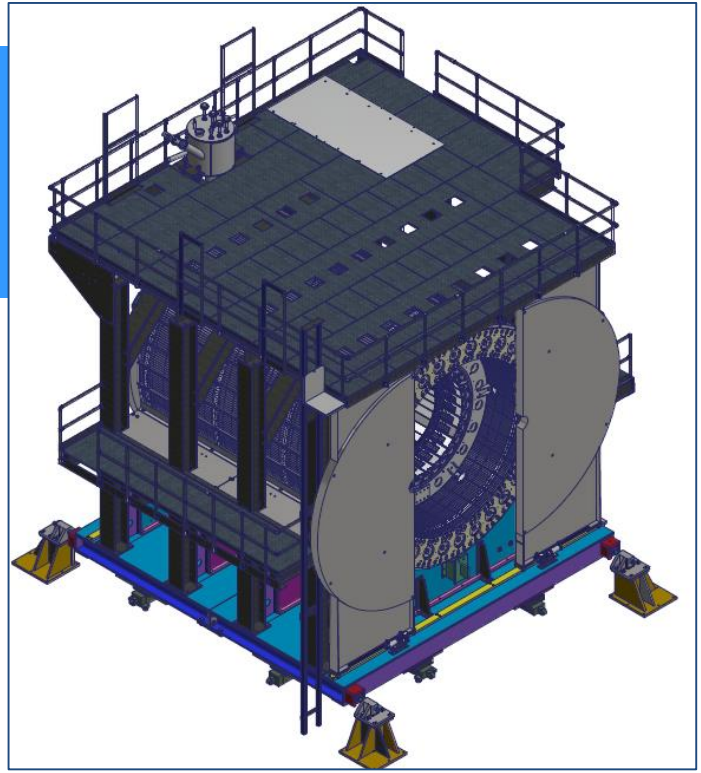
sPHENIX Engineering Status Nov 4th, 2019 sPHENIX PMG

Russell Feder

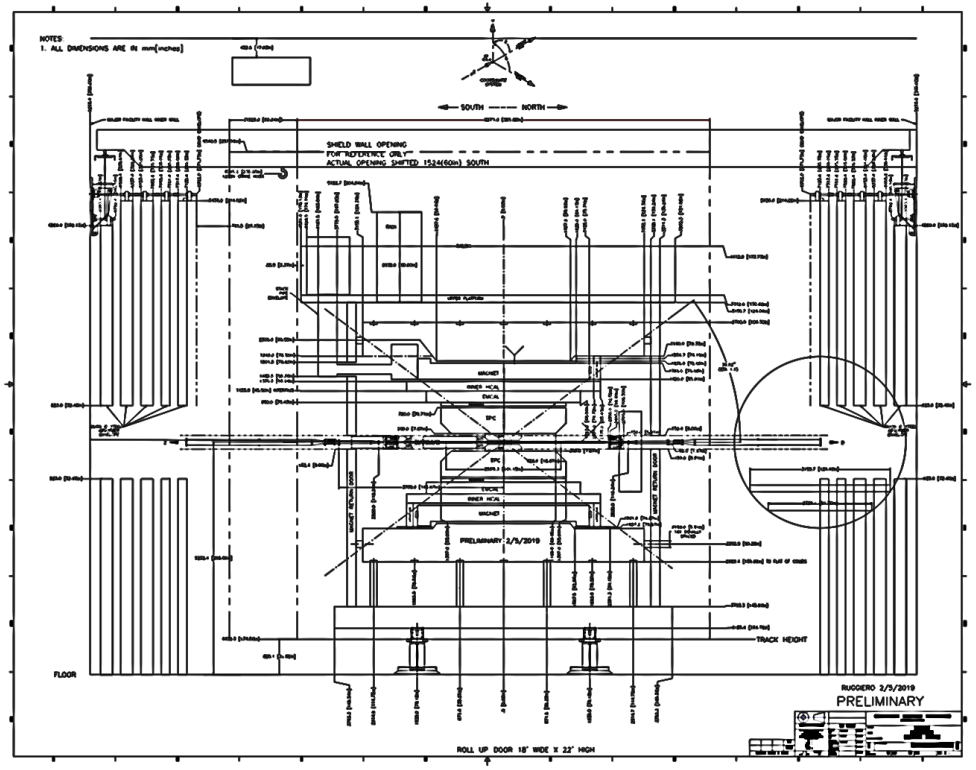
November 4, 2019



sPHENIX Office of System integration

Office of System Integration (OSI)

