Status of sPHENIX Babar magnet installation engineering

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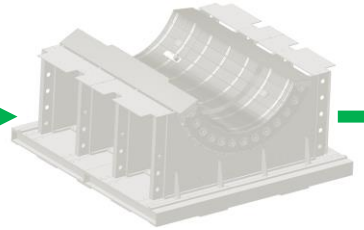
2/26/2020

WBS 2.5.3-2.5.12 sPHENIX Installation

(1) Cradle Base, AH

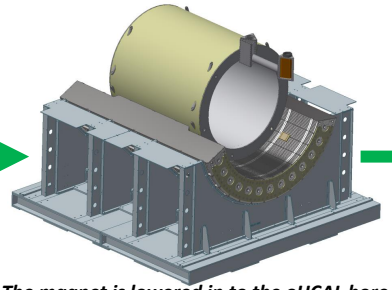
The base will be built on top of the AH rails

(2) oHCAL Sector 1-13, AH



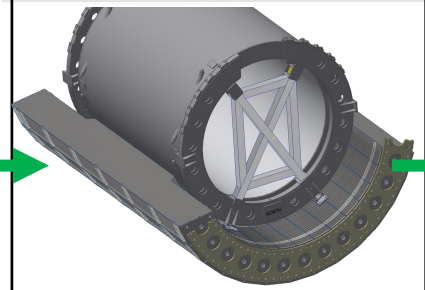
Magnet mount hardware is also attached

(3) Magnet mount, AH



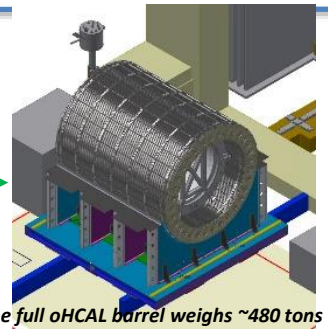
The magnet is lowered in to the oHCAL bore

(4) Inner Rings, AH



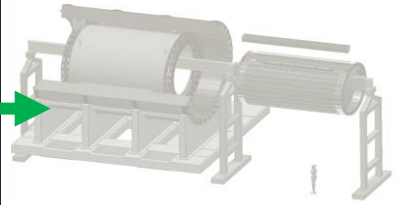
The rings also work to stabilize the magnet

