

Magnet, Support and Infrastructure

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August 27, 2016

Outline

- Director's Review Comments
- Update on Engineering Tasks for FY16
- Hall A Layout for SoLID (updated magnet position)
- Magnet Disassembly & Transfer to JLAB
- Transport and Storage of CLEO
- CAD Model Available to Collaboration

Director's Review Comments

2B.

- The Committee strongly recommends testing the CLEO magnet coils (cold test), power supply and controls, before installation in Hall A.

Response: JLAB plans to setup cold test of cryostat in FY18. A 3D magnet analysis is needed to determine the amount of return iron needed to produce proper axial magnetic forces on the coils. Need to coordinate manpower and facility to conduct tests before putting Cryostat in storage area. - JLAB allocated 30% of magnet engineers for FY16, engineers have yet to be available due to 12 GeV needs.

- A new magnet power supply should be included in the total cost of SoLID.

Response: No progress on defining new power supply.

- Evaluate the schedule impact of mapping the magnetic field in situ in Hall A.

Response: Need Collaboration to define specifications for magnetic field mapping. Ideally, use (borrow) an existing mapper. A 3D magnet analysis is needed to aid in magnet mapping definition and defining forces. - JLAB allocated 30% of magnet engineers for FY16, engineers have yet to be available due to 12 GeV needs.

Director's Review Comments

2D.

- It should be confirmed that the baffle design, including the support structure, is optimized for background rejection and signal acceptance. Furthermore the baffle design should minimize generation of secondary backgrounds.

Response: Nose and baffle support design are in initial analysis stage, iterations will continue as design develops. Structural analysis will be included in FEA study.

3B.

- A cost benefit analysis for any systems being reused should be carried out, including the magnet power supply.

Response: As the CLEO-II magnet is disassembled detailed parts and part conditions can be identified; cryogenic lines, controls, power supply... -this effort will continue through September of 2016.

Evaluation of compatibility of existing CLEO equipment with Hall A systems will commence upon completion of transfer magnet and components -this effort will continue through FY17.

Director's Review Comments

3C.

- We strongly recommend tests at JLab of the CLEOII magnet coils (cold test), ideally with the new power supply and controls, before installation into the hall.

Response: Agree to cold testing of cryostat, need to coordinate timing such that controls and power supply are ready. New controls and power supply ready before FY18 would be “challenging”.

- An effort should be made to clearly specify resources required from JLab that are not explicitly in the project (effort, noneffort, equipment, building space, etc.)

Response: Agree. Expect to have more definition of space and utility requirements by early FY16, then start coordinating with JLAB facilities and cryo groups. – space allocation coordinated with FM. Cryo and control systems requirements can be better defined upon completion of CLEO removal from Cornell.

Director's Review Comments

3D.

- The project should develop a preliminary resource loaded schedule for the installation and the corresponding space management plan for the hall floor.

Response: Agree, planned engineering effort for late FY15 – basic layout updated with other experimental equipment included. Space for mobile crane used for assembly taken into account. Preliminary installation estimate complete for manpower. With knowledge gained from CLEO disassembly the installation plan can be refined.

- The project should start planning the process of how to change from one SoLID configuration to another in order to better understand the time and effort involved and if there are any potential issues such as radiation

Response: Agree, integrated into design of magnet and detector supports, more detail as design of experiment continues.