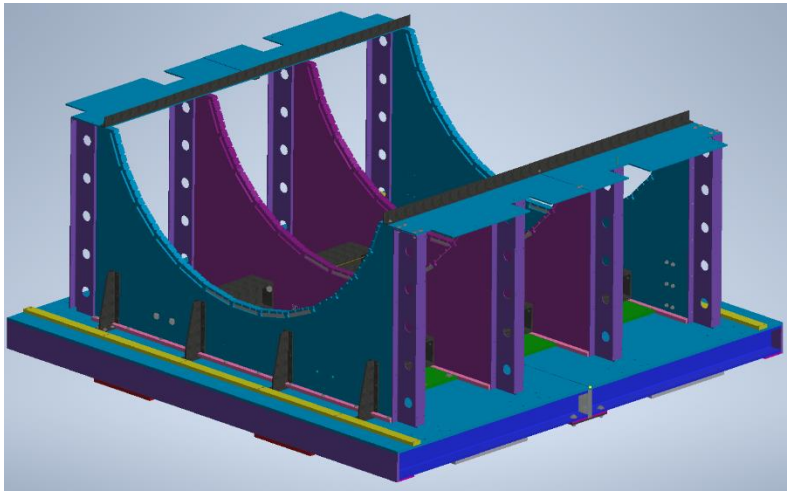
- Regular monthly meetings and/or as needed. Some examples of recent work
  - Babar magnet handling and installation
  - Shield wall survey and clearance during installation
  - Cradle-base interfaces
  - TPC space envelope growth for laser calibration system
  - MVTX integration and beam pipe interface
- Maintain and approve changes to the design envelope control drawing (*205-000-000, Rev A)*
- Updating interface control documents (ICDs)
- Installation planning and prototypes



Every sPHENIX system and structure is assigned a "design space" or envelope. Deviations are reviewed and approved by OSI.

Cradle-Base procurement and integration

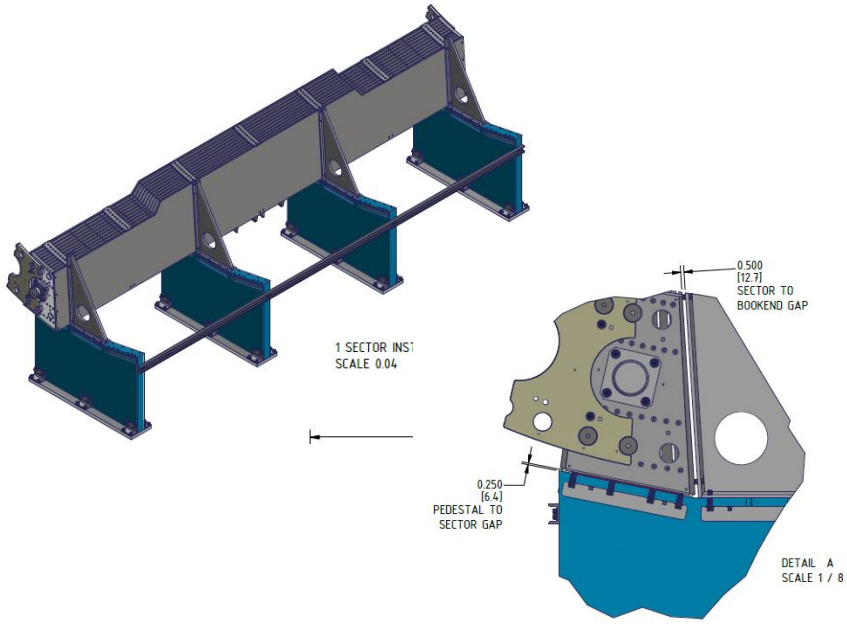
- ***FDR and Production Readiness Review (PRR) are complete***
- ***Critical interfaces with the AH and IR rail system and with the oHCAL sectors have been thoroughly checked***
- ***All drawings and engineering calculations have been checked***



➢ ***sPHENIX has gotten strong support from CA-D engineering for the Cradle, Carriage and Pole Tip design***