(5) oHCAL Sector 14-32, AH



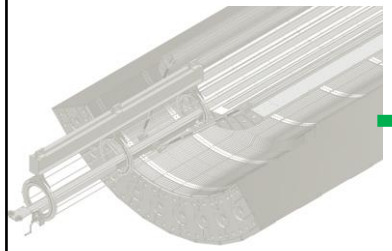
The full oHCAL barrel weighs ~480 tons

(6) Inner HCAL



The iHCAL barrel slides in from the North

(7) EMCAL

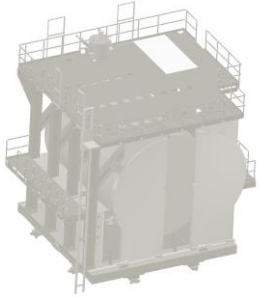


There are 64 EMCAL sectors each installed one at a time with a special tool

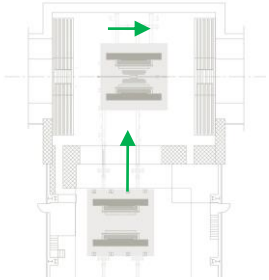
(8) Open Shield Wall

Work on sPHENIX will stop for the time needed to remove the shield wall

(9) Carriage, platforms, Pole Tips, AH



(10) Move sPHENIX to IR

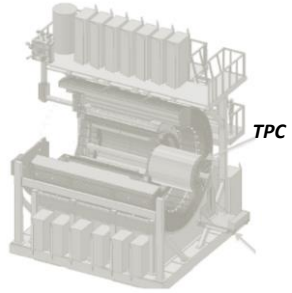


There is a 5-foot move North in the IR

(11) Connect, Map Magnet

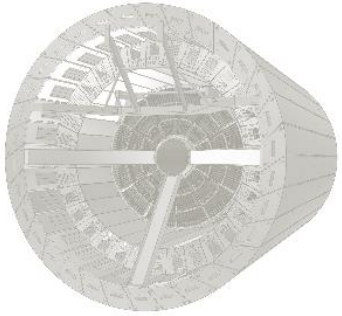
Results from an sPHENIX OPERA EM FEA

(12) TPC, IR



TPC slides in the EMCAL bore from North

(13) INTT Supports, IR

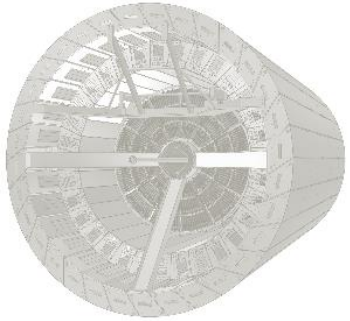


iHCAL, EMCAL, TPC and INTT Supports

(14) Beam Pipe Install. IR

Beam pipe is supported temporarily as a few locations for MVTX installation

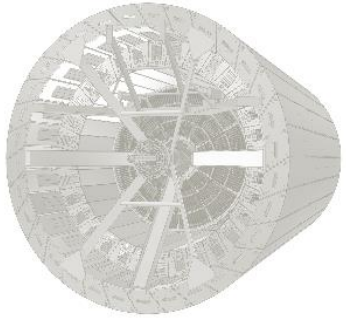
(15) INTT Device, IR



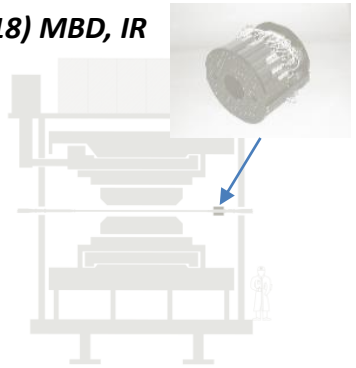
(16) MVTX, IR

MVTX has a 2mm clearance to the beam pipe

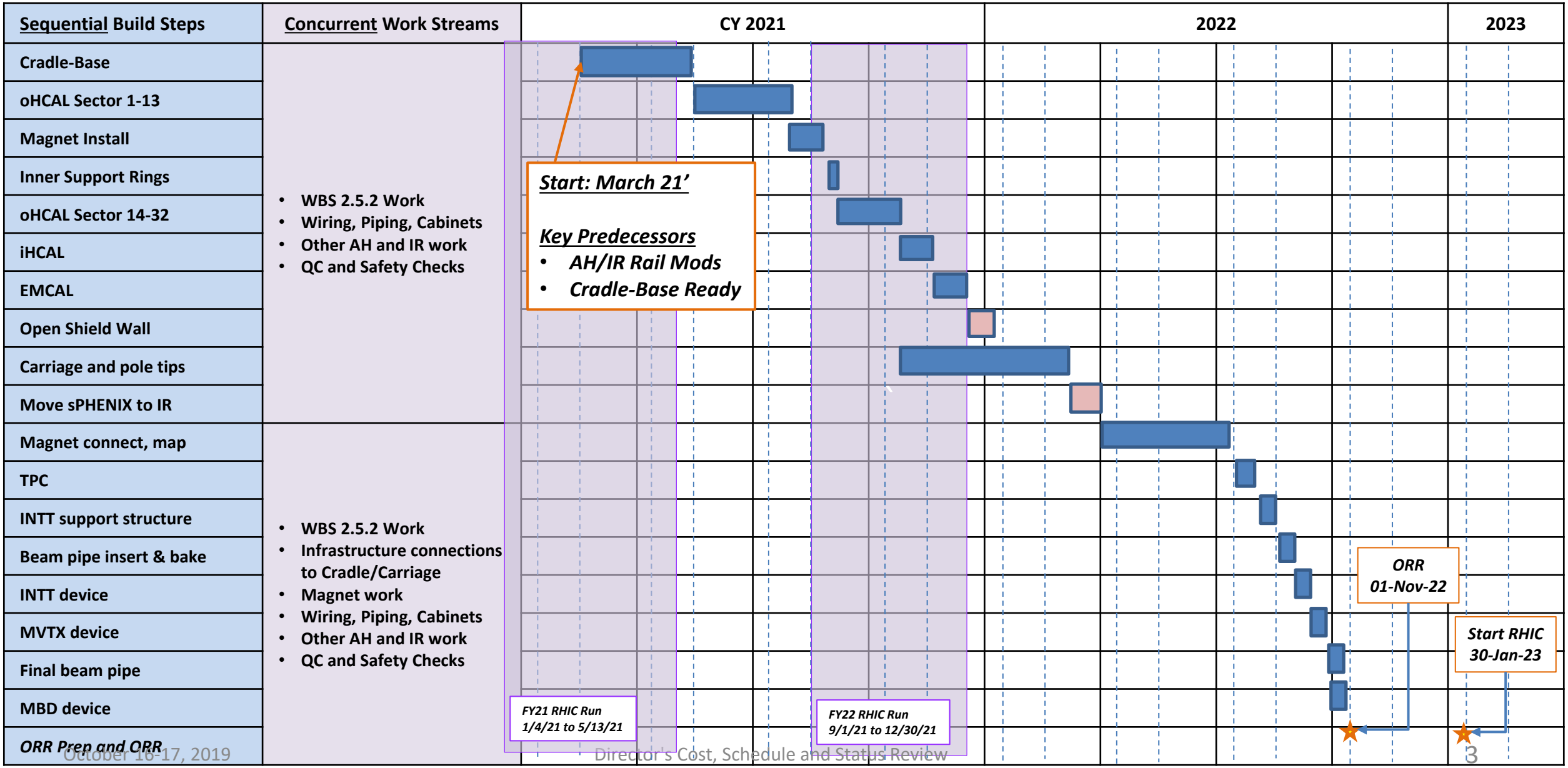
(17) Secure Beam pipe, IR



(18) MBD, IR



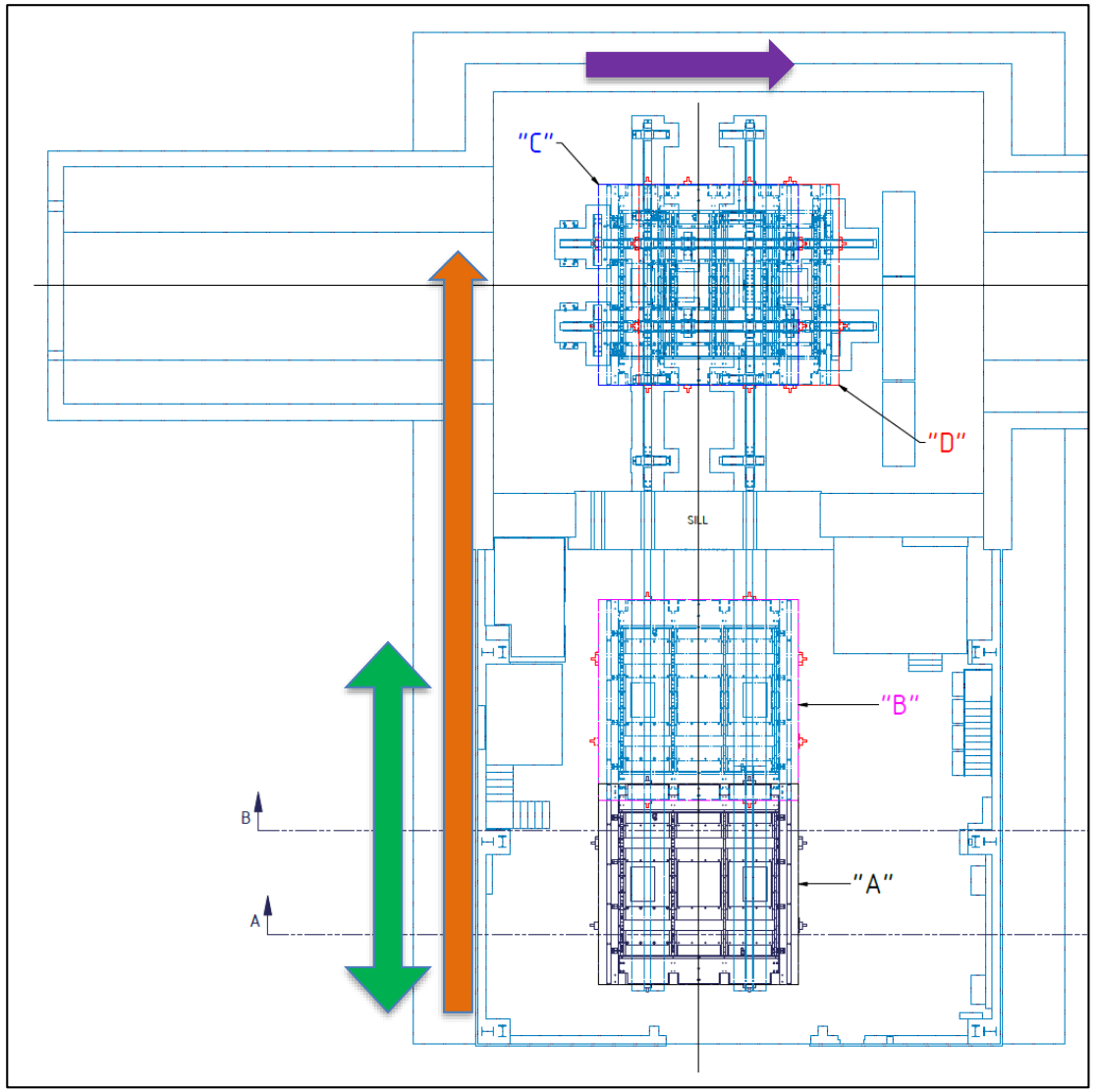
WBS 2.5.3-2.5.12 sPHENIX Installation



WBS 2.5.3-2.5.12 sPHENIX Installation

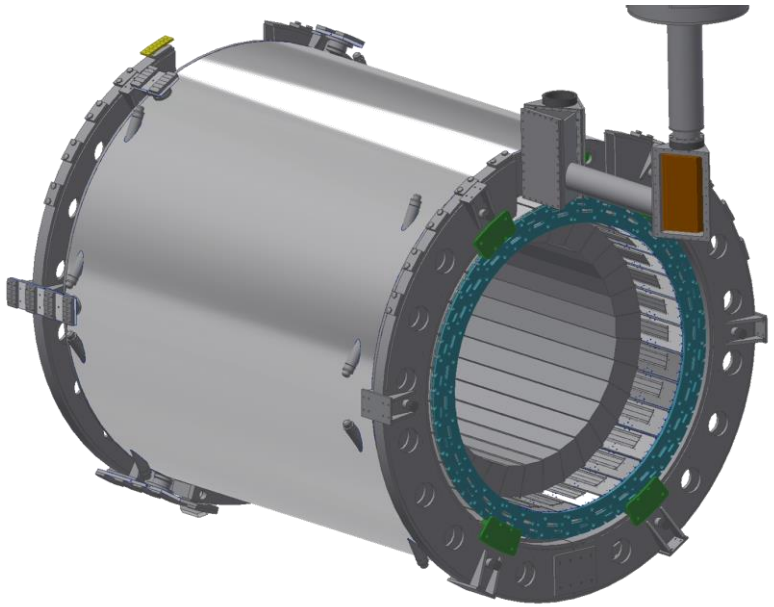
The sPHENIX assembly is moving with the Babar magnet during construction