Hall A Engineering Group Tasks

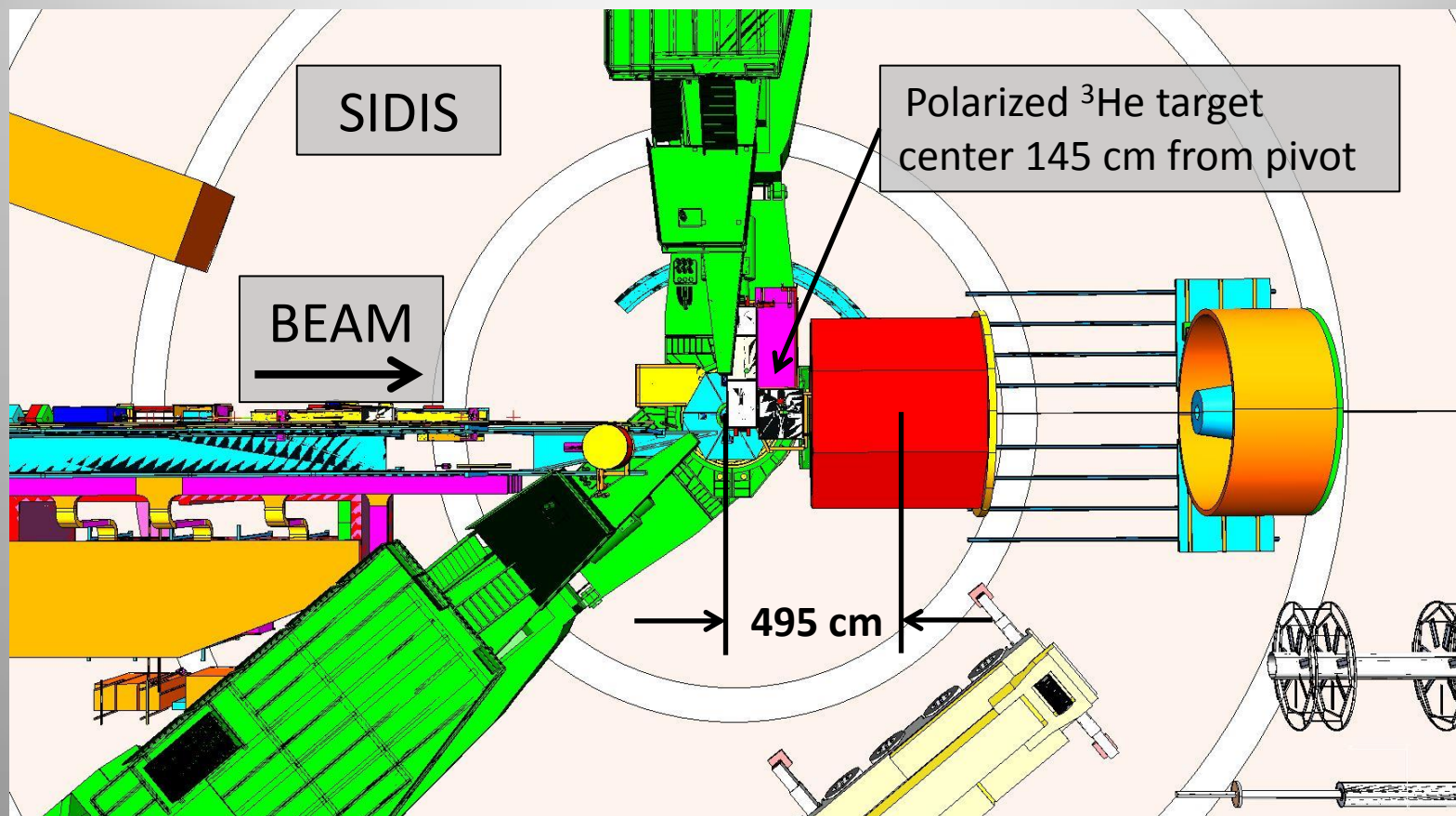
FY16 (6MW design/10MW engineer)

- Participate in the removal of CLEO from Cornell July – Sept 2016 – *Disassembly of magnet is on schedule with multiple trips to Cornell remaining for JLAB personnel. More details below.*
- Shipping of CLEO parts to JLAB scheduled for Sept - Oct 2016
- For the steel - *We have defined shipping requirements and given them to JLAB Shipping & Receiving department. We have developed a cost estimate for this task.*
- For the cryostat –*We have provided Cornell new axial transport brackets to secure the coil during transport. We are defining the unloading plan, which will require crane rental and additional hardware to roll into Testlab.*
- Coordinate storage of CLEO components with property management –**FM** has allocated space for all of the components.

