sPHENIX Construction Update

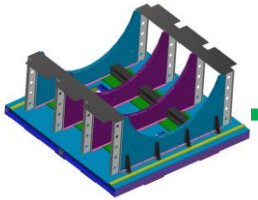
Outer HCAL with 20 sectors installed

iHCAL barrel fabrication rig in 912

sPHENIX Detector Construction Sequence

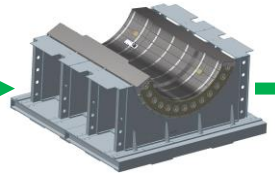
You are here

(1) Cradle Base, AH



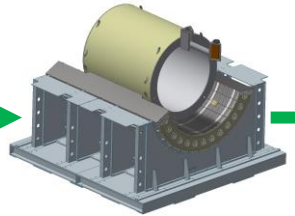
The base will be built on top of the AH rails

(2) oHCAL Sector 1-13, AH



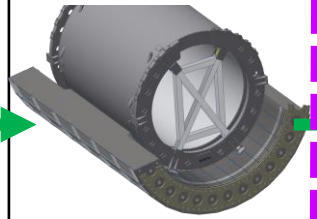
Magnet mount hardware is also attached

(3) Magnet mount, AH



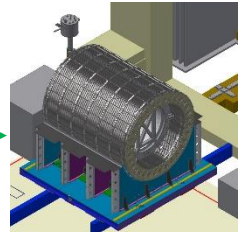
The magnet is lowered in to the oHCAL bore

(4) Inner Rings, AH



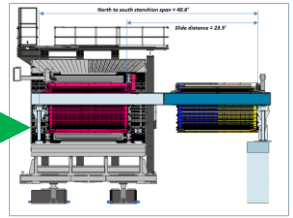
The rings also work to stabilize the magnet

(5) oHCAL Sector 14-32, AH



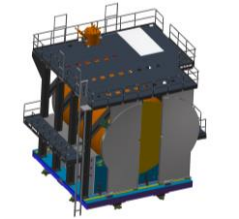
The full oHCAL barrel weighs ~480 tons

(6) Inner HCAL structure



The iHCAL barrel slides in from the North

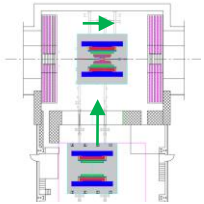
(7) Carriage, platforms, Pole Tips, Valve Box AH



(8) Open Shield Wall

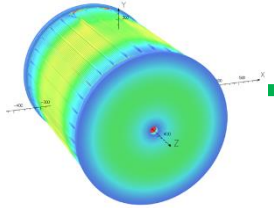
Work on sPHENIX will stop for the time needed to remove the shield wall

(9) Move sPHENIX to IR



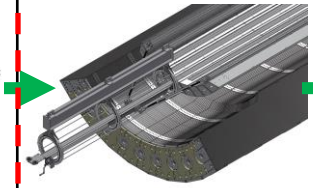
There is a 5-foot move North in the IR

(10) Connect, Map Magnet, IR



