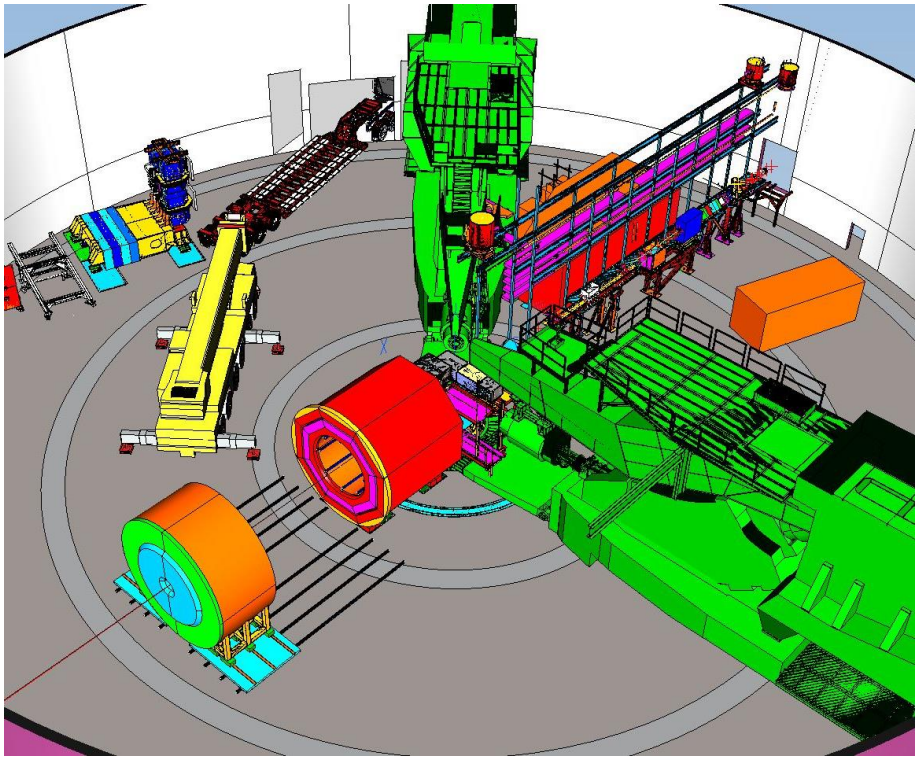
SoLID Collaboration Meeting

Magnet & Detector Support



Whit Seay

January 9, 2024

Presentation Outline

Latest updates:

1) Next steps for CLEO II testing
2) Engineering and design support - CAD model updated
3) Update on engineering and design support for CY25

Magnet – Low Current Test – Next Steps

- Finalize data analysis and present conclusions to division and collaboration.
- Develop plan with labor and cost requirements to present to physics management for approval. – In Progress

Options Include:

- Fix the vacuum leak in service turret and search for any additional leaks on cryostat.
- Verification of JT valve seats and bullets required to investigate leak by on some valves and calculate flow rates.
- Removing transfer lines and pressure testing He and N2 circuits to verify leak tightness after cold test.
- Considering options for further investigation of thermal short and repair of vacuum leak.
- Make improvement to instrumentation and controls.
- Provide a report of any new findings from follow up testing
- Provide cost/labor estimations and planning input for full current test in the future.

Magnet – Engineering and Design Support

After consulting with SoLID Collaboration work will focus on the following priorities:

1. Produce SoLID cad model matching latest magnet design from Jay Benesch.
   Continue design and engineering work on magnet components including supports and motion system.

2. Coordinate with the LGC group to update tank design, specifically focused on how the LGC interfaces mechanically with the greater SoLID assembly and accounting for all expected necessary attachments and cabling from the LGC and other components/detectors that require space in the vicinity of the LGC detector.

3. Coordinate with EC group to have a conceptual design to mount EC shower, pre-shower and SPD for both forward and large angles.