Hall A Engineering Group Tasks

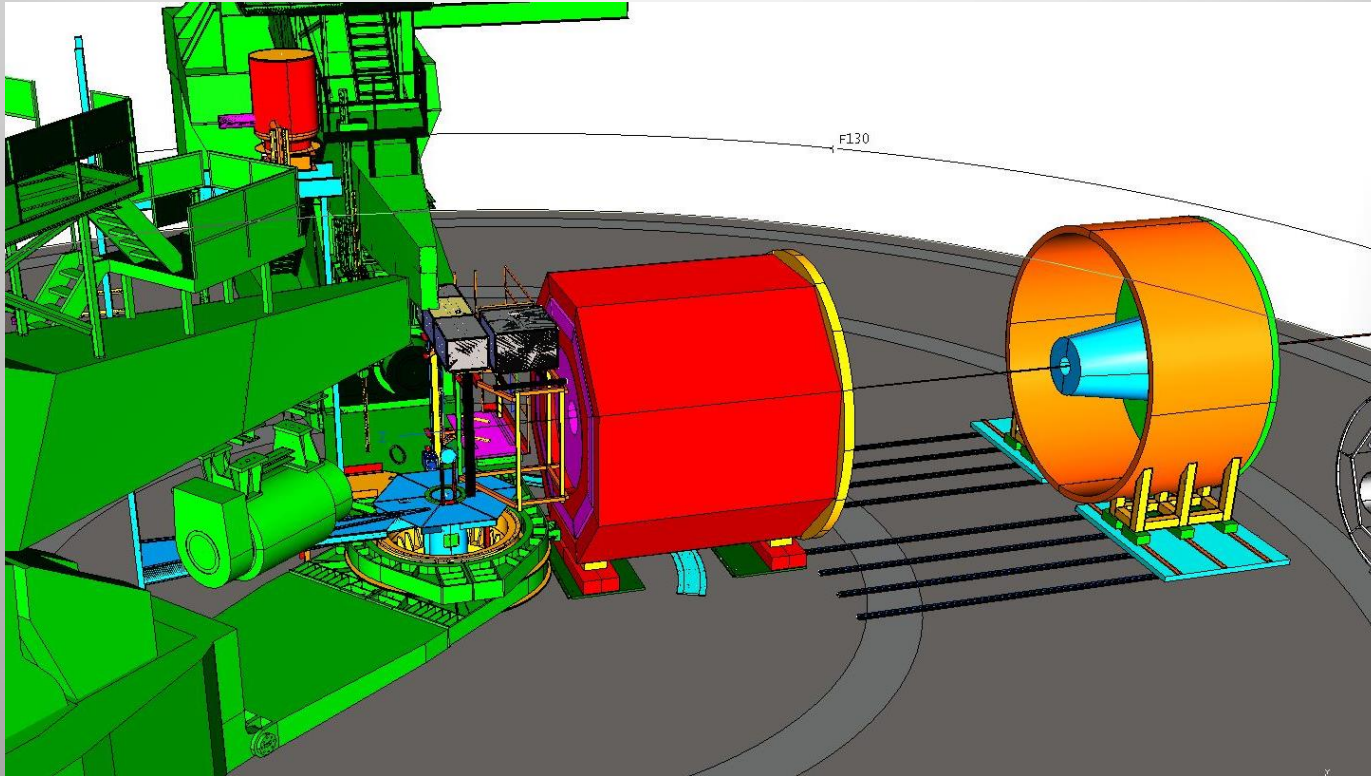
- 3D magnet analysis to aid in magnet mapping definition and defining forces -*JLAB allocated 30% of magnet engineers for FY16, engineers have yet to be available due to 12 GeV needs.*
- FEA of magnet and detector supports –will begin after completion of 3D magnet analysis and include detector supports.
- Develop plan and coordinate setup of JLAB facility for cold test of cryostat –*this effort will continue through FY17.*
- Define new power supply – no progress this FY.

Update on Magnet Position in the Hall Layout



- HRS beam right spectrometer moved back beyond the truck ramp opening and will allow direct access for delivery of SoLID items.
- Polarized ^3He target to be 145cm downstream of pivot for magnet to clear pivot bearing. Maintained the distance between coil center and target center of 350 cm.