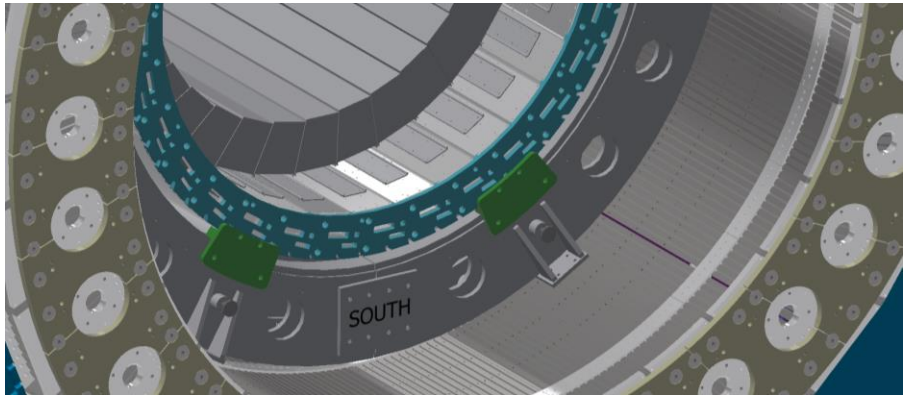
1. Green Arrow: Move east and west as shield wall is removed (*2-3 moves*)
2. Orange Arrow: Move from AH to IR
3. Purple Arrow: Move north to final IR position

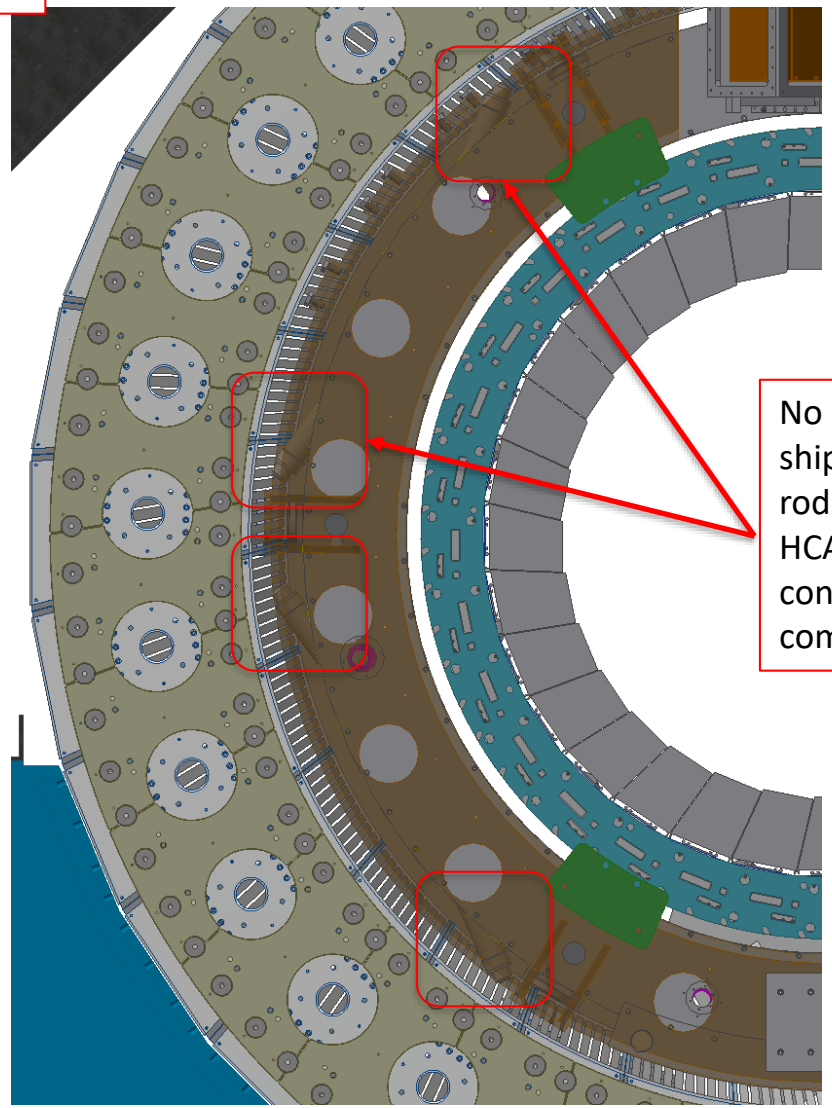


Access to the Babar magnet stabilizing tension rods is lost once the Inner Support Rings are installed

