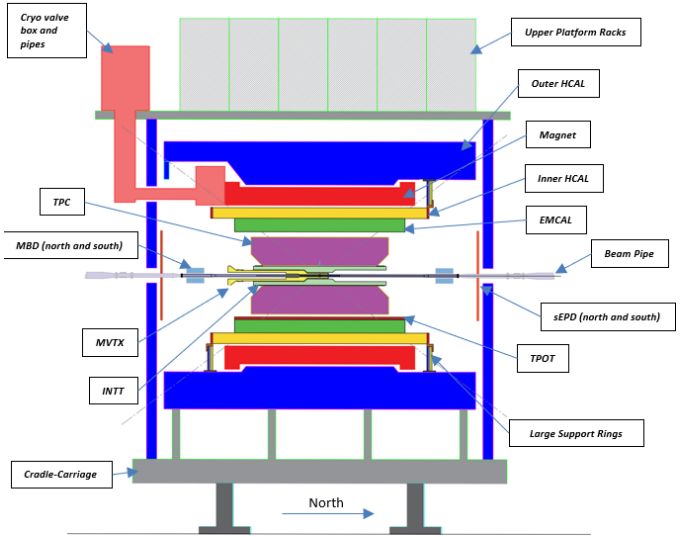
sPHENIX PMG

Construction Update, 4/20/2022

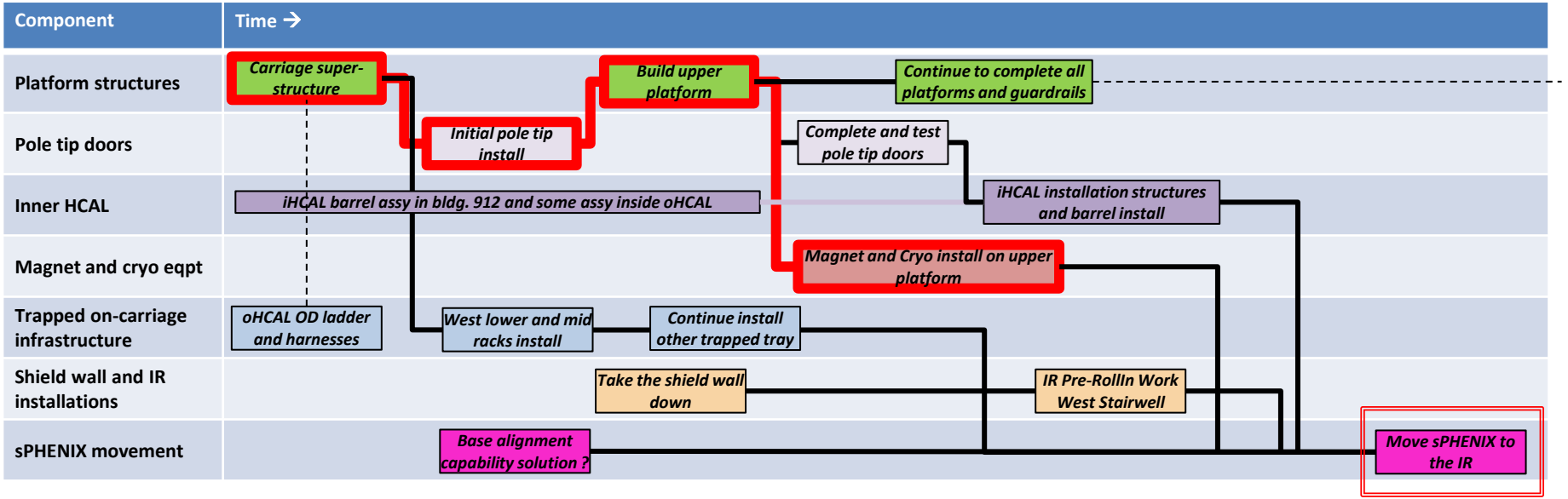


This is a simplified 2D model of sPHENIX highlighting the nested detector structures and magnet return steel construction.

What is needed to roll sPHENIX into the IR?

