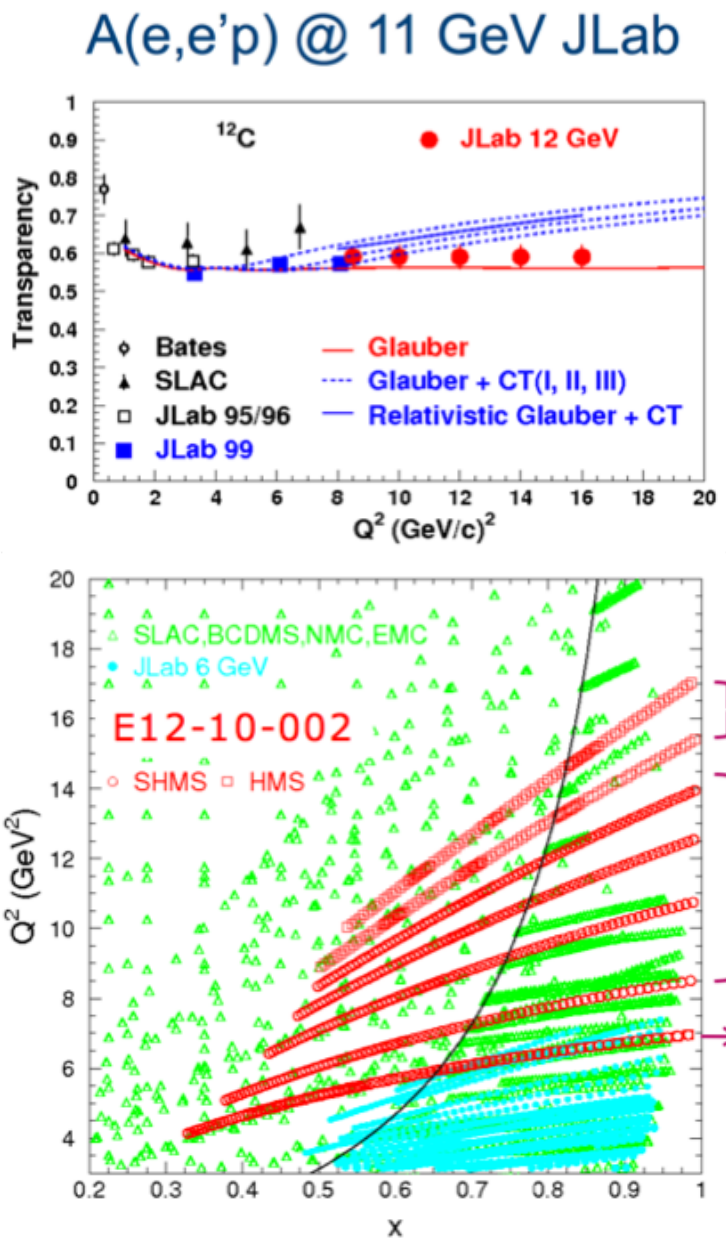
Integrate light nuclei with $F_2$ run,

Point target helps acceptance studies.

3 days of E12-10-003 d(e,e'p)

Push to lower cross sections

E12-09-017 SIDIS TMD



# Recent preparations for running

Shielding installed to cover gaps around SHMS dipole.
(Lead filled boxes)

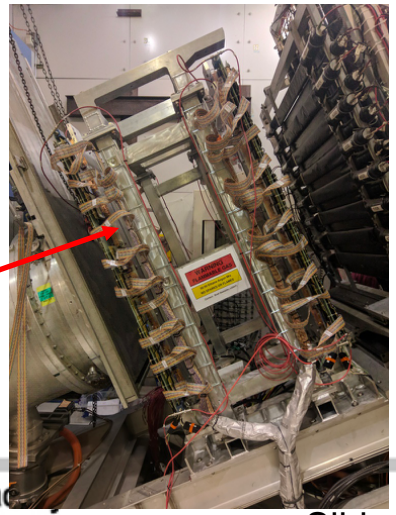
Maintenance of HMS magnets, SHMS magnet shakedown

Cryogenics, NMR probes, …

Studies of SHMS and HMS magnets to establish operation procedures

KPP B v I curves (See Holly Szumilla-Vance talk)

New UV-glass PMTs installed on 4th hodoscope plane (quartz bars). (See Simona Malace/Carl Zorn talk.)