Update on Magnet Position in the Hall Layout



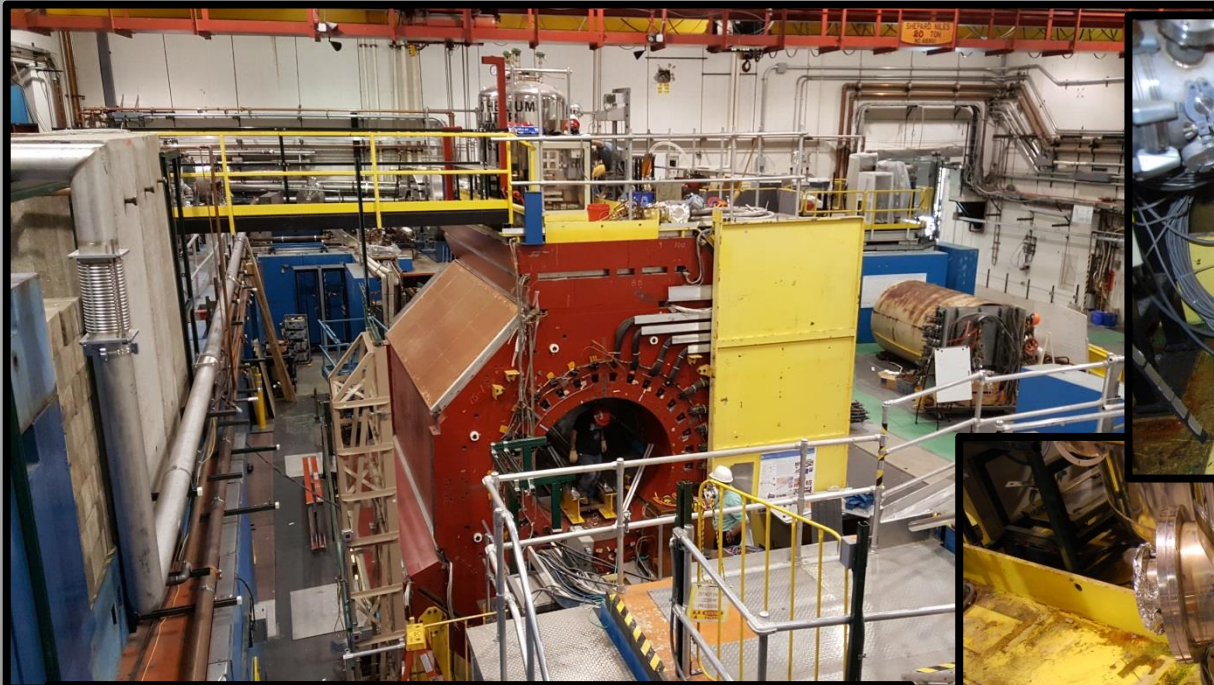
- Need to consult with the JLAB Target Group to understand the implications of the 30 cm shift for the two SIDIS and the J/ψ targets. The PVDIS target design may be affected as well.