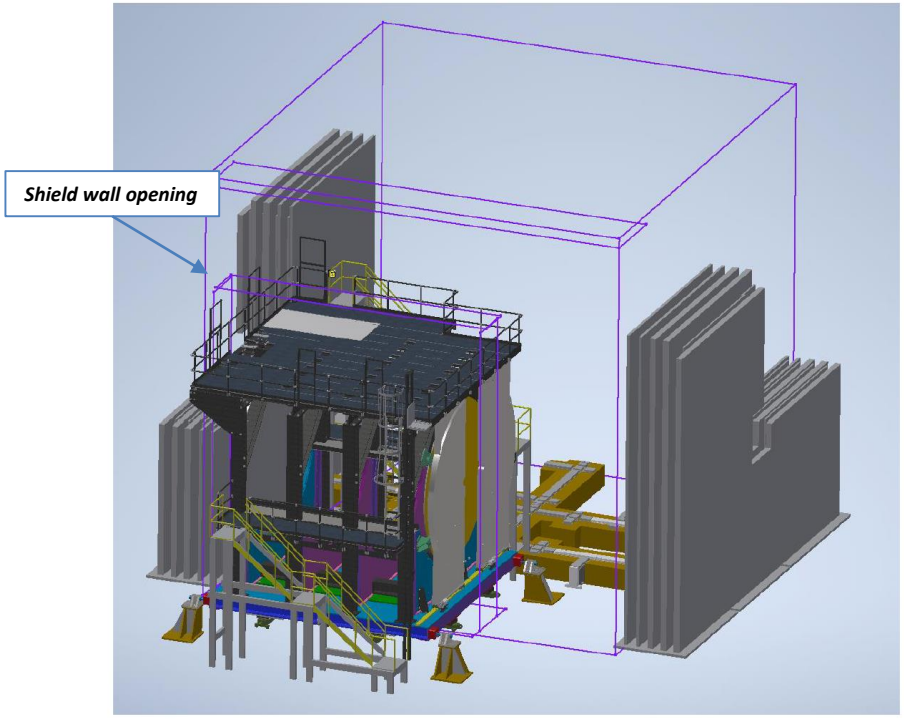
Cradle-base to oHCAL assembly prototype

- Model of cradle-base and oHCAL sectors 1-3
- *Test interface fits and develop installation procedures and tools*
- In final design awaiting analysis and FDR

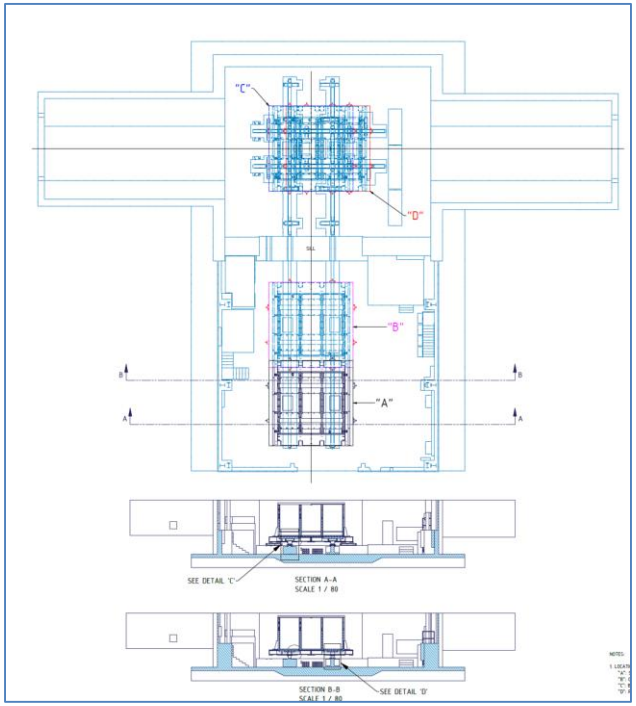


Bldg 1008 Assembly Hall and IR Interfaces

Survey data shows there is currently 4" of clearance between sPHENIX and the shield wall opening. We are working with CA-D to increase this clearance to at least 6" to account for real build tolerance and any guide rail misalignment.