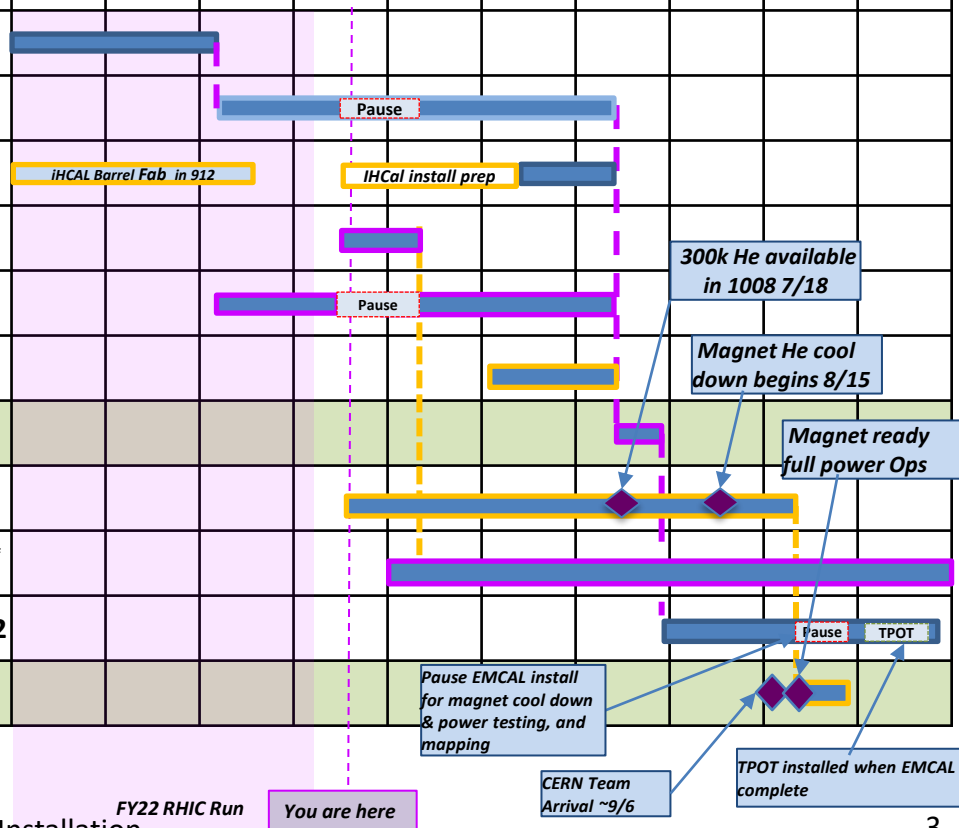
There are six prerequisites for moving sPHENIX to the IR once the shield wall comes out:

1. Complete enough of the platforms to install cryo equipment on the upper platform and to install and test the pole tip doors
2. Install the magnet extension valve box and the large distribution valve box in the SW corner of the upper platform
3. Install and test the motion of the pole tip doors
4. Complete the mechanical installation of the iHCAL barrel
5. Install all trapped on-carriage infrastructure; cable tray, racks
6. Install pre-roll-in infrastructure in the IR (can't be installed safely or easily once sPHENIX is rolled in)