4. Coordinate with HGC, baffle, GEM and MRPC groups to have a conceptual design to mount them.

Starting in Jan 2025 Hall A engineers and designers will become more available:

- 3 designers
- 1.5 engineers

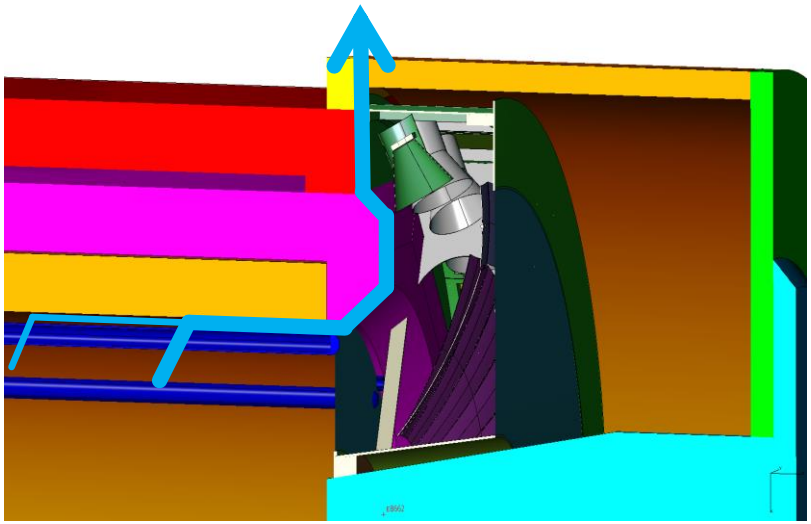
Magnet – Engineering and Design Support

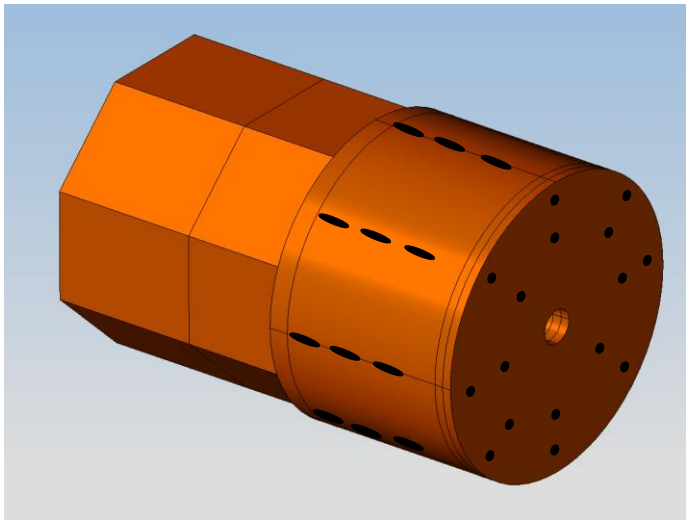
Priority:

1. Produce SoLID cad model matching latest magnet design from Jay Benesch.

✓ Match geometry of magnet steel
✓ Add details of axial and radial support mechanisms
✓ Add some of the required details to assemble magnet. Mounting hardware, etc
- Develop and engineer mechanical interface of magnet components for assembly
- Further the design concept for detector support rails inside magnet and endcap
- Develop magnet and endcap support system
- Develop details for cable routing – access holes in steel, etc

Design work listed above will help prepare for priorities 2 thru 4.





Magnet – Engineering and Design Support

The design effort on priority #1, to date, produced the following:

1. Cleaned up the existing NX CAD model. A lot of “mock-up” out of date geometries removed. This brought the structure of the CAD model more in line with our group’s standards.

2. Created detailed model of the existing return steel with all cutouts and threaded holes.

3. Created the cuts to match the latest return steel geometry. Add conceptual mounting holes for new return steel (endcap) interface to look for interferences with existing holes.