Resolved at 11/26 Meeting → https://indico.bnl.gov/event/7143/

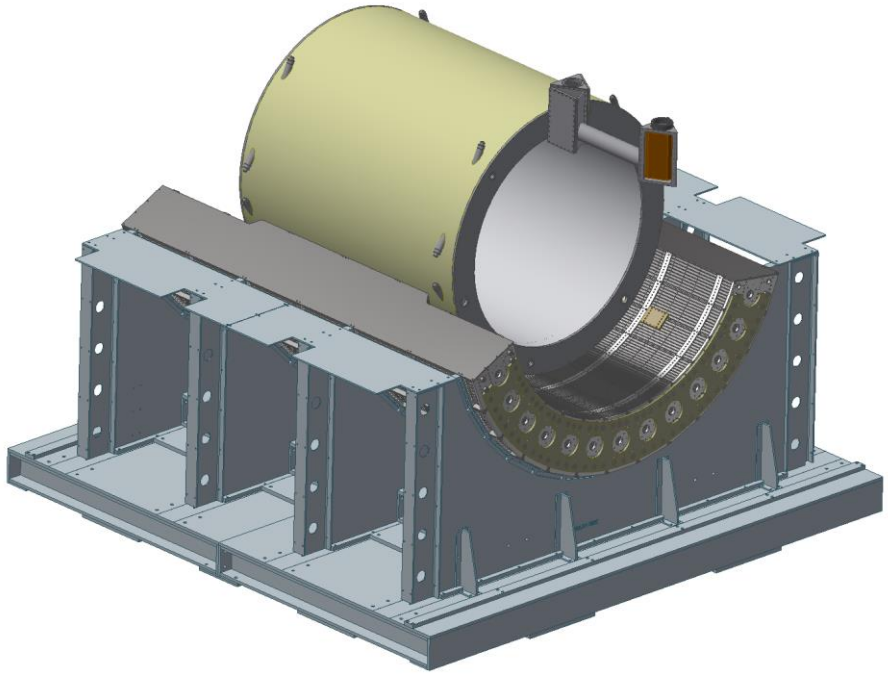


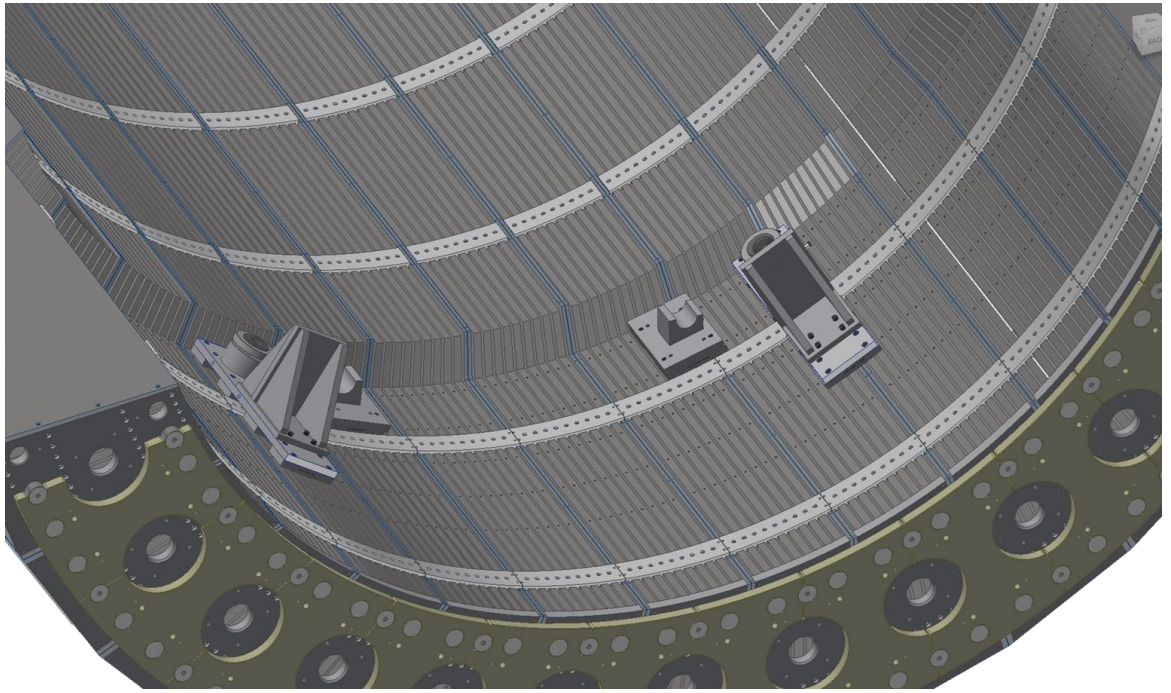




No access to magnet shipping stabilization rods once the Outer HCAL barrel construction is completed.

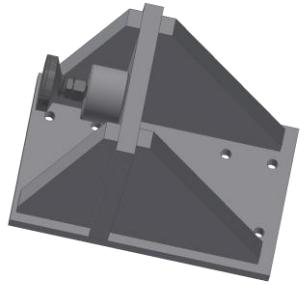
Step #1: Magnet supports installed on ID lower Outer HCAL sectors