New Drift Chambers (from HU) installed in HMS

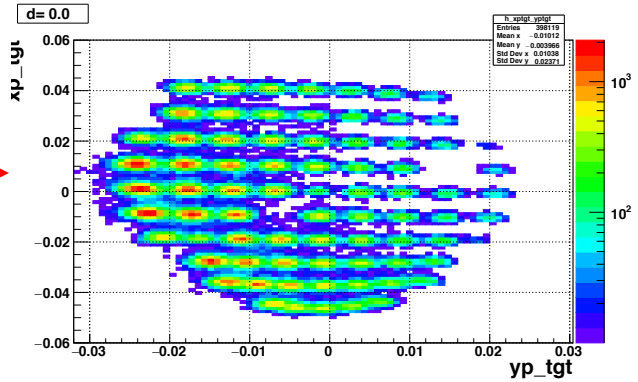
Same design style as SHMS chambers

(See Bishnu Pandey talk – June 2017 Hall A/C Meeting)

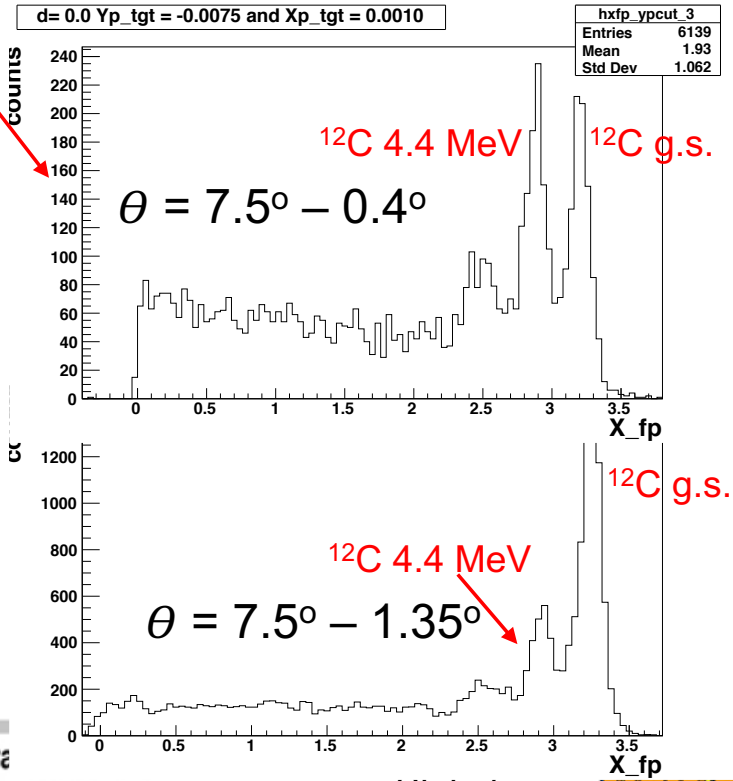
# Commissioning

SHMS commissioning data taken at 2.2 and 6.4 GeV

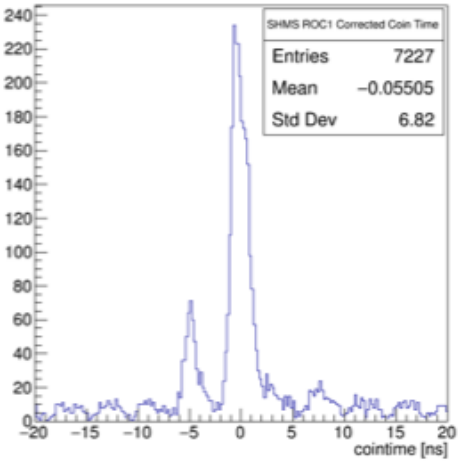
- Optics data taken
- Sieve slit holes imaged with COSY matrix elements




- $^{12}$C ground state and 4.4 MeV state have expected angular dependence




- Coincidence DAQ established




4 ns RF structure
(4 hall operation)

For better/more up to date plots: See talks

**Run update, Optics, Quartz Plane, Analyzer, DAQ,**

**+ 4 commissioning experiments**

# Shifts Available!

Hall receiving steady beam at currents up to 65 uA.