sPHENIX Construction: Path to Magnet Mapping, EMCAL and TPOT Install

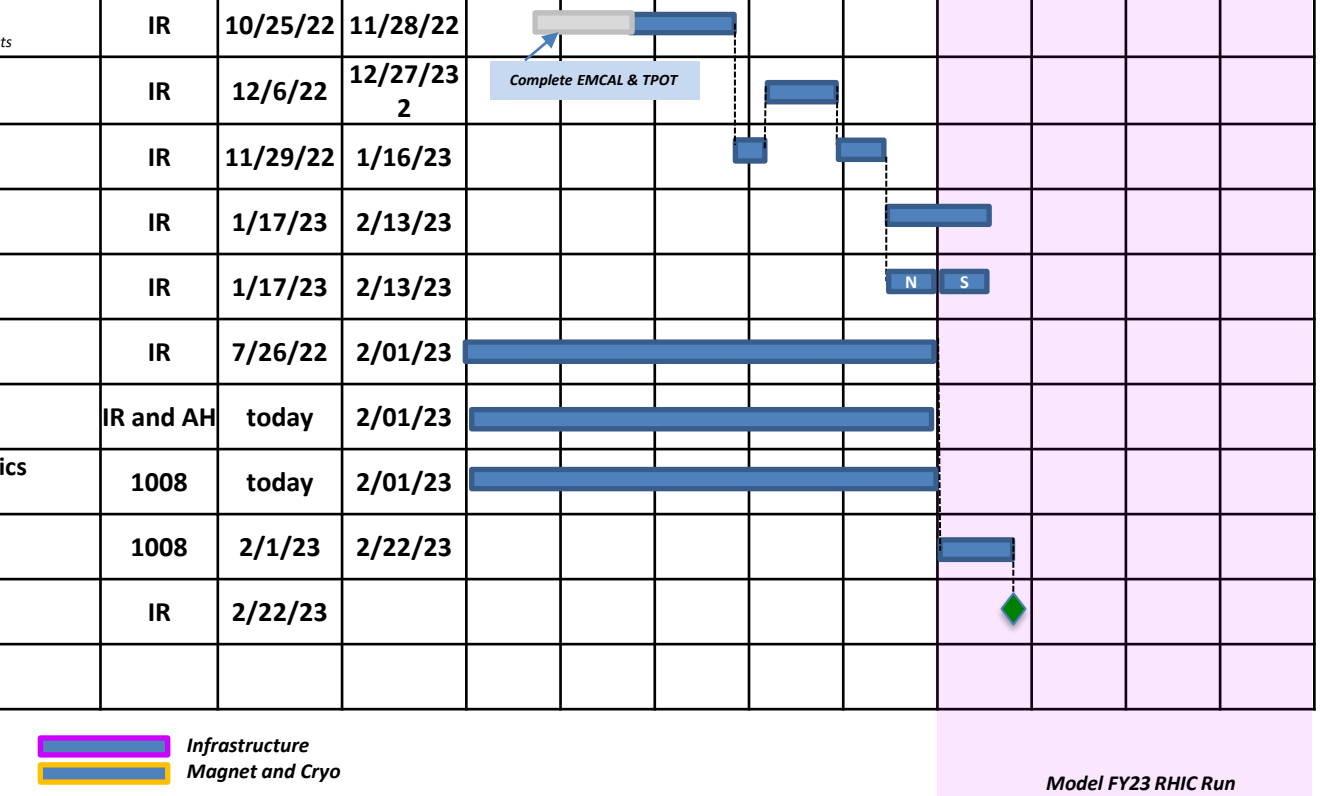
Sequential Build Steps	Location	Start	End
Complete oHCAL Sector Installation	AH	12/16/21 *Actual*	3/1/22 *Actual*
Build the Carriage, Platforms, Pole Tip Doors *This CA-D organized team will work in parallel with the sPHENIX techs working on iHCAL*	AH	3/7/22	7/15/22
Install the iHCAL Barrel *Install structures, barrel insertion into magnet bore*	AH	6/14/22	7/15/22
Remove the Shield Wall *sPHENIX moved East → West → East → West two times to get all shield wall parts out*	AH/IR	4/18/22	5/6/22
On-carriage detector infrastructure AH installs *Cable trays, piping, rack installations*	AH	3/7/22	7/15/22
Magnet and Cryo Infrastructure in AH *Valve stem, cold box and other **upper platform installations***	AH	6/2/22	7/15/22
Move sPHENIX To the IR *sPHENIX moves west and north to final IR position*	AH/IR	7/18/22	7/22/22
Magnet Cryo, Power, Cool Down & Testing in IR *Complete magnet infrastructure pre- and post- sPHENIX roll-in*	IR	4/22/22	9/9/22
Detector Infrastructure AH and IR installs *New AH chiller platform, cables, piping, racks on carriage, etc…*	IR	5/2/22	Through end of project
EMCAL, TPC install structures, TPOT install in IR *TPOT installed last in order to use TPC installation structures*	IR	7/25/22	10/24/22
Magnet Mapping *Favor magnet mapping over EMCAL install, finish ASAP and then restart EMCAL*	IR	9/6/22	9/27/22