4. Add cryogenic platform on top of magnet

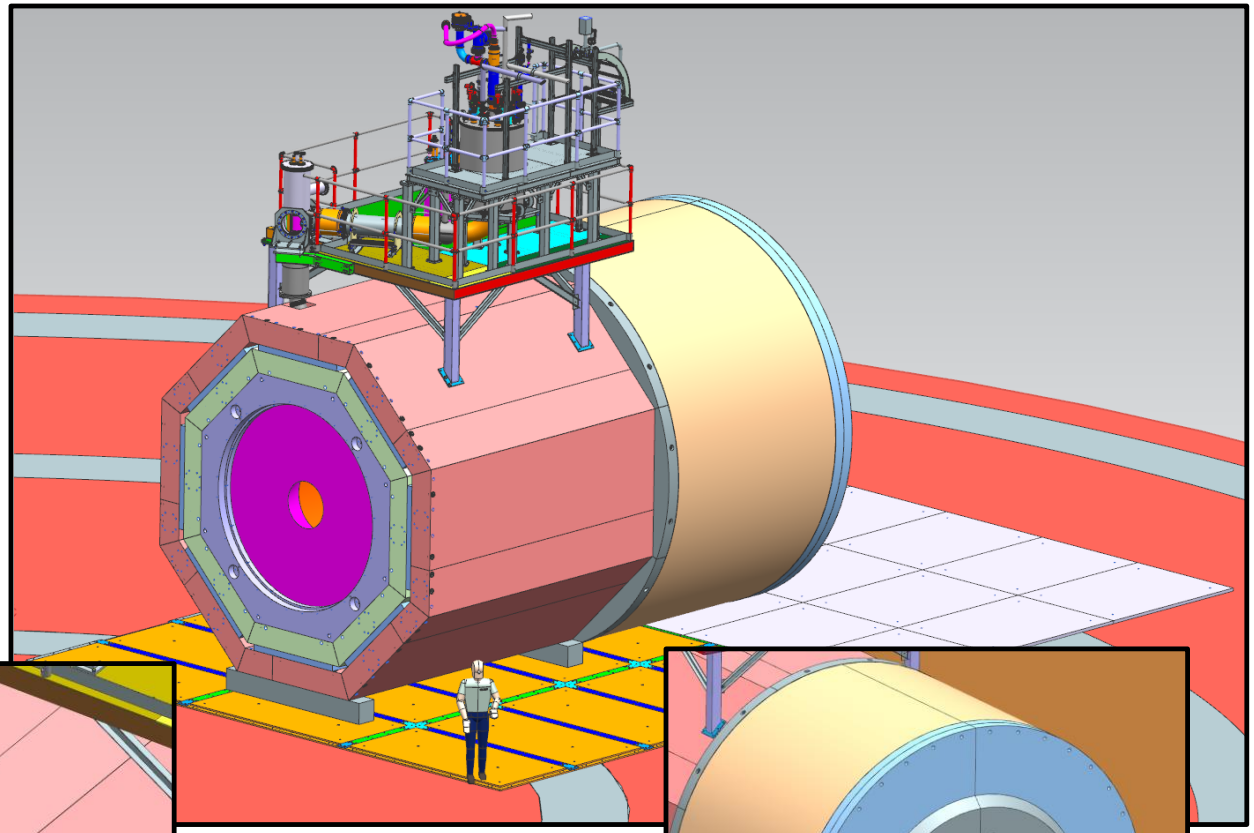
5. Updated endcap cone geometry of production model to match Jay’s TOSCA (Spring 24)