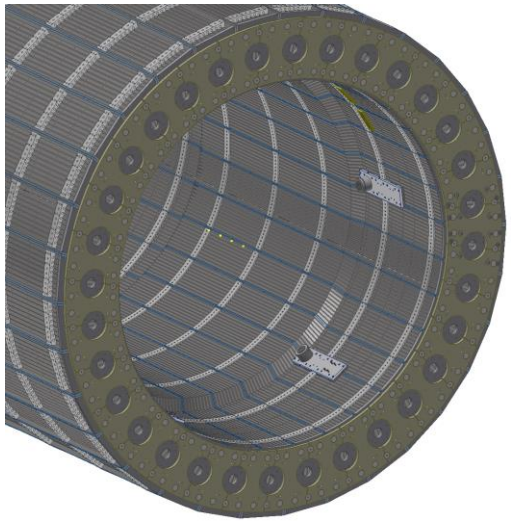


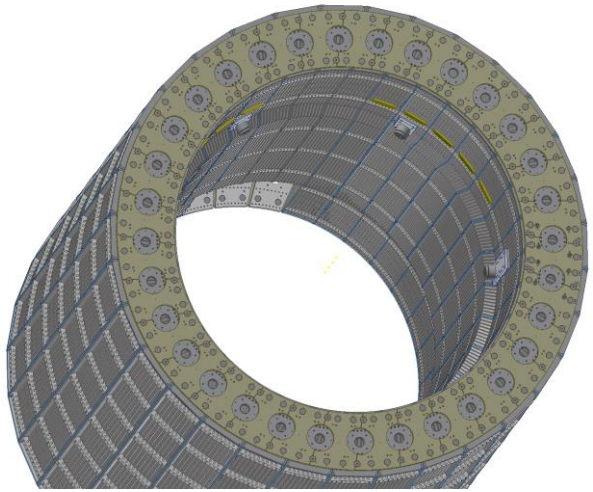
PRELIMINARY DESIGN

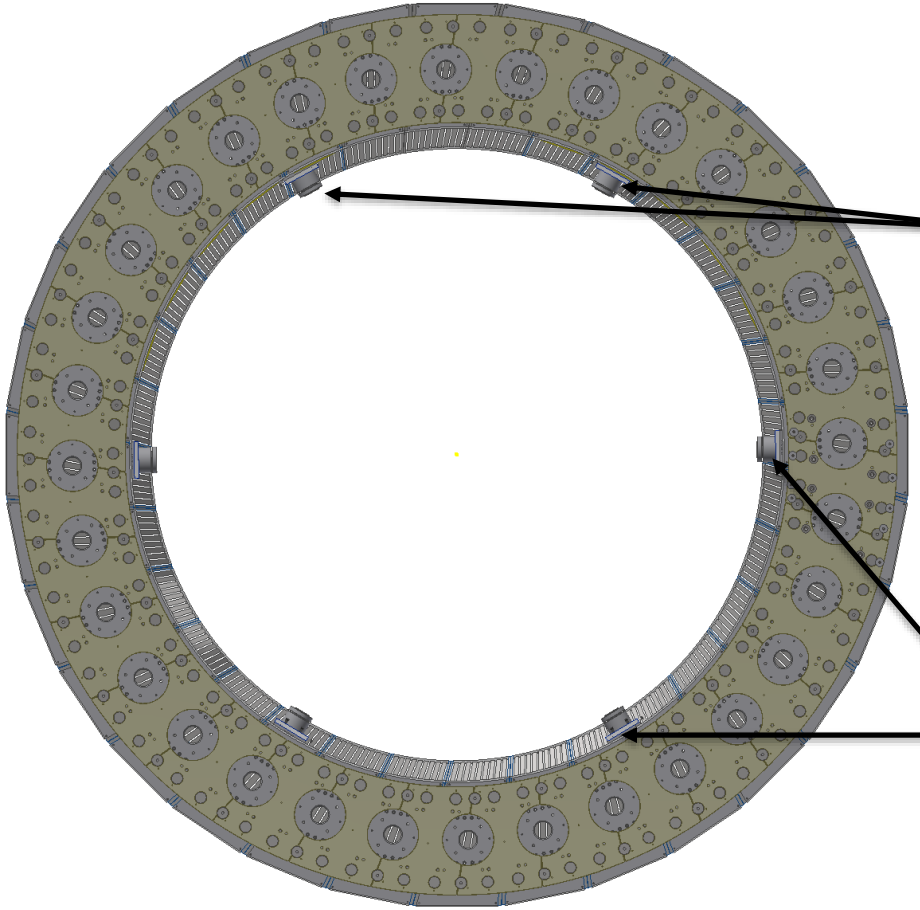
TEMPORARY
MAGNET RESTRAINT

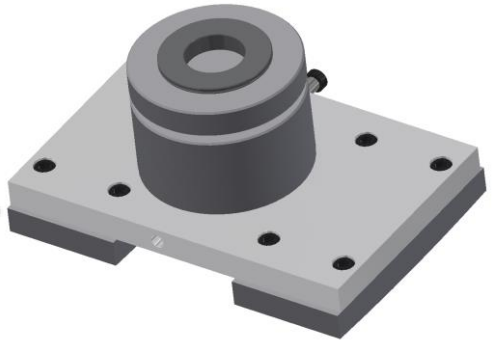


There will be six magnet support pad locations

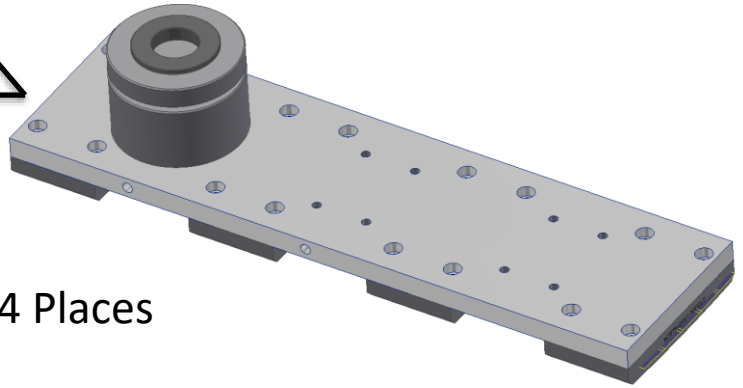






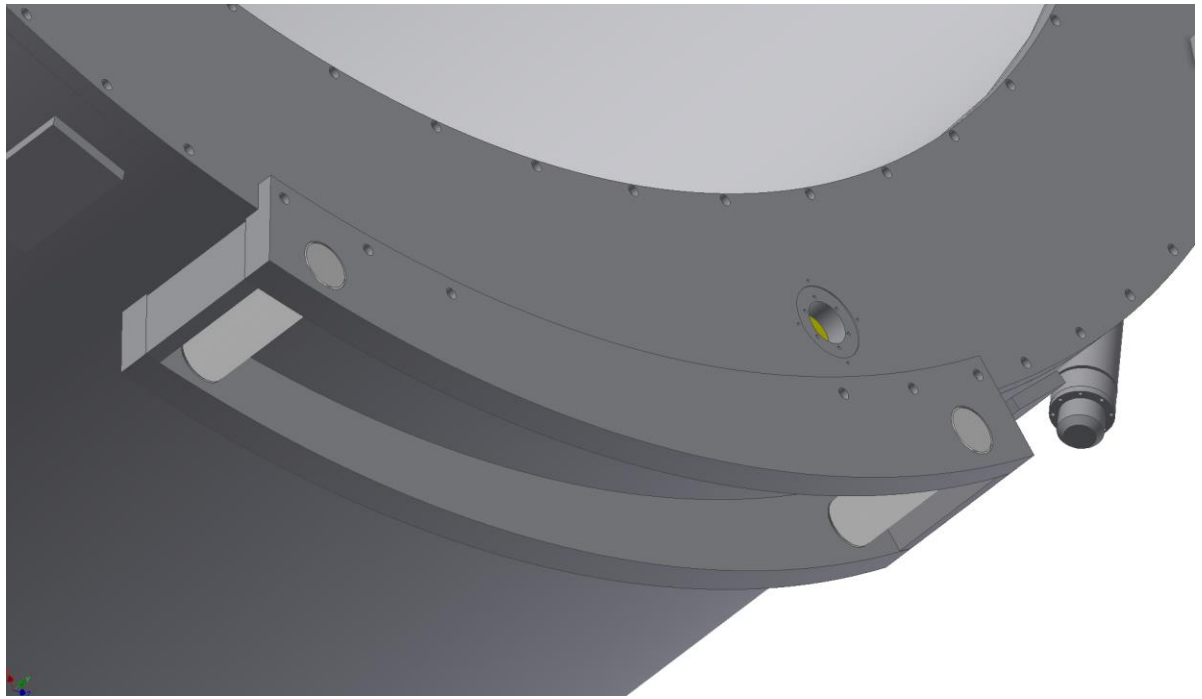


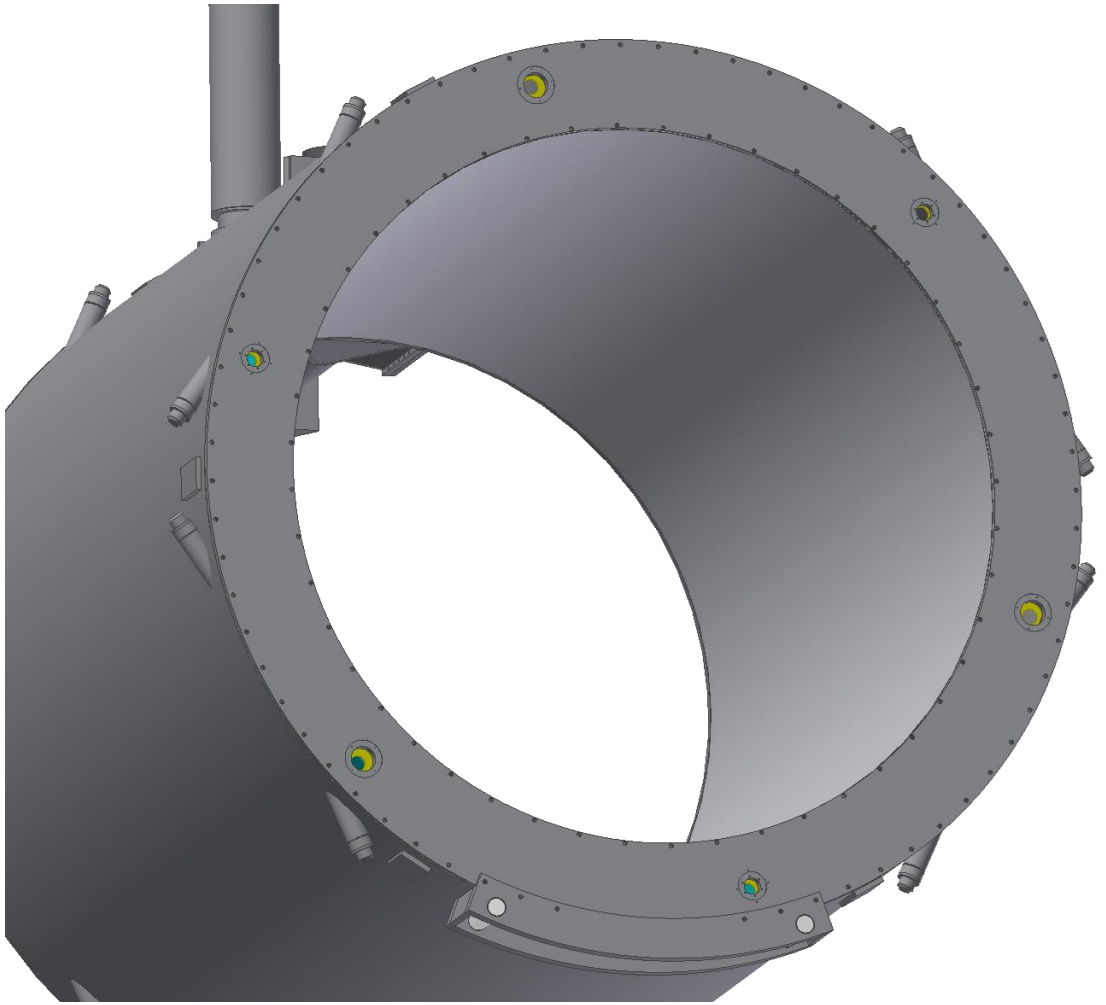
2 Places



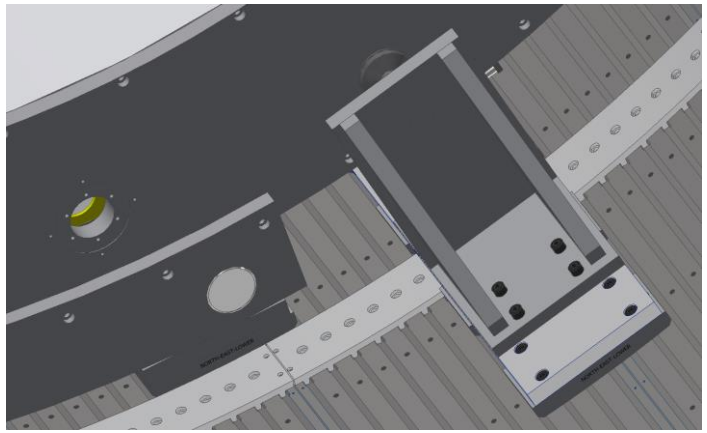
4 Places

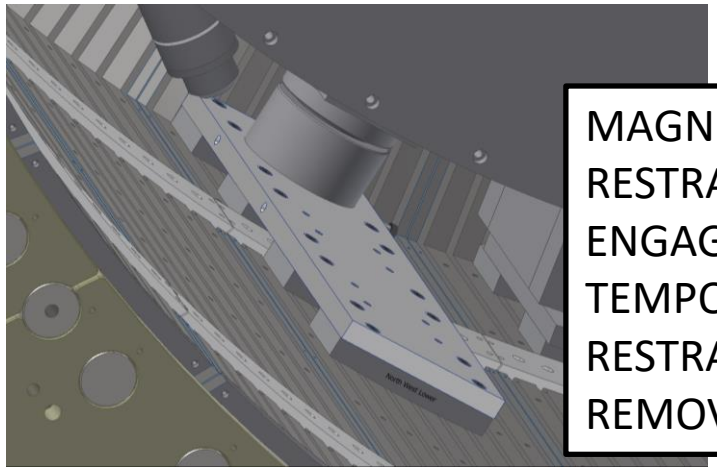
Step #2: Magnet locating and support feature attached to cryostat