sPHENIX Construction: TPC to ORR. Revised schedule

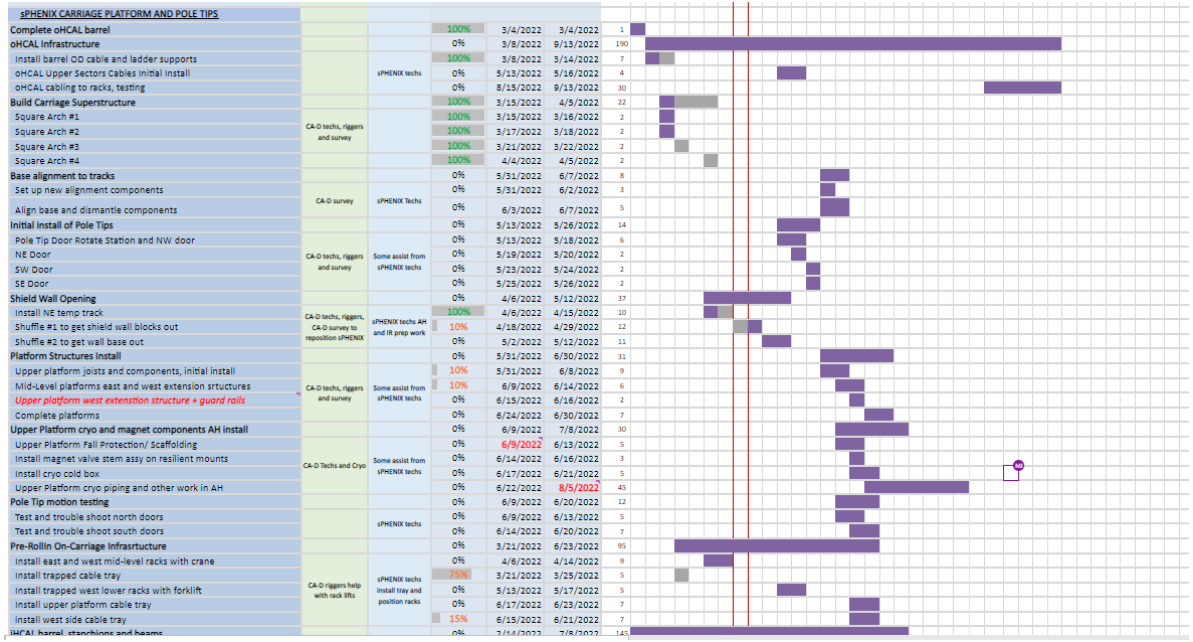
Single shift schedule. Includes parallel work steams with two installation teams; sPHENIX tech team and CA-D tech team

Sequential Build Steps	Location	Start	End	S-22	O-22	N-22	D-22	J-23	F-23	M-23	A-23	M-23
TPC *Includes dedicated time for access for laser and service connections and tests*	IR	10/25/22	11/28/22									
Beam Pipe install and bake *Complete 1008 beam line*	IR	12/6/22	12/27/23 2									
INTT *INTT supports → beam pipe → INTT*	IR	11/29/22	1/16/23									
MVTX *and final beam pipe adjustments*	IR	1/17/23	2/13/23									
sEPD and MBD(N&S)	IR	1/17/23	2/13/23									
On-carriage infrastructure	IR	7/26/22	2/01/23									
Off-carriage infrastructure	IR and AH	today	2/01/23									
DAQ and Control Rooms, Software and Physics Infrastructure	1008	today	2/01/23									
ORR Prep and ORR	1008	2/1/23	2/22/23									
Ready to run sPHENIX	IR	2/22/23										



sPHENIX Construction Schedule Management

- Rob Michnoff, David Chan, Roberto Than, and Russ Feder (with input from many others) working closely on integrated schedule (sPHENIX-schedule-carriage-platform-and-poletips.xlsx) → *periodic percent-complete updates, and bi-weekly update meetings moving forward*
- Detailed discussions with Dave Chan and Marianna Albanese on labor planning between CA-D and sPHENIX technicians and trades
- The end-game cabling, piping, and commissioning plan is being elaborated out, lead by the sPHENIX commissioning tasks force (Caroline Riedl and John Haggerty, Chris Pontieri)
    - *The main issue is how much dedicated time on the primary shift to allow for services and commissioning of each system before making way for the next mechanical installation. At this point, remaining work will be done on a second or alternate shift basis. We are working on optimizing this.*
- Working with Ray Fliller and his team on integrating in the IRR and ARR plan
- On a practical level, we (*sPHENIX and CA-D leaders*) meet every morning at 830 for the plan of the day, every Thursday at 2 PM for the two-week look-ahead, and informally several times a day with various work leaders. → Big, big thanks to Fred Kobasiuk, Marianna Albanese, Dave Chan, and several others from CA-D for their organization and help!