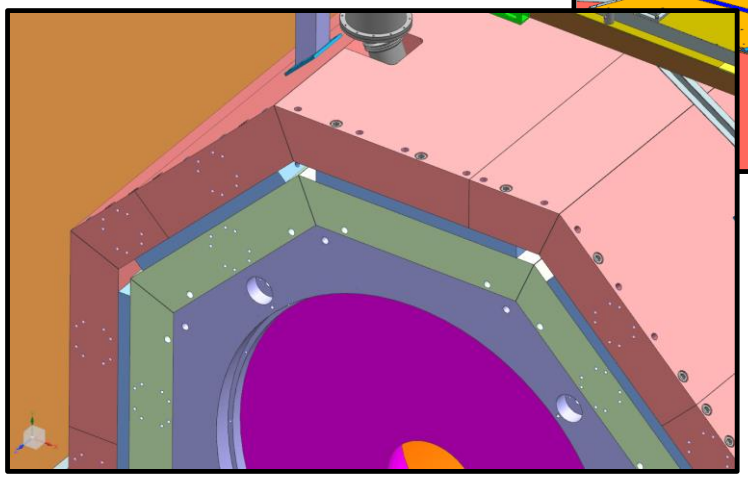
Magnet – Engineering and Design Support

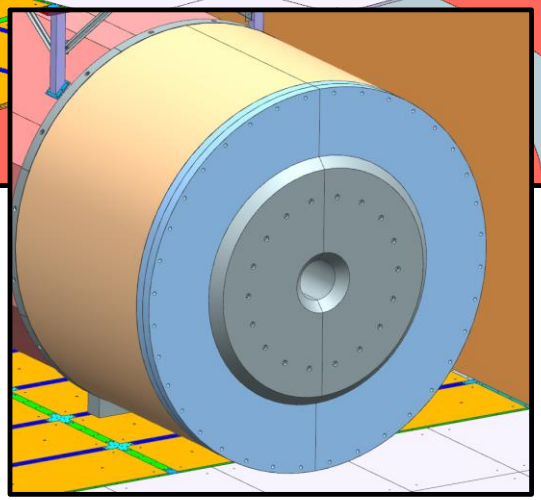
All known existing holes in the steel have been modeled.

Mounting hole concept established on the endcap.

Added service turret and CCR components along with access platform on top of the magnet.