Hall equipment functioning well.

Just 8 shifts required for authorship on all four commissioning experiments!

Shift signup link on Hall C home page.

Training:

Radworker I, ODH, Hall C Safety walkthrough

+ read COO, ESAD, RSAD and ERG (also linked on home page)

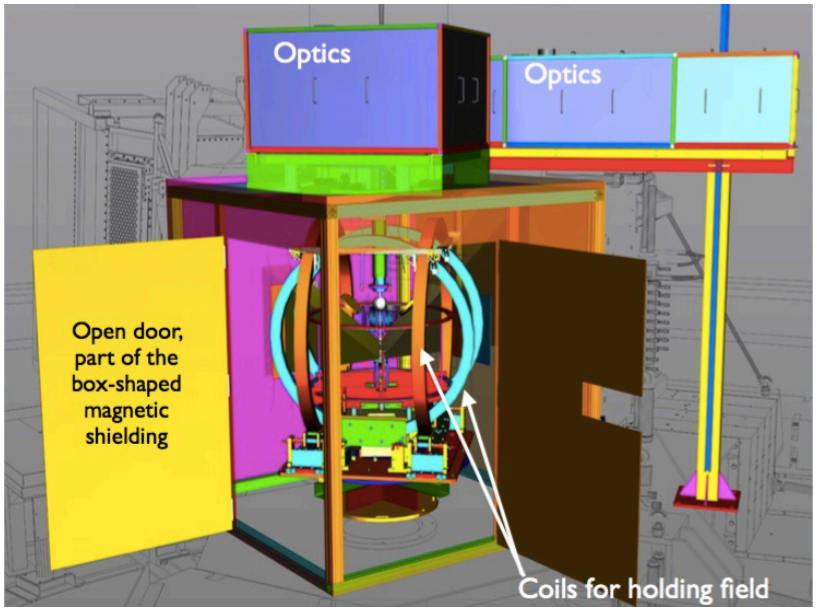
Target training needed for target operator. (Training good for halls A+C).