sPHENIX CARRIAGE PLATFORM AND POLE TIPS						
Complete oHCAL barrel			100%	3/4/2022	3/4/2022	1
oHCAL Infrastructure			0%	3/8/2022	9/13/2022	190
Install barrel OD cable and ladder supports		sPHENIX techs	100%	3/8/2022	3/14/2022	7
oHCAL Upper Sectors Cables initial install		sPHENIX techs	0%	5/13/2022	5/16/2022	4
oHCAL cabling to racks, testing		sPHENIX techs	0%	8/15/2022	9/13/2022	30
Build Carriage Superstructure			100%	3/15/2022	4/5/2022	22
Square Arch #1	CA-D techs, riggers and survey		100%	3/15/2022	3/16/2022	2
Square Arch #2	CA-D techs, riggers and survey		100%	3/17/2022	3/18/2022	2
Square Arch #3	CA-D techs, riggers and survey		100%	3/21/2022	3/22/2022	2
Square Arch #4	CA-D techs, riggers and survey		100%	4/4/2022	4/5/2022	2
Base alignment to tracks			0%	5/31/2022	6/7/2022	8
Set up new alignment components	CA-D survey	sPHENIX Techs	0%	5/31/2022	6/2/2022	3
Align base and dismantle components	CA-D survey	sPHENIX Techs	0%	6/3/2022	6/7/2022	5
Initial Install of Pole Tips			0%	5/13/2022	5/26/2022	14
Pole Tip Door Rotate Station and NW door			0%	5/13/2022	5/18/2022	6
NE Door	CA-D techs, riggers and survey	Some assist from sPHENIX techs	0%	5/19/2022	5/20/2022	2
SW Door	CA-D techs, riggers and survey	Some assist from sPHENIX techs	0%	5/23/2022	5/24/2022	2
SE Door	CA-D techs, riggers and survey	Some assist from sPHENIX techs	0%	5/25/2022	5/26/2022	2
Shield Wall Opening			0%	4/6/2022	5/12/2022	37
Install NE temp track	CA-D techs, riggers, CA-D survey to reposition sPHENIX	sPHENIX techs AH and IR prep work	100%	4/6/2022	4/15/2022	10
Shuffle #1 to get shield wall blocks out	CA-D techs, riggers, CA-D survey to reposition sPHENIX	sPHENIX techs AH and IR prep work	10%	4/18/2022	4/29/2022	12
Shuffle #2 to get wall base out	CA-D techs, riggers, CA-D survey to reposition sPHENIX	sPHENIX techs AH and IR prep work	0%	5/2/2022	5/12/2022	11
Platform Structures Install			0%	5/31/2022	6/30/2022	31
Upper platform joists and components, initial install	CA-D techs, riggers and survey	Some assist from sPHENIX techs	10%	5/31/2022	6/8/2022	9
Mid-Level platforms east and west extension srtuctures	CA-D techs, riggers and survey	Some assist from sPHENIX techs	10%	6/9/2022	6/14/2022	6
Upper platform west extenstion structure + guard rails	CA-D techs, riggers and survey	Some assist from sPHENIX techs	0%	6/15/2022	6/16/2022	2
Complete platforms	CA-D techs, riggers and survey	Some assist from sPHENIX techs	0%	6/24/2022	6/30/2022	7
Upper Platform cryo and magnet components AH install			0%	6/9/2022	7/8/2022	30
Upper Platform Fall Protection/ Scaffolding	CA-D Techs and Cryo	Some assist from sPHENIX techs	0%	6/9/2022	6/13/2022	5
Install magnet valve stem assy on resilient mounts	CA-D Techs and Cryo	Some assist from sPHENIX techs	0%	6/14/2022	6/16/2022	3
Install cryo cold box	CA-D Techs and Cryo	Some assist from sPHENIX techs	0%	6/17/2022	6/21/2022	5
Upper Platform cryo piping and other work in AH	CA-D Techs and Cryo	Some assist from sPHENIX techs	0%	6/22/2022	8/5/2022	45
Pole Tip motion testing			0%	6/9/2022	6/20/2022	12
Test and trouble shoot north doors		sPHENIX techs	0%	6/9/2022	6/13/2022	5
Test and trouble shoot south doors		sPHENIX techs	0%	6/14/2022	6/20/2022	7
Pre-Rollin On-Carriage Infrastructure			0%	3/21/2022	6/23/2022	95
Install east and west mid-level racks with crane			0%	4/6/2022	4/14/2022	9
Install trapped cable tray	CA-D riggers help with rack lifts	sPHENIX techs install tray and position racks	75%	3/21/2022	3/25/2022	5
Install trapped west lower racks with forklift	CA-D riggers help with rack lifts	sPHENIX techs install tray and position racks	0%	5/13/2022	5/17/2022	5
Install upper platform cable tray	CA-D riggers help with rack lifts	sPHENIX techs install tray and position racks	0%	6/17/2022	6/23/2022	7
Install west side cable tray	CA-D riggers help with rack lifts	sPHENIX techs install tray and position racks	15%	6/15/2022	6/21/2022	7
IHCAL barrel, stanchions and beams			0%	2/14/2022	7/8/2022	145