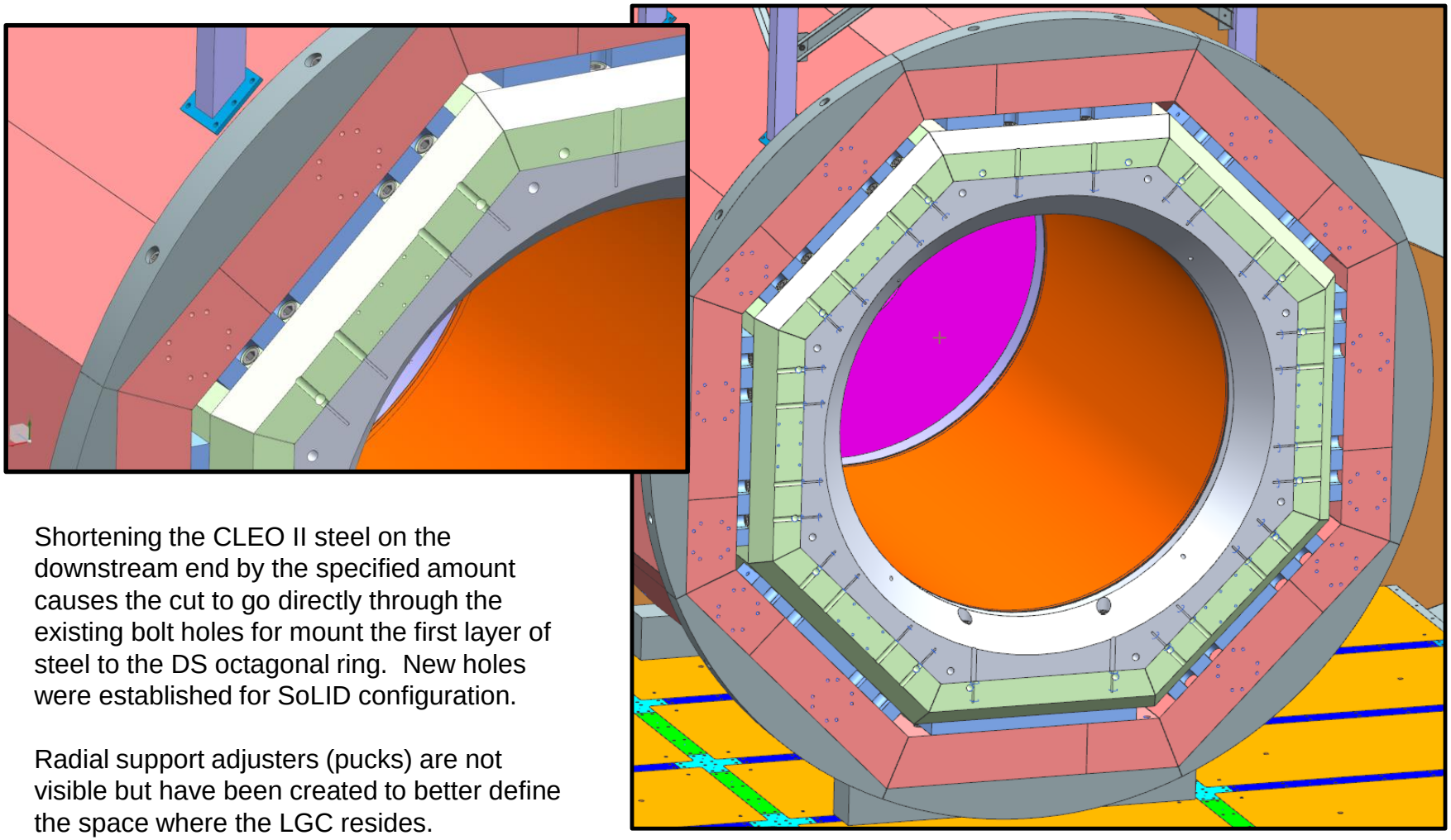






Magnet – Engineering and Design Support

Downstream end of the magnet – endcap removed

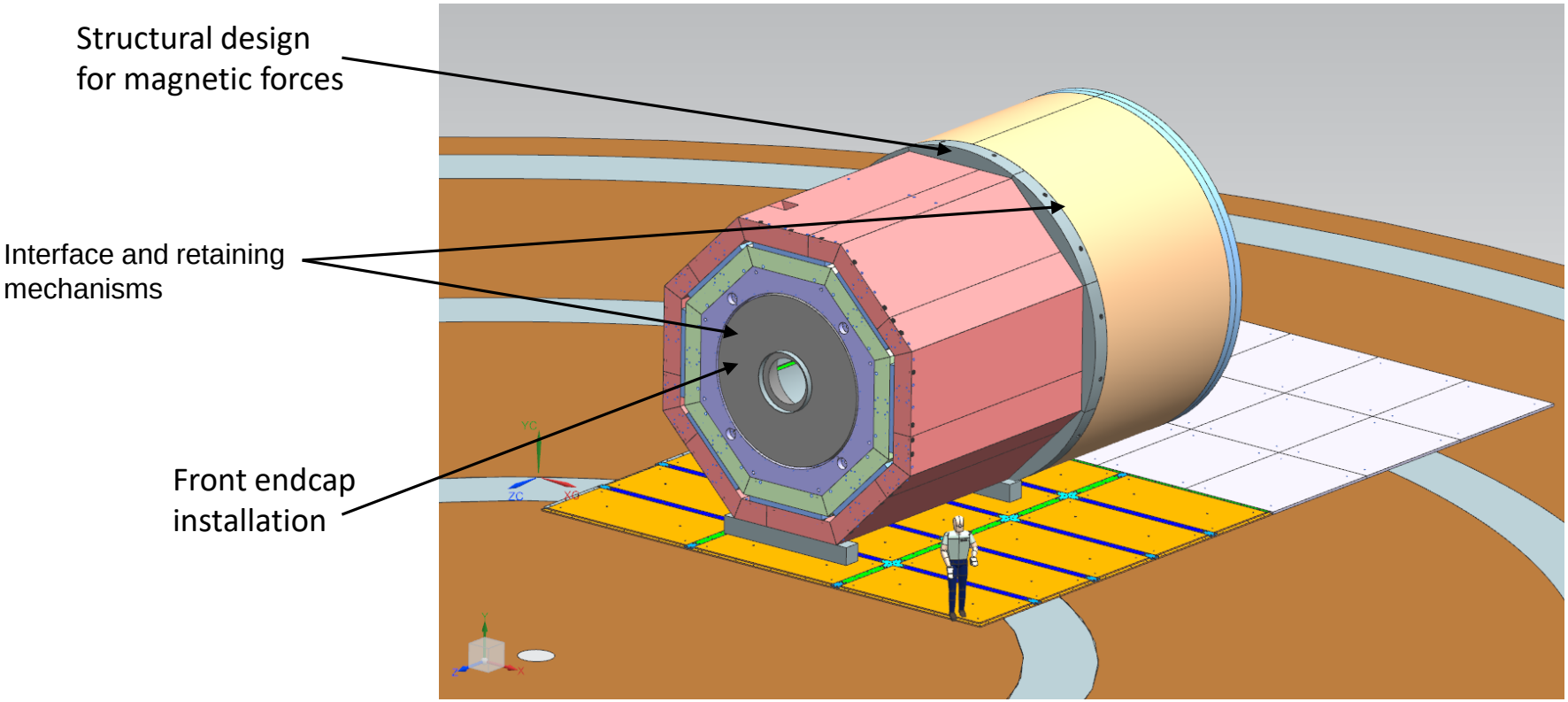


Shortening the CLEO II steel on the downstream end by the specified amount causes the cut to go directly through the existing bolt holes for mount the first layer of steel to the DS octagonal ring. New holes were established for SoLID configuration.

Radial support adjusters (pucks) are not visible but have been created to better define the space where the LGC resides.