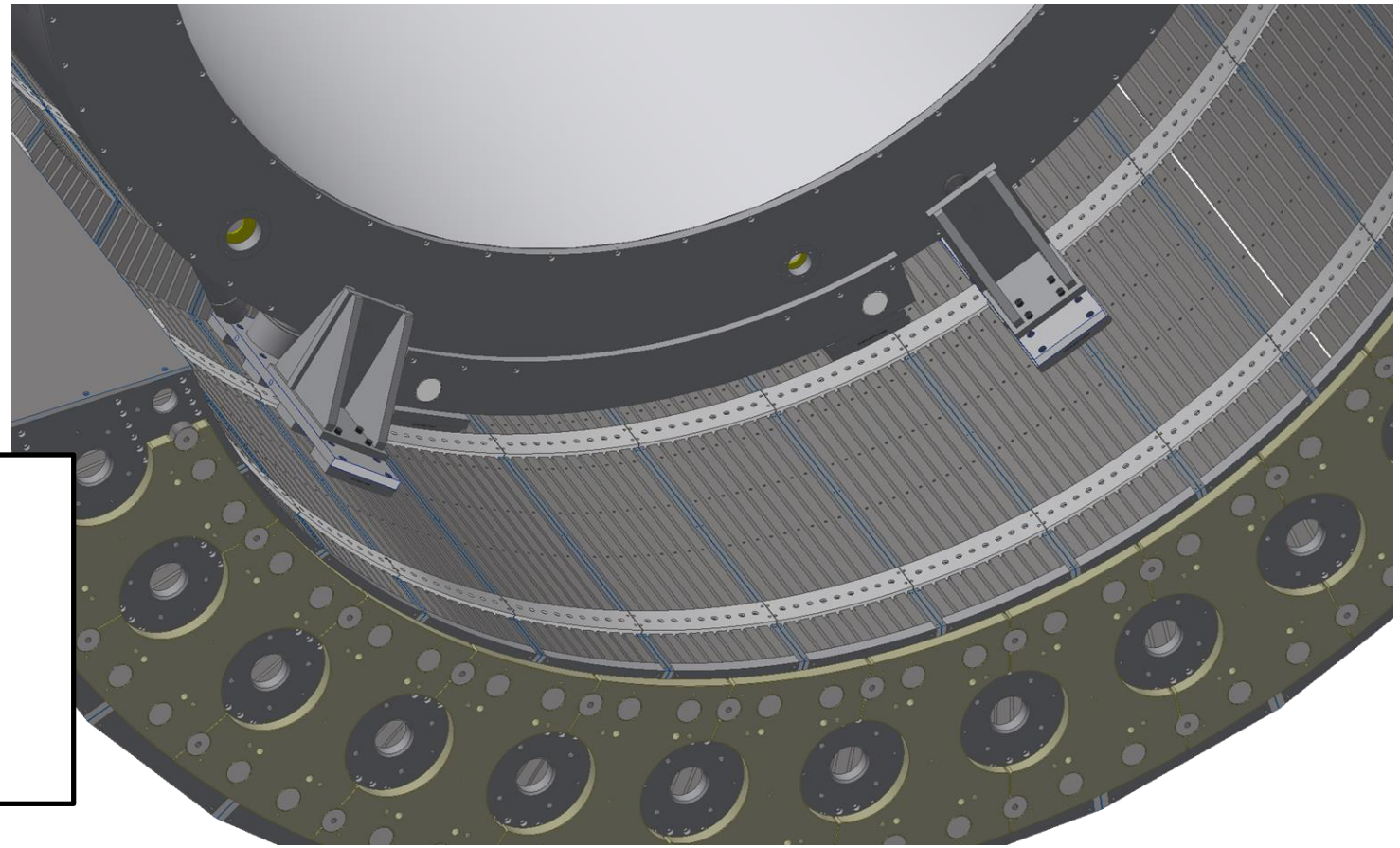


Step #3: Lower magnet in to position on lower pads and locating features





MAGNET RESTRAINTS ENGAGED & TEMPORARY RESTRAINTS REMOVED