- Key dates, through magnet mapping, on this detailed plan are within 5-10 days of the PowerPoint plan shown on the previous slide.
- For example, this EXCEL schedule shows magnet mapping ending on 10/10. The PowerPoint schedule shows 9/27.
- I don't recommend making any more adjustments and issue an updated reconciled schedule until sPHENIX is rolled into the IR. Some planned work has started earlier and will finish sooner, and some is taking longer.

sPHENIX Construction Status

In 1008

- Shield wall removal started. sPHENIX and CA-D teams working extra hours to accelerate work.
- CA-D started the platforms assembly and will continue when/if there is shield wall shuffle down time
- sPHENIX techs will continue with cable tray and rack installation once the mid-level platforms are ready
- CA-D installing infrastructure equipment and west stairwell in IR
- sPHENIX techs are working on infrastructure work in the control room, rack room, and rack factory continues

In 912

- sPHENIX techs and CA-D riggers are working on iHCAL installation structures assembly and rigging tests
- sPHENIX techs are working on EMCAL installation practice

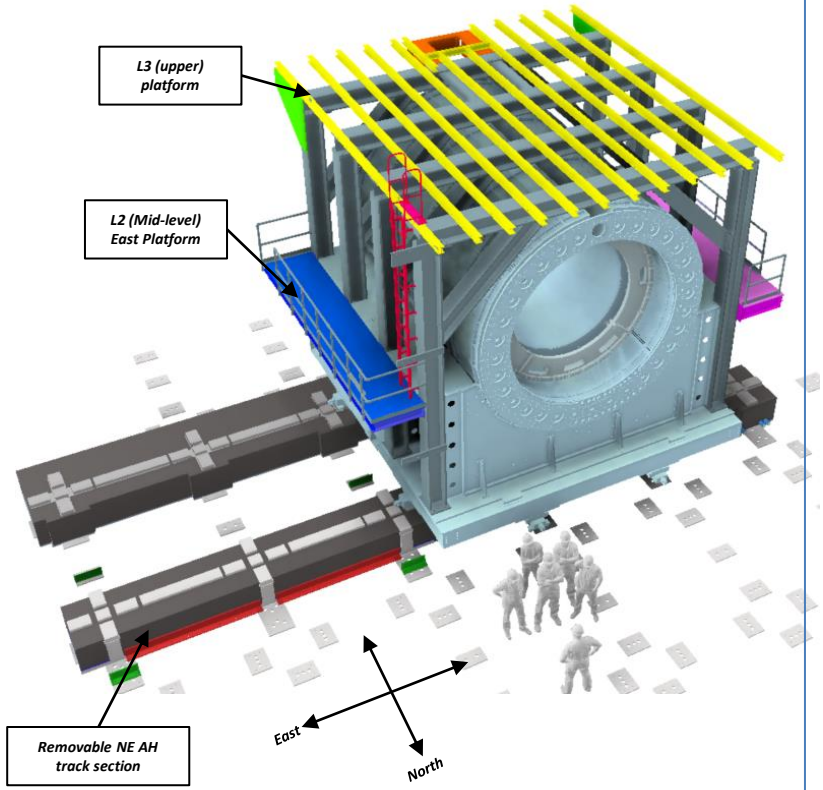
In 510

- The sPHENIX team is finished making EMCAL dummy sectors → take to 912
- INTT and TPC lab work continues