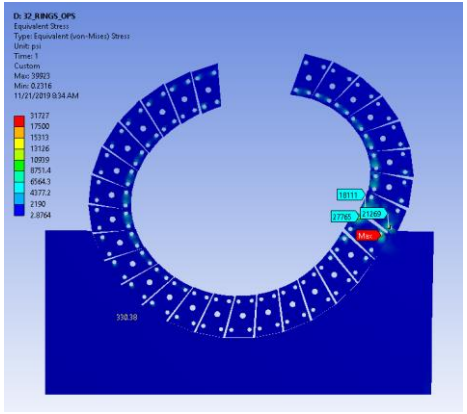
***Purple lines* = Bldg 1008 IR and shield wall opening metrology data imported into Inventor design software**

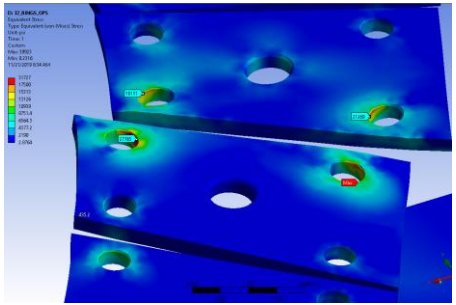


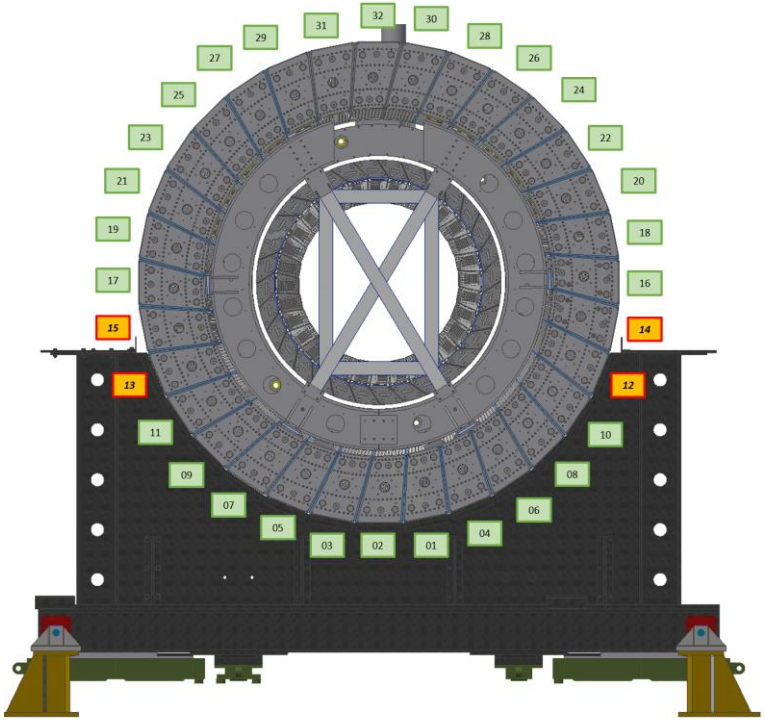
Interface control drawings have been created for the positioning of the sPHENIX base on the AH and IR rails. These drawings are also being used to check floor loading in the 1008 building.

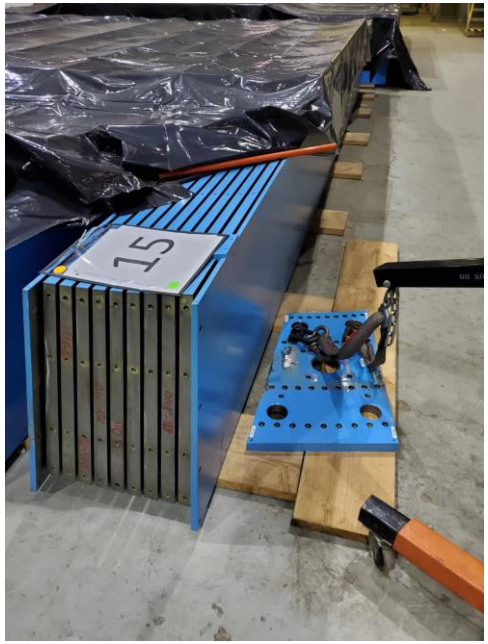
Outer HCAL sector end plate solution is resolved

- FDR was 9/17 → follow up meeting with committee was 12/3/19 to address sector end plate stress
- Conclusion → replace 8x oHCAL sector end plates with new high strength steel plates