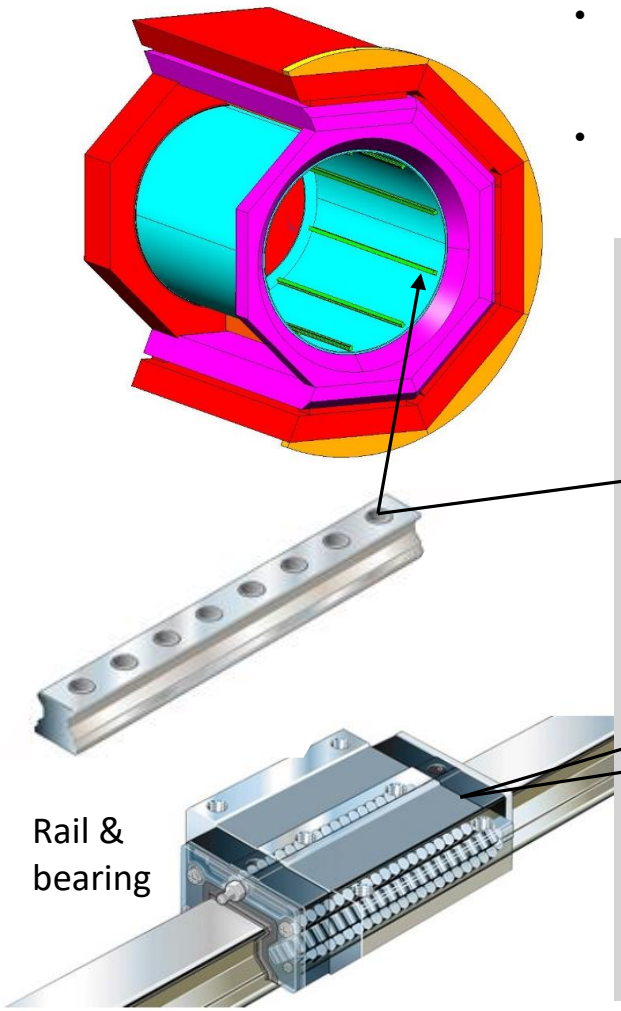
Magnet – Detector Support Structure

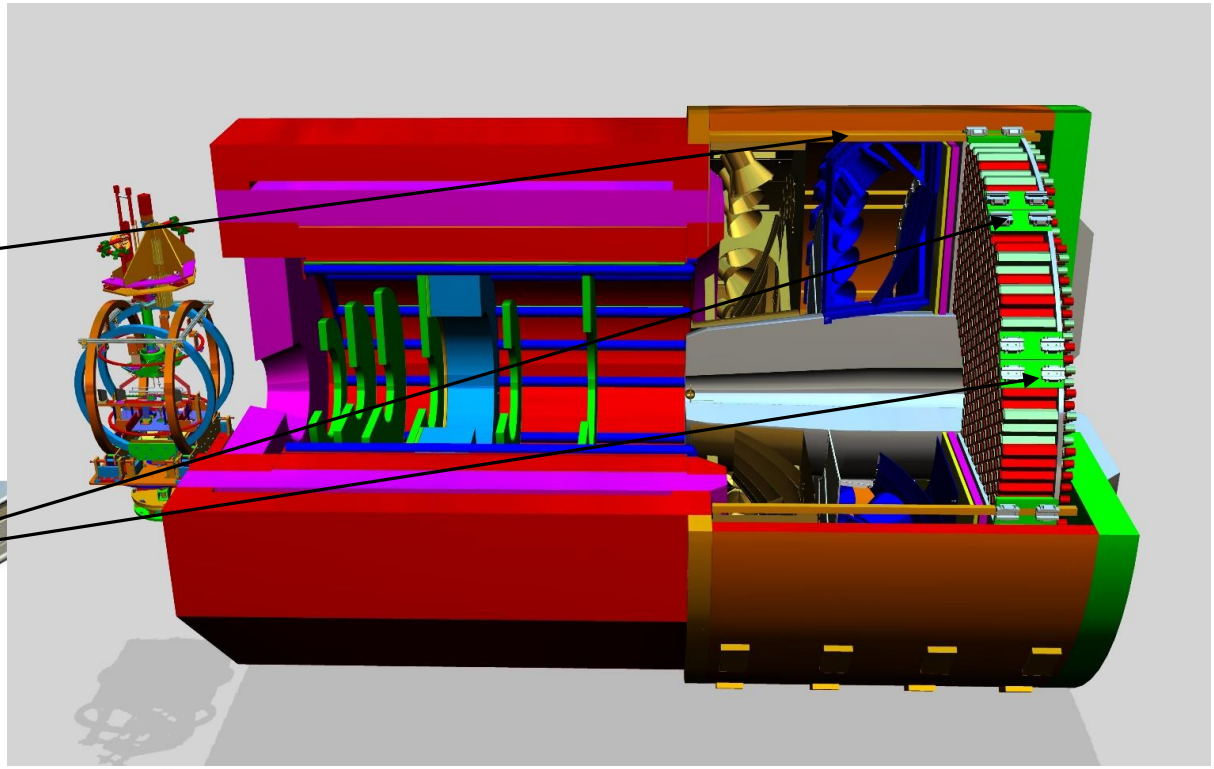
- Design magnet interface components for installation and magnetic forces.
- Finalize design of support base for magnet and endcap. Ensure weight distribution under main magnet.
- Develop installation concept for front endcap and retaining mechanisms.
- Develop system for repeatably position the endcap when retracted to the magnet. Design retaining mechanisms.