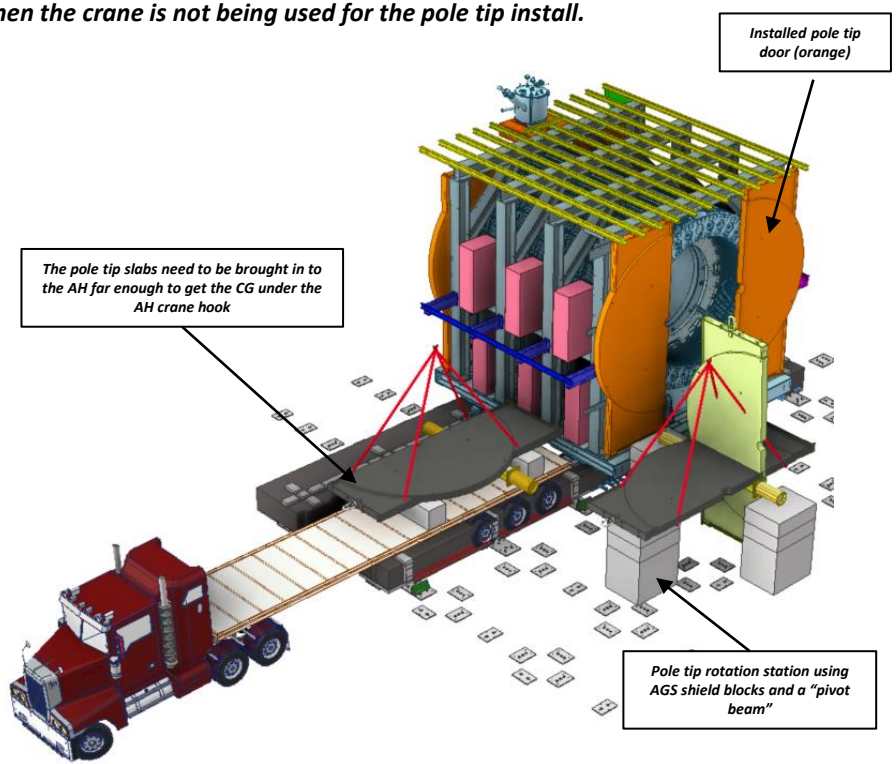
Next steps in the 1008 AH: Platforms and Pole Tip Doors

All platform and pole tip components and hardware are in-hand

CA-D started installing these elements (colors) of the L2 and L3 platforms. The upper platform work has started earlier than planned and will not interfere with the pole tip installation when that starts.

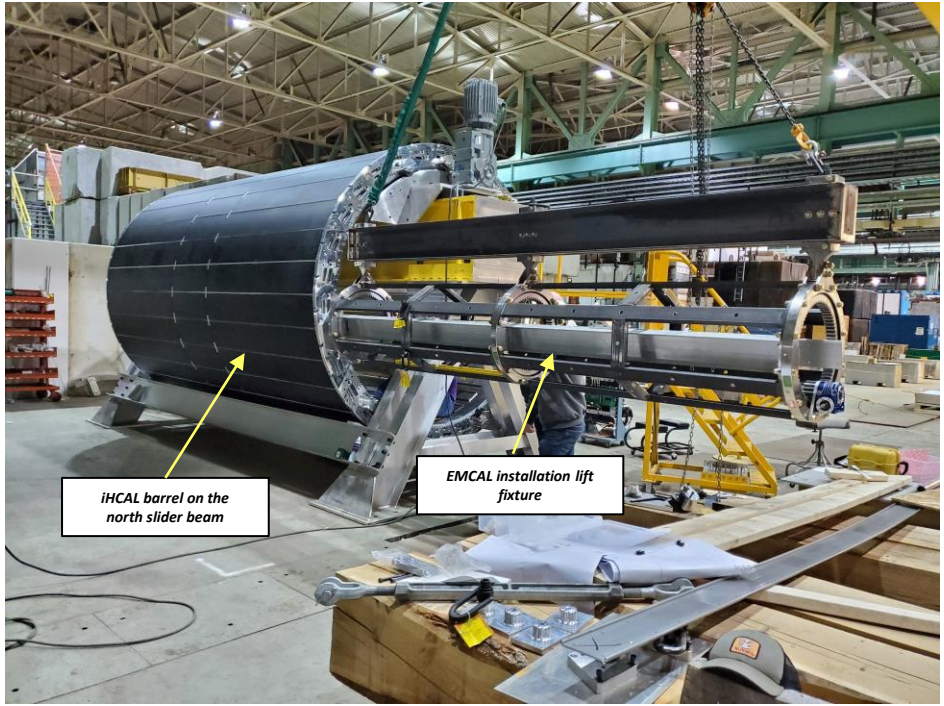


The pole tip doors installation will start when the shield wall shuffle is complete and we re-position sPHENIX. Work on the platforms can continue in parallel when the crane is not being used for the pole tip install.