Magnet Disassembly & Transfer to JLAB

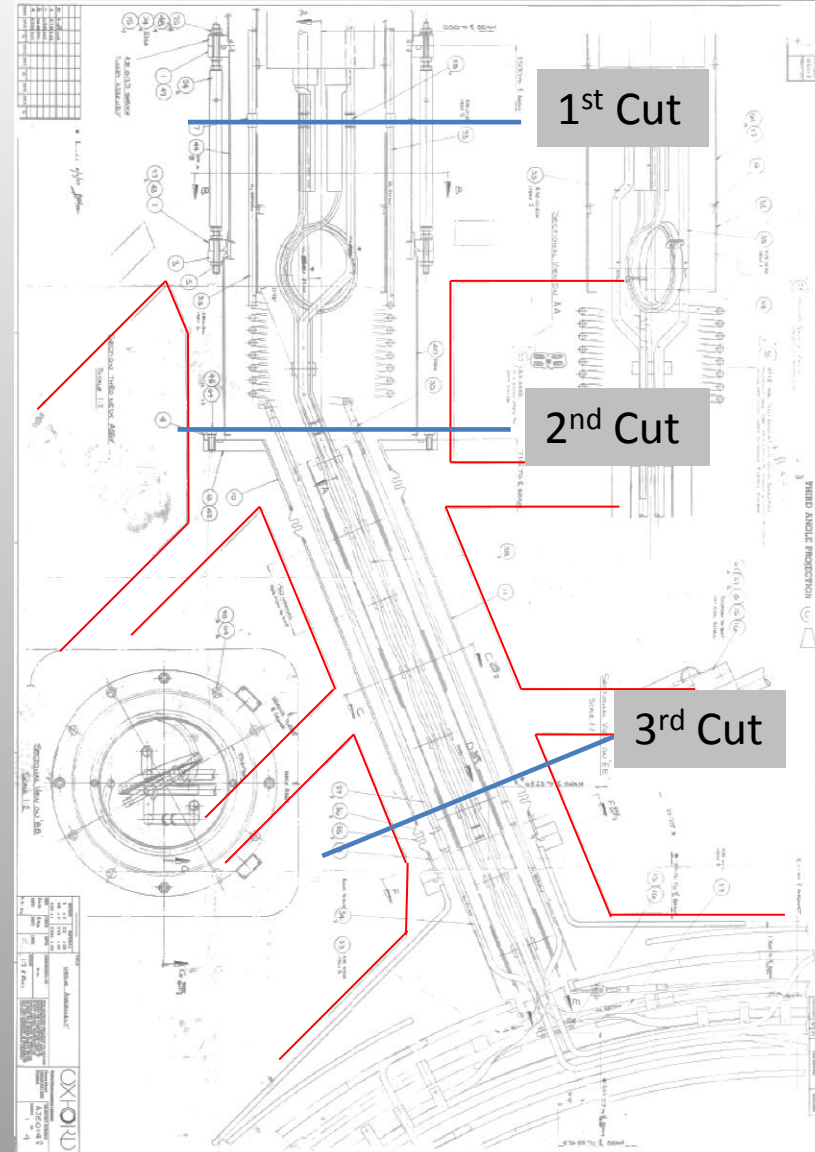
- Currently progressing on schedule – current task is removal of large barrel calorimeter mounted inside the bore of the cryostat.
- Next step involves removing the remaining steel including the octagonal coil collars and prepare to lift the cryostat and place it on the support frame.
- Then removal of the neck and packaging for transport remain.