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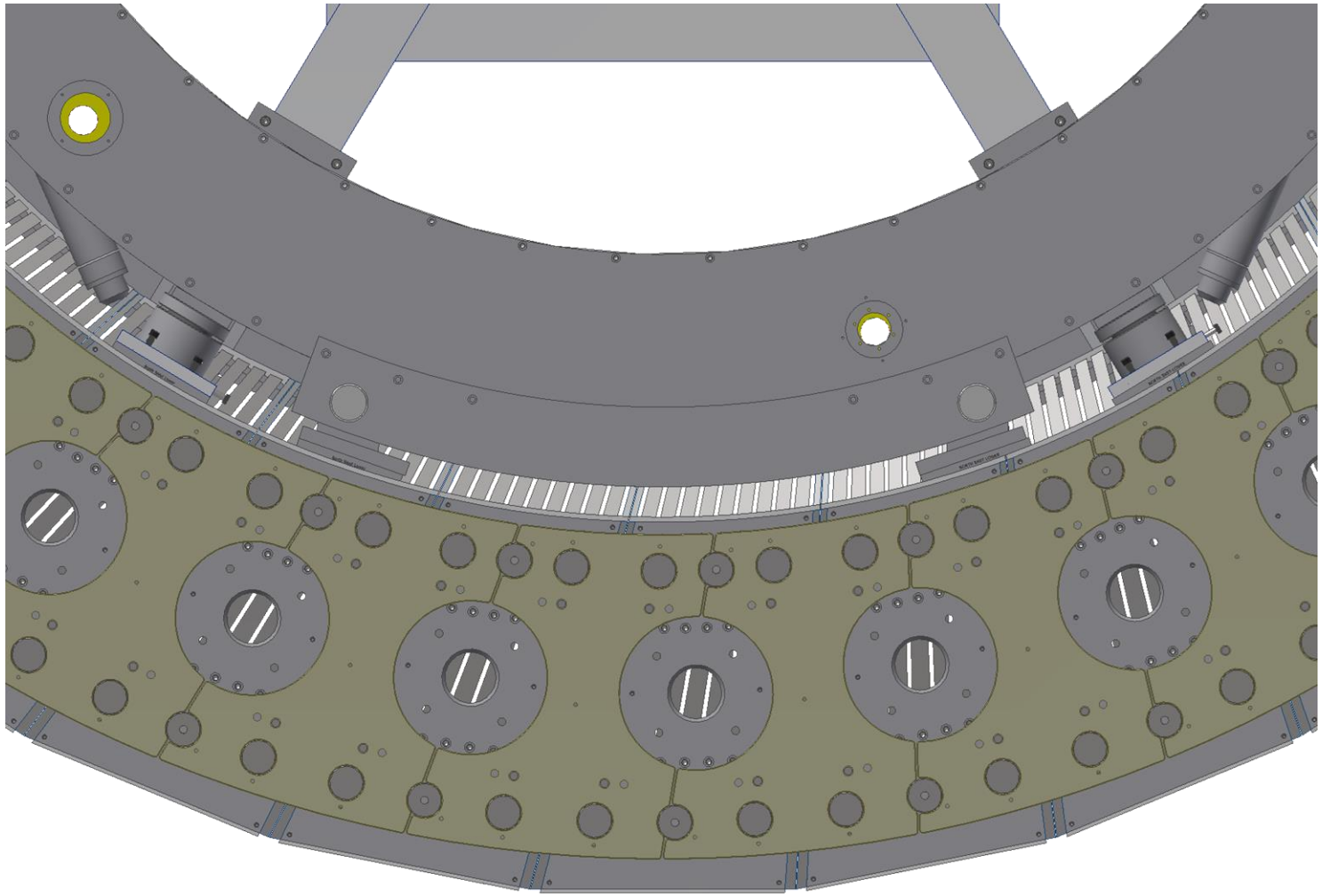
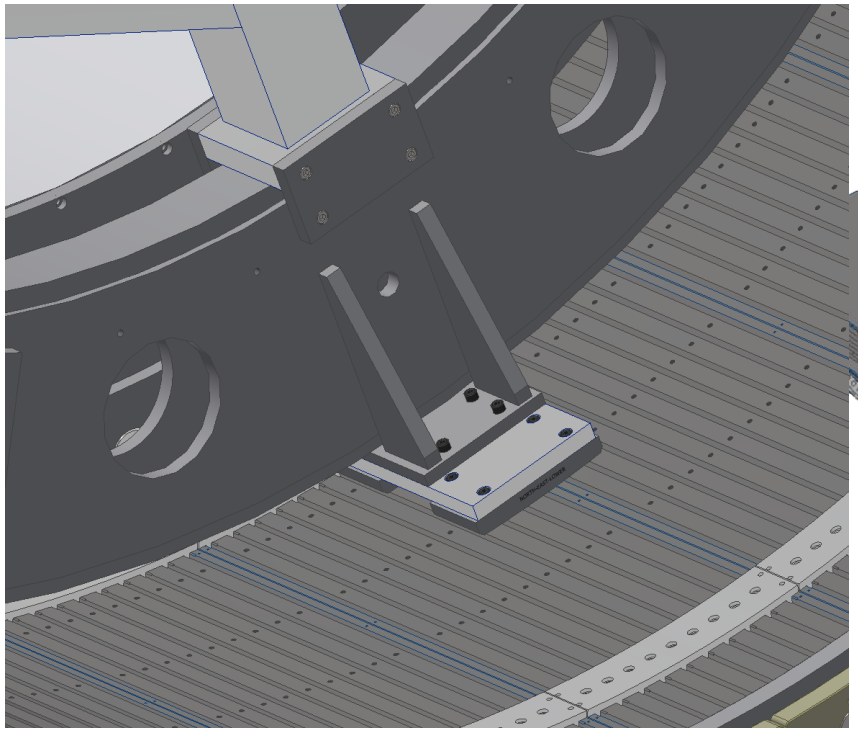
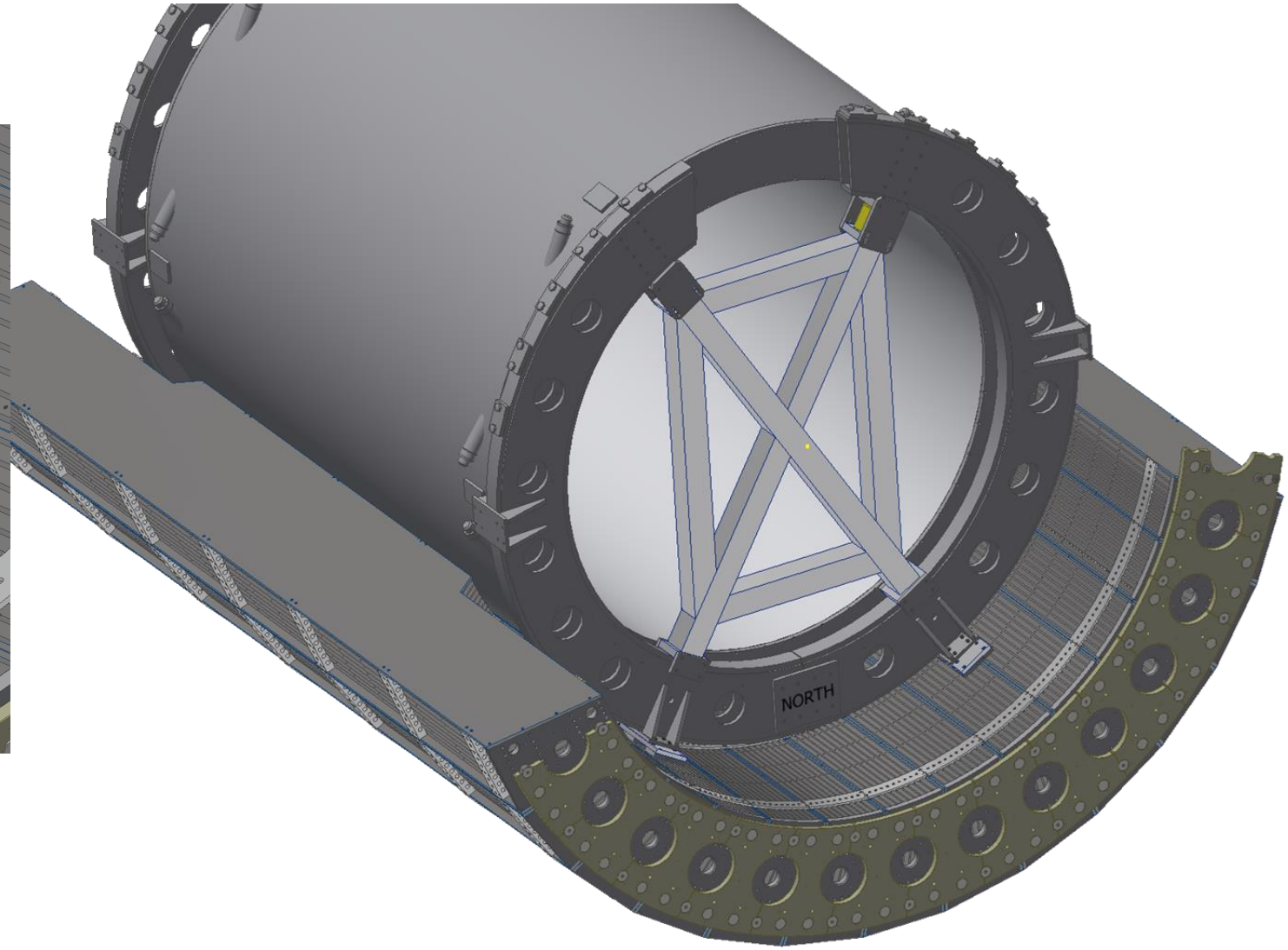
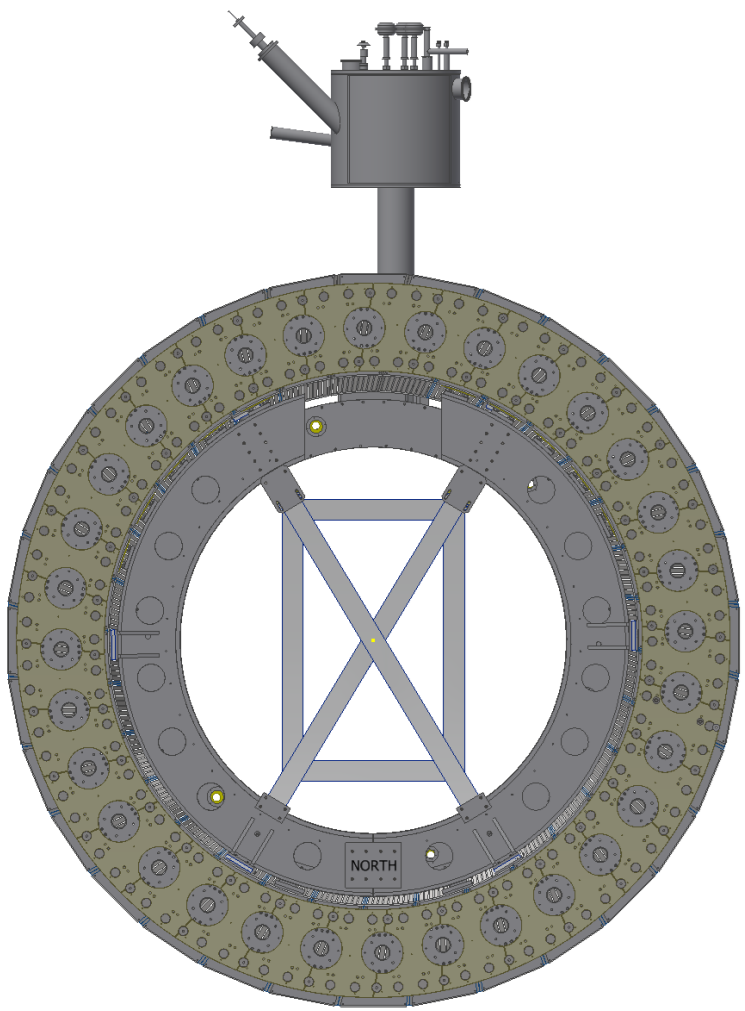