912 Status

Practice EMCAL installation on completed iHCAL barrel

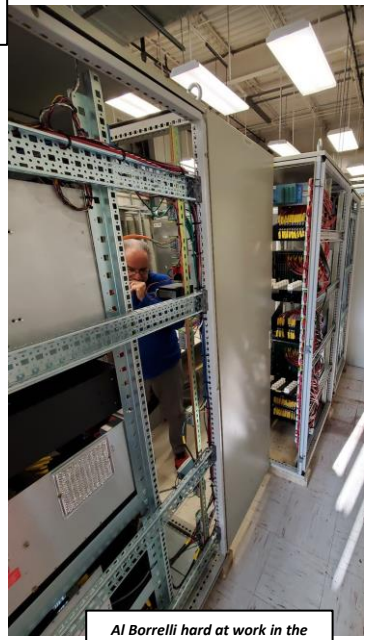


Testing of the iHCAL south slider L-shaped lift fixture

Infrastructure Progress

New water lines and cable tray in the IR and AH

31 new on-carriage racks in the 1008 rack factory


Al Borrelli hard at work in the 1008 rack factory


View of the back of a typical sPHENIX on-carriage rack

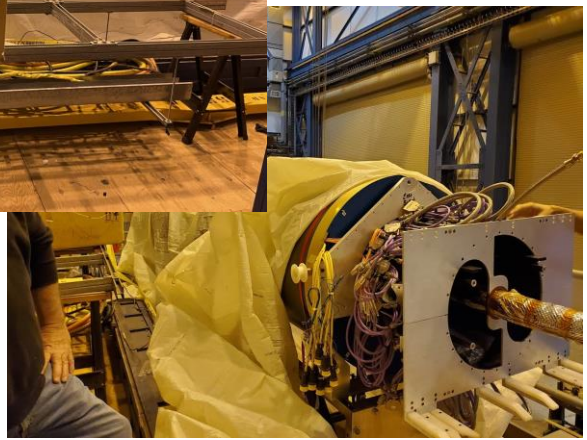
Control room: New PLC-based control and safety systems, new HMI interface station

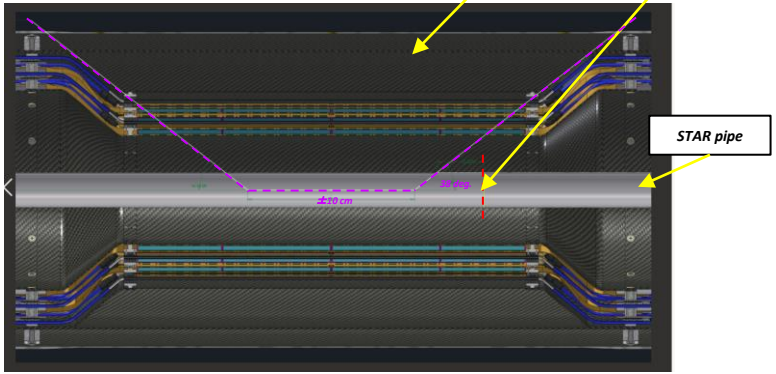
Beam Pipe

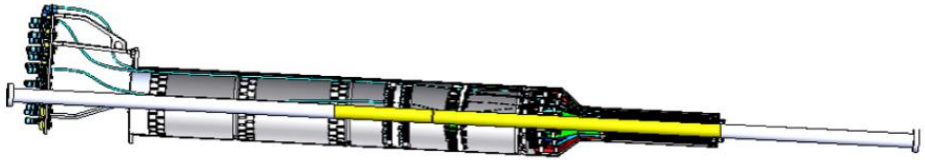
The STAR small bore Al-Be beam pipe can be used for sPHENIX; same diameter, allows for same pseudorapidity coverage

Next steps

- Hardware: Extract the pipe from the STAR assembly and inspect the pipe ID NEG coating. Require new NEG coating?
- Design: MVTX integration, use same pipe supports, same installation tooling and bake hardware
- Silver lining ? → If NEG coating OK and MVTX integration OK, then can use the STAR pipe as is…mitigates other risks
- Bob Soja brought in to lead the extraction
- Getting very good support from CA-D for technician help







MVTX installation study done by MVTX team at Bates and LANL