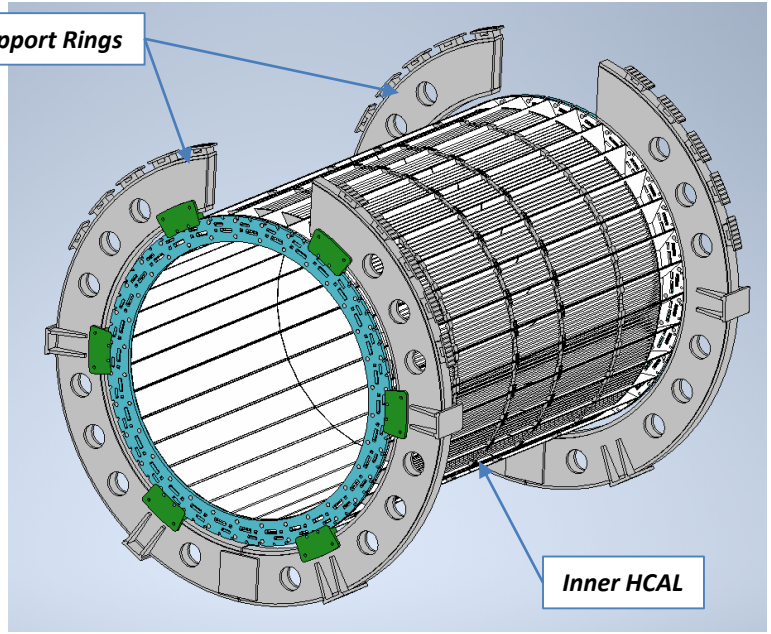




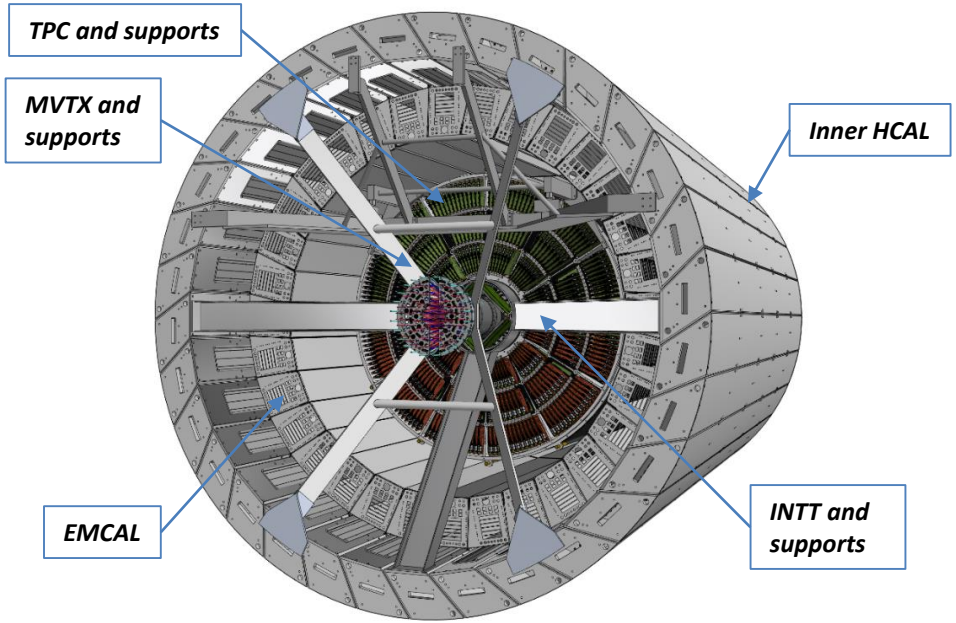


Current focus is on Inner HCAL and Support Rings integration

- The Inner Support Rings support the upper Outer HCAL and the full Inner HCAL barrel
- The Inner HCAL has the largest number of mechanical interfaces
  - *HCAL tiles and electronics, inner support rings, cryostat fit, EMCAL, TPC, INTT, MVTX*



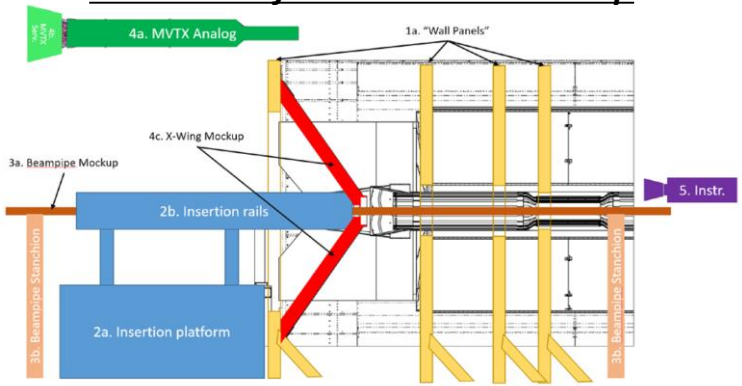
iHCAL is supported north and south by the inner support rings and is designed to pilot in to and clear the cryostat bore by ~2 inches