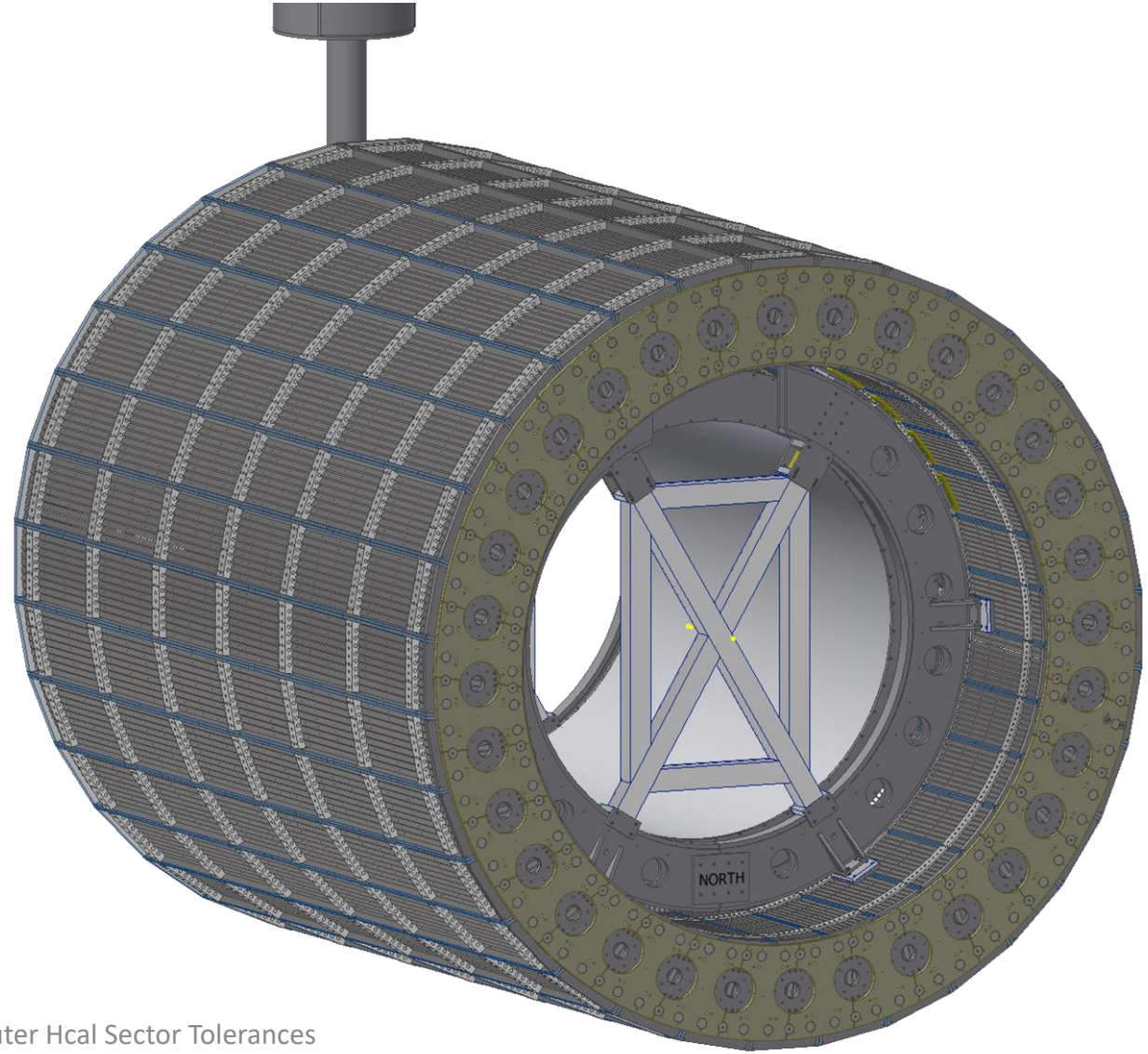
Step #4: Install North and South Inner Support Rings





Step #5: Complete Outer HCAL Installation Around the Magnet





sPHENIX Babar Magnet Installation Engineering Status

- There is a conceptual/preliminary design for the support of the Babar magnet in the sPHENIX Outer HCAL bore but additional design and analysis is needed.

- There is also a preliminary sPHENIX installation plan that establishes the construction sequence and helped to set up the sPHENIX 2.X project plan.

- 11/26/2019 meeting held with magnet experts to clarify requirements for adjusting internal cryostat tension rods.
  - When the magnet is shipped and there is a risk of random uncontrolled motion the tension rods are locked to stabilize the superconducting windings.
  - These tension rods needs to be loosened before Babar is placed in the oHCAL cradle and covered by the large inner support rings
  - *The 11/26 meeting team agreed that no access is needed to the tensioners and that the sPHENIX motion on the assembly hall rails is slow and smooth enough to not require tensioning.*
  - *Kin also followed up with an engineer from SLAC that verified they did not use stabilizing tensioners when moving Babar in and out of position*

- No new work on magnet install engineering has been accomplished since early December, 2019 → Start up work again in April-May after iHCAL FDR