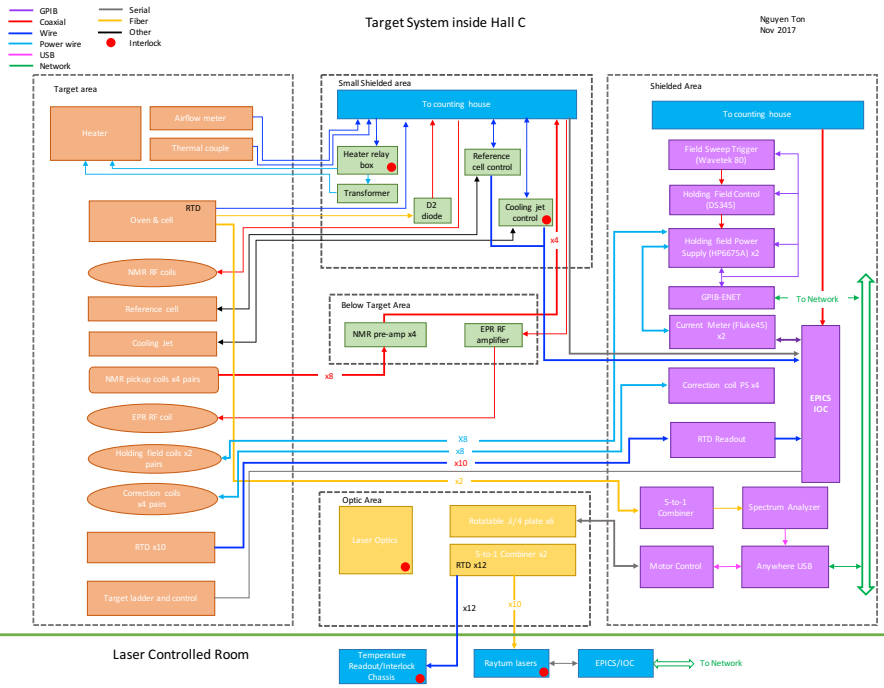
# Polarized 3He Target Status

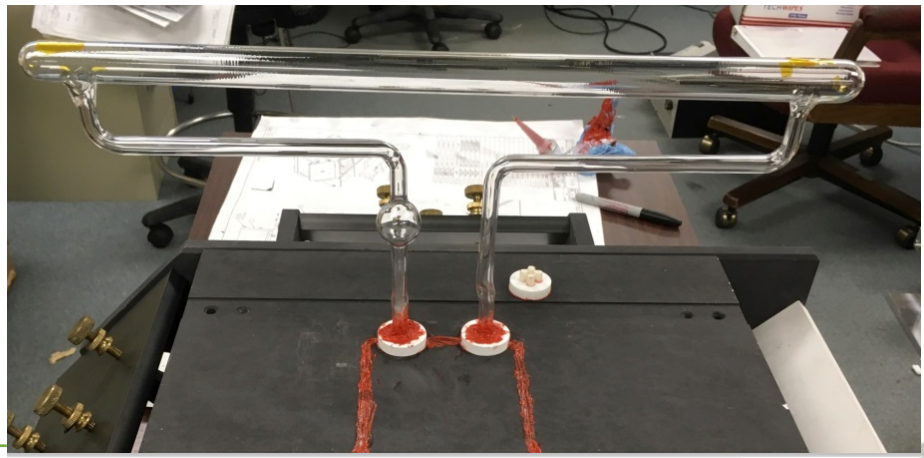
## Improvements and continued development

Phase I upgrade of existing target

- Implementable in either Hall (C or A)
- 40 cm production quality cell at JLab
- Systems design for Hall C in progress
- Can be installed with ~6 months notice



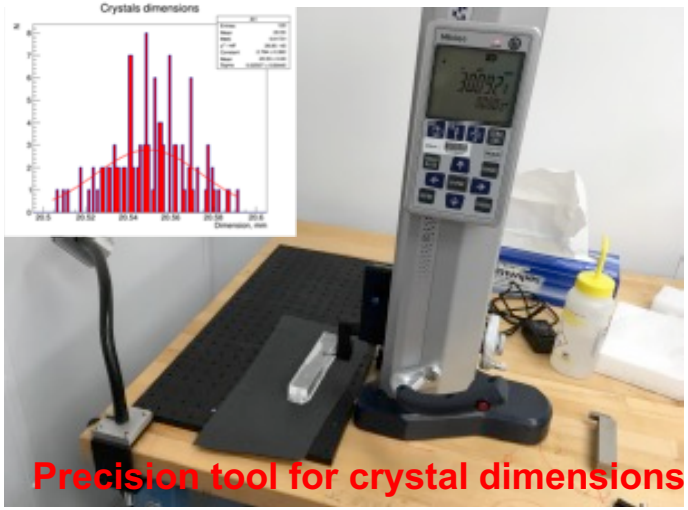
# NPS – Project Status


The NPS PbWO4-based calorimeter

**Four fully approved experiments, supported by NSF MRI PHY-1530874 (CUA, OU, ODU), international (IPN-Orsay, Glasgow, Yerevan), and JLab – one conditionally approved experiment.**

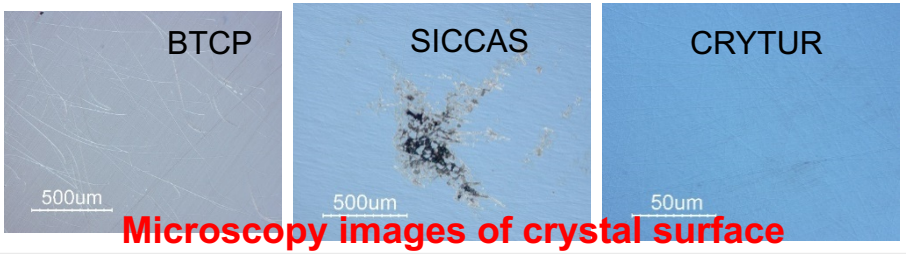

Main coil before shipping

- Magnet: corrector and main coil construction complete, corrector coil is in test lab, yoke steel cutting nearly final, setting up space in test lab for assembly