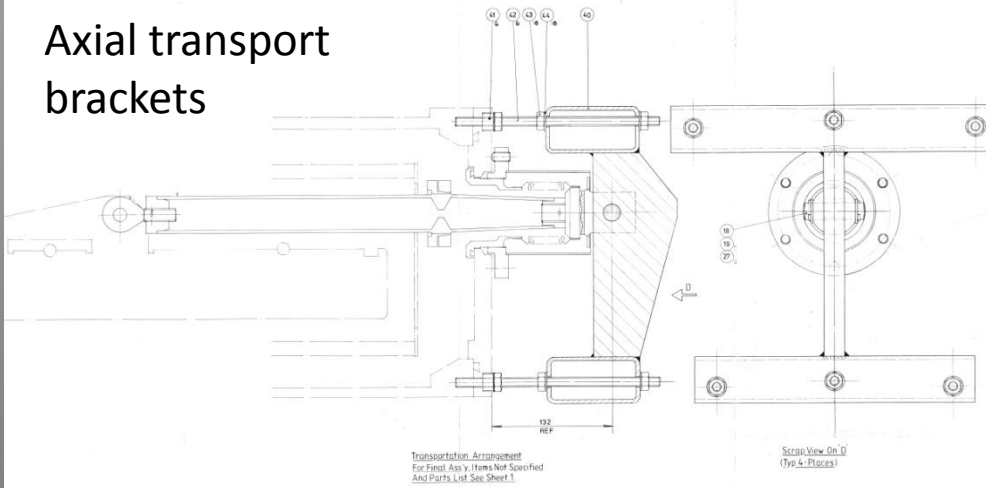
Magnet Disassembly & Transfer to JLAB



Magnet Disassembly & Transfer to JLAB

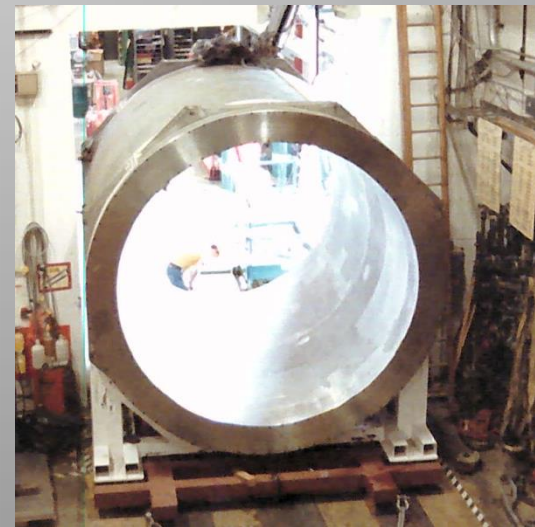
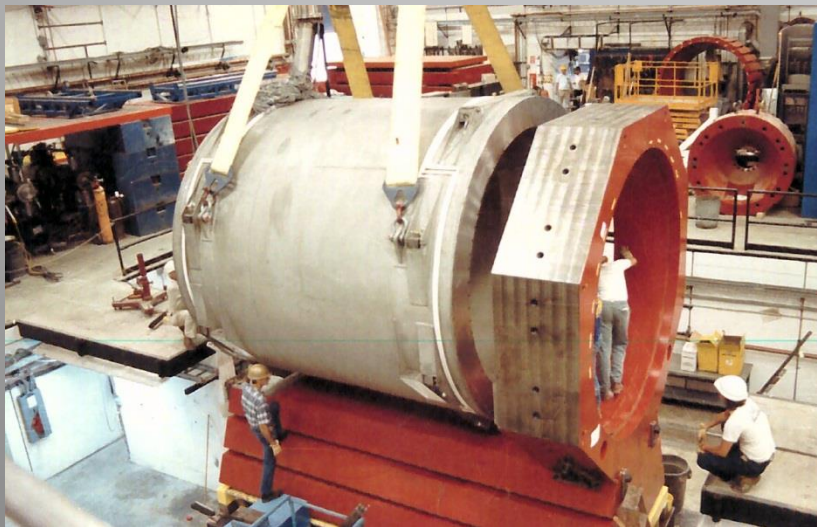


Axial transport brackets



Transport and Storage of CLEO II

- Disassembled and loaded on trucks for shipping by the Cornell personnel with oversight by Jefferson Lab. It will require 52 trucks to transport the magnet and related equipment.
- We have identified all of the parts of the CLEO magnet, with sizes and weights, anticipating a need for storage of these parts at Jefferson Lab starting Summer 2016, total weight of 1,053k lbs.
- The cryostat (44k lbs) will need to be stored in an environment-controlled area of approximately 400 square feet. Space has been allocated in the Test Lab for storage.
- Planning for storage of all iron parts nearly finalized with several locations being evaluated.



SoLID CAD Files

CAD

Introduction

The idea is to share CAD file of individual parts from different groups, then combine them into the full system by JLab engineering

please send file to Zhiwen Zhao <zwzhao@jlab.org> or Whit Seay <wseay@jlab.org>

all files are at <http://hallaweb.jlab.org/12GeV/SoLID/download/CAD>

for the status of overall SoLID CAD, refer to slide 10 of http://hallaweb.jlab.org/12GeV/SoLID/meeting_coll/2016_01/Whit_SoLID_JAN_2016-SEAY.pdf

Distance to the center of the coils from the Hall A center is about 465 cm.

overall

SIDIS Setup

- v1.0, http://hallaweb.jlab.org/12GeV/SoLID/download/CAD/SoLID_SIDIS_V1.0.stp, http://hallaweb.jlab.org/12GeV/SoLID/download/CAD/SoLID_SIDIS_V1.0.stl
 - from "Whit Seay" <wseay@jlab.org> in 2016/04
 - Base on magnet 1.0, HGC 2.0, EC 1.0, and all other parts with general geometry as placeholder
 - stp version is from Whit, stl is converted by Zhiwen using "autodesk inventor"