iHCAL provides structural support for EMCAL, TPC, INTT and MVTX

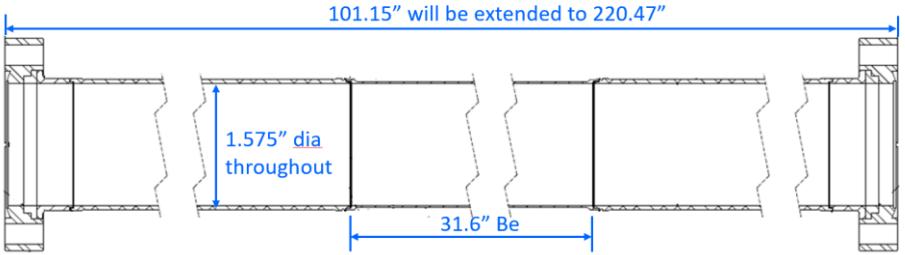
MVTX and Beam Pipe Integration

Schematic of MVTX install mock-up



1. Holding regular MVTX integration meetings
   - Next meeting is today 12/3!
2. Working with MIT team on the design of an MVTX installation mock-up
   - Practice installation around mock beam pipe
   - Refine insertion tool design
   - Looking at including INTT features
3. Camelia Mironov will be on-site soon to help keep MVTX moving forward

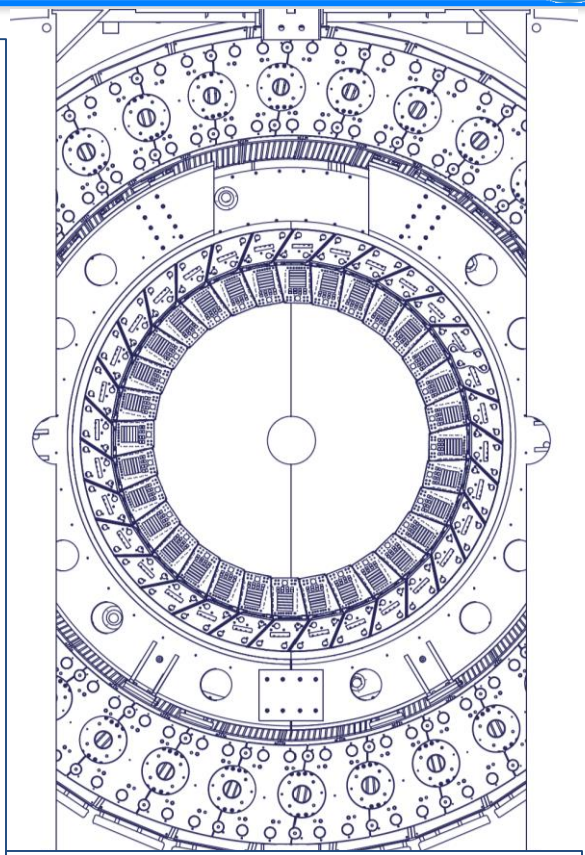
Al-Be beam tube for sPHENIX



1. Beam pipe will be sent to Materion (formerly Brush-Wellman)
   - Etch out old NEG coating and prep surfaces for new stronger coating
   - E-beam weld new aluminum extensions to tight straightness and profile tolerance for MVTX clearance
2. Returned to BNL for application of new NEG coating
3. *CA-D vacuum group has been leading this effort*

Summary

1. Most sPHENIX detector systems are past or moving through final design. System integration and interface management is one key reason for this progress.
2. The sPHENIX cradle-base procurement is moving forward after a successful FDR, PRR and completion of all drawings and interface checks.
3. Installation planning and interface management in bldg. 1008 is an important aspect of the design of sPHENIX structures and detectors.
4. Completion of the Inner HCAL and Inner Support Ring designs is now a major focus of the engineering staff while supporting on-going work for oHCAL, EMCAL, TPC and INTT
5. Integration of the core tracking detectors and the lengthened beam pipe is being managed by the sPHENIX OSI and regular meetings are held with the MIT MVTX team to ensure coordination.



Looking from the North through the open sPHENIX pole tip doors before TPC is installed