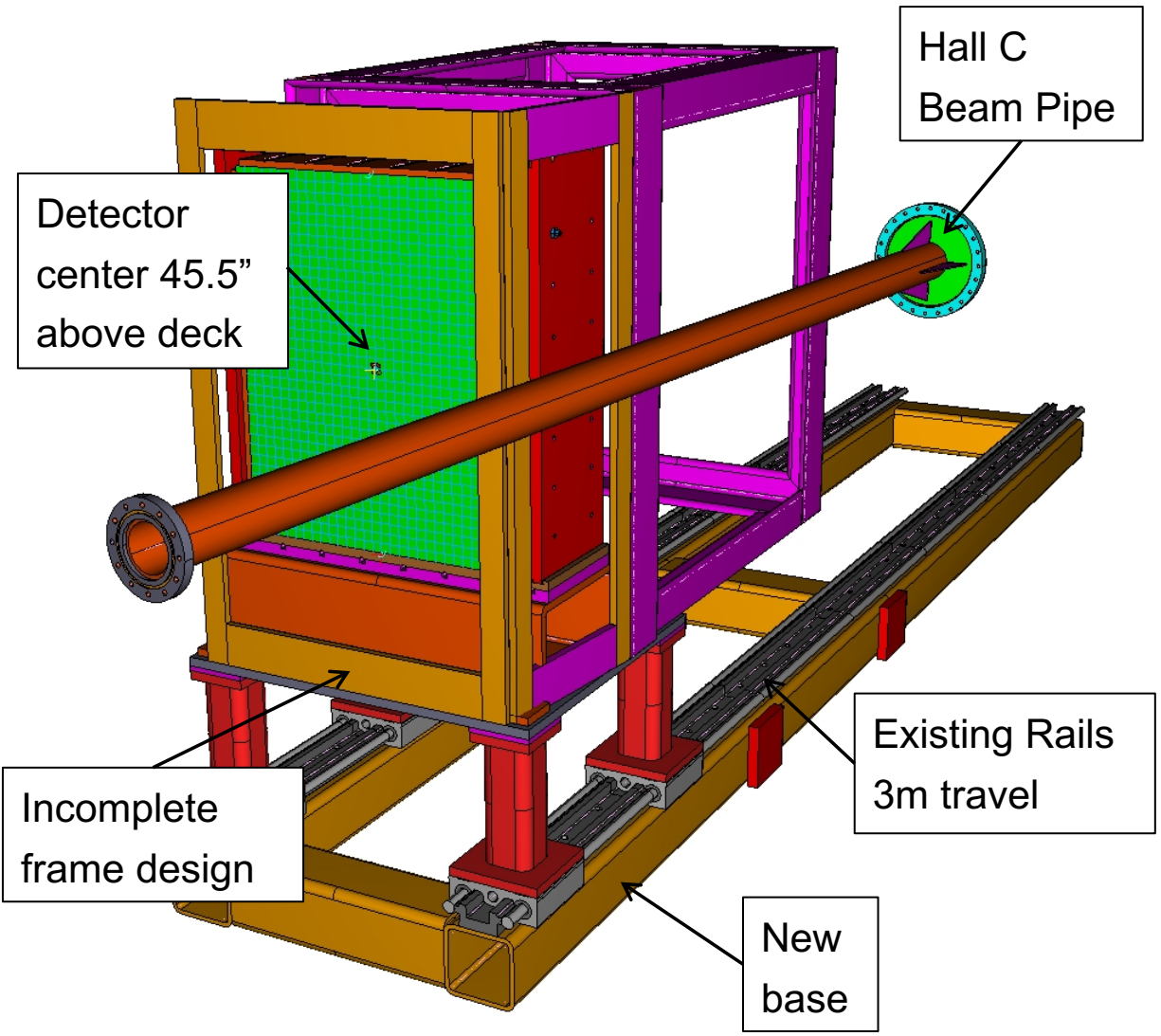
Precision tool for crystal dimensions

- PMT and HV bases: design drawings final, prototyping, procurements started
- Frame and integrated systems: concepts and initial design complete, detailed drawings to be presented this week
- Crystals: 460 crystals procured from SICCAS, full crystal testing facilities at CUA and IPN-Orsay, chemical analysis and crystal growth in collaboration with the VSL, synergy with EIC crystal calorimeter R&D, cleanroom ready



Microscopy images of crystal surface

# NPS Detector – crystal stack, 30 by 36 matrix




## Comments about LAD/NPS

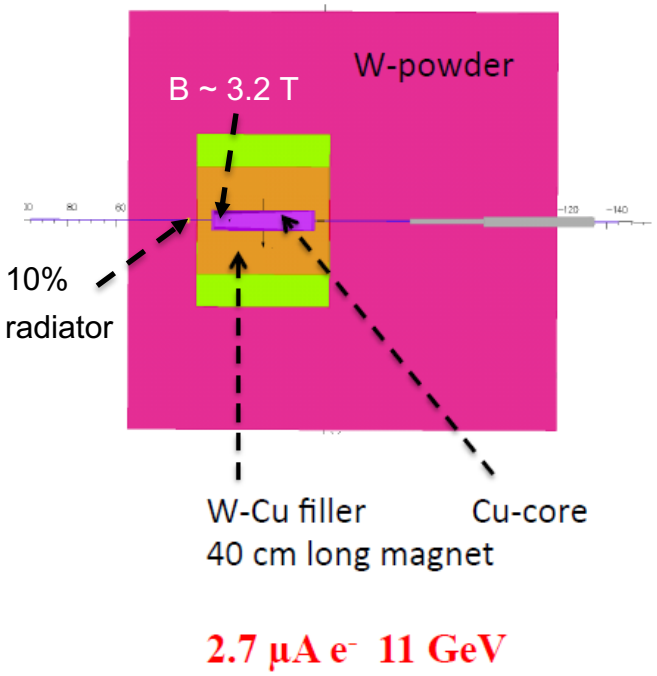
- Planning to start HV/Signal cabling for NPS & LAD
  - Do at least enough to support LAD first
  - Similar patch panels (HV breakout and signal) at front of SHMS deck
- Procure some electronics as funds available
  - TI boards
  - VXS crates

# (Hermetic) Compact Photon Source – C & D

Further worked out CPS engineering design concept for Hall C (or A) – basic layout will also work for CPS in Hall D Tagger Vault: if one uses a 2nd raster system for Hall D to compensate for the initial 1 mm raster this can be an equivalent essential design

*Some differences…*

- Hall D alcove has more space, so simpler positioning and shielding placement
- Hall D up to 60 kW (<5 μA @12 GeV), Halls A/C up to 30 kW (2.6 μA @ 11 GeV)
- Different length/field magnet for Hall D & Shielding may differ.




Due to the use of a Cu core: $T_{max}$ = 380 C

Maximum heat density in core = 584 W/cm$^3$

After 1000 hours, the accumulated 1-MeV-Nu damage to silicon at the pivot is less than $10^{12}$ at 20 cm away from beam line. Outside a (10 cm) borated plastic layer it is several $10^{11}$

The dose rate from activation 1 hour after the beam is shut down at the pivot is ~1 mrem/h.

→ CPS design concept is maturing!

# NIM Article on SHMS

Howard Fenker volunteered to organize technical description of the SHMS spectrometer (Nuclear Instruments & Methods in Physics Research)

Motivation for spectrometer

Design principles/specifications

Magnet characteristics (leave engineering details for other pubs)

Detector descriptions - design and performance

Optics – design and calibration

Commissioning results

PID – design and performance


Existing material (Manual, Howtos, CDR?,Wiki?) could be starting point for some sections.

Contributors welcomed