Magnet – Detector Support Structure

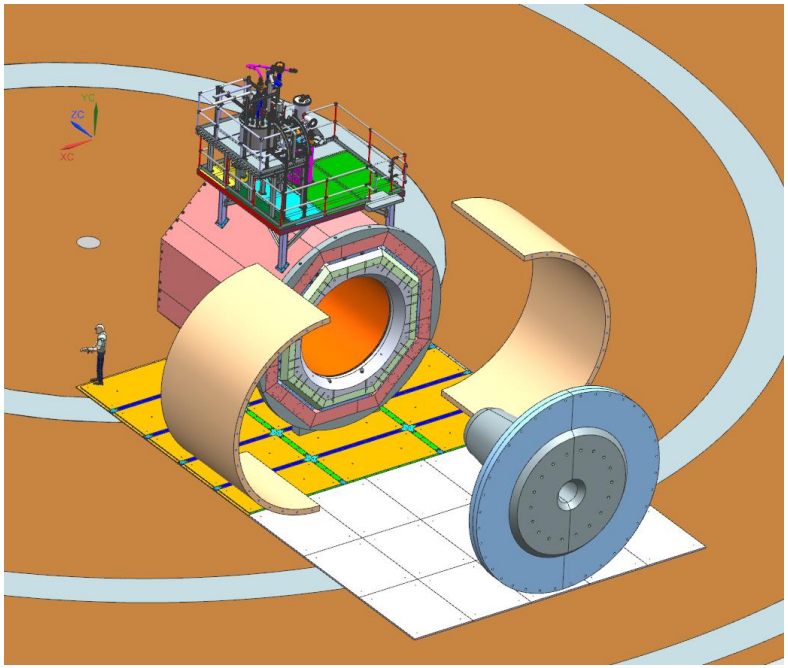
- Provide a universal mounting system that is utilized by each detector group for internal magnet and endcap locations.
- Conceptual design uses off the shelf rails and bearings. Bearings will be integrated into individual detector design.
- Engineering analysis on-going to specify components for detector mounting. Analysis includes deflection and structural calculations.

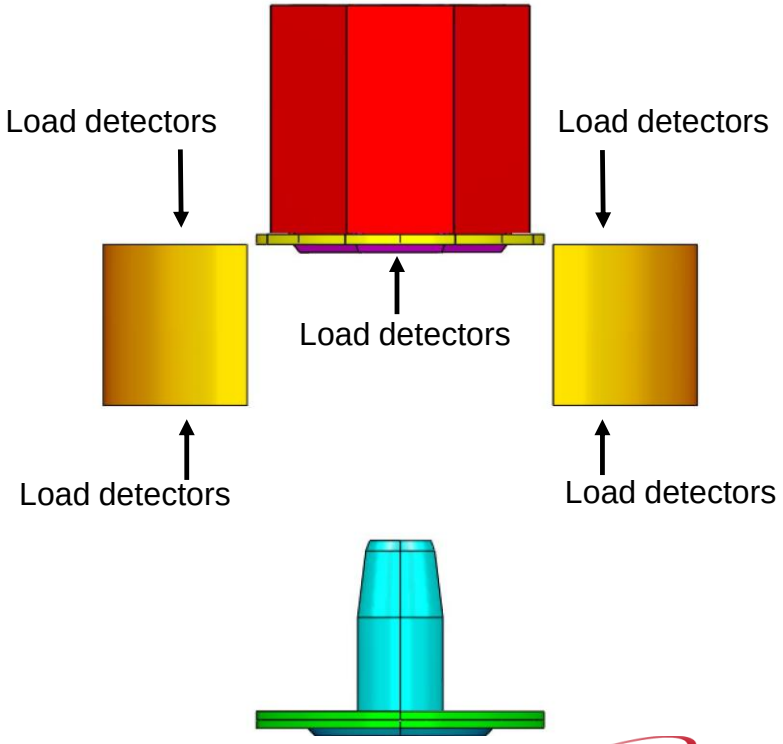




Magnet – Endcap Motion Concept

- Develop structural support and motion system for cylinders and backplates.
- Decouples the nose and backplates from the half cylinders
- Provides additional access points for installing and servicing detectors
- Simplifies motion system and tracks mounted to the floor





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Questions/Comments?