subsystems

Please continue to send us updated CAD files or upload them to the wiki page

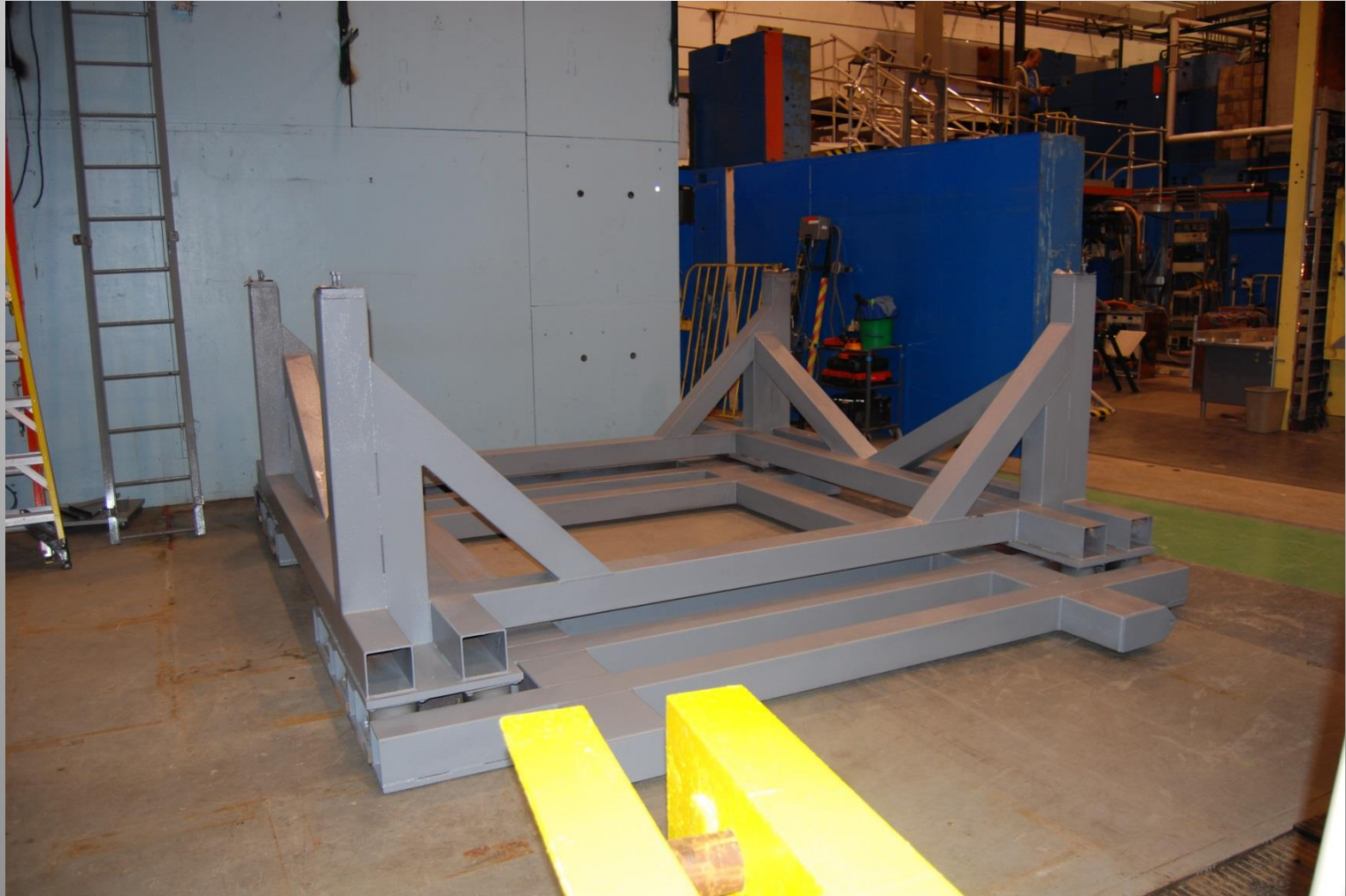
https://hallaweb.jlab.org/wiki/index.php/SoLID_CAD

<http://hallaweb.jlab.org/12GeV/SoLID/download/CAD/>
please send file to Zhiwen and edit the wiki with some info

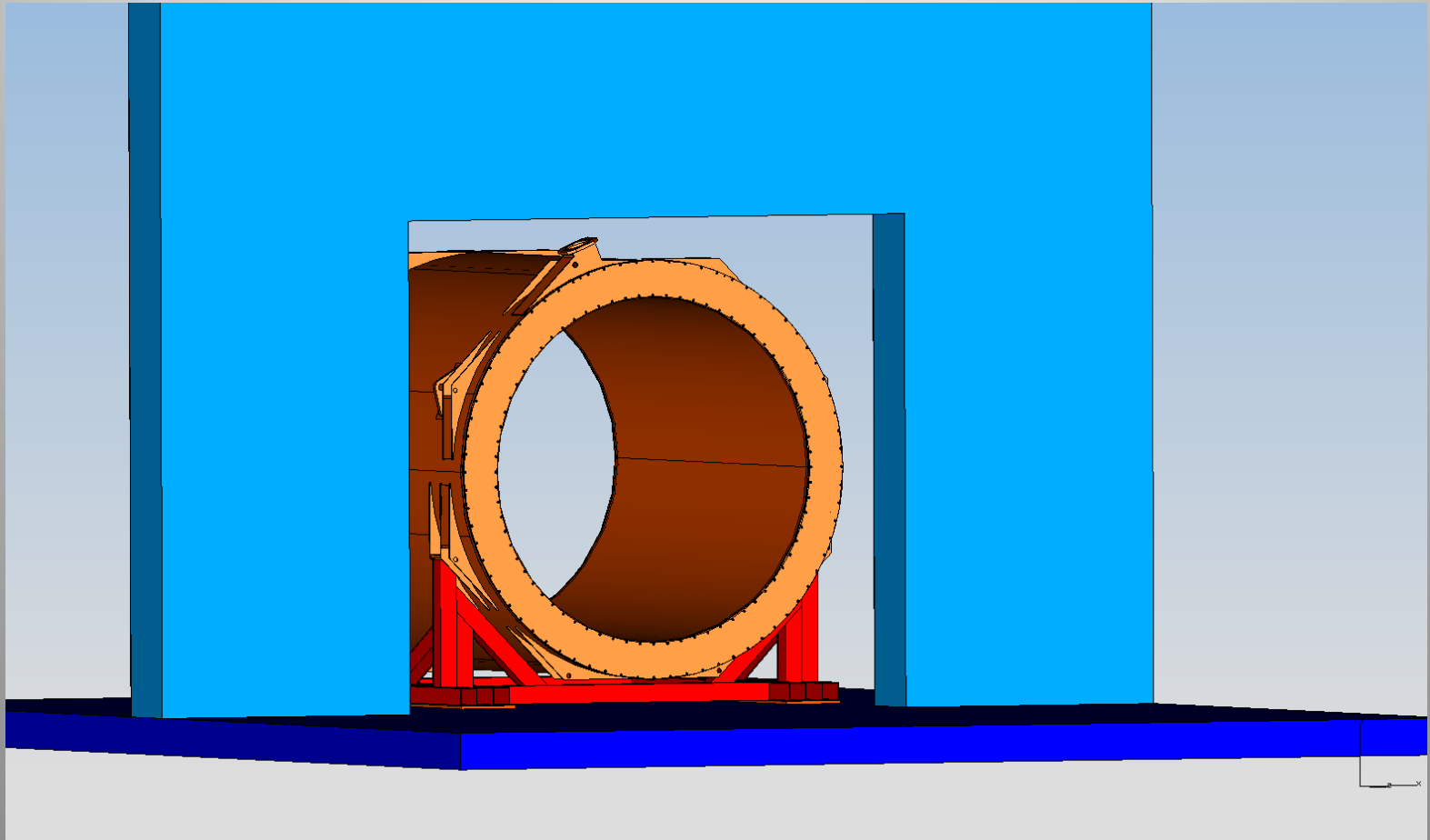
SoLID CLEO Mock up V1.0 is the current version of the magnet and endcap that has been used over the last year in presentations by the engineering group.

Backup Slides

Refurbished Support and Transport Frames



Test Lab Entrance – Small clearance issues



SoLID Installation

- Preliminary installation estimate: 1.5 to 1.75 years
- Total FTEs = 14
- Preparation of Hall A 2.5 FTE
- Magnet 3.85 FTE
- Detectors 2.65 FTE
- Target 2.0 FTE
- Engineering Support 0.5 FTE
- Installation Coordination 1.75 FTE

- \$150k for installation tools/hardware
- Additional funds to be estimated for crane and rigging
(Recent contract for 60 ton crane & riggers-
\$3800/day, estimate 52 days, need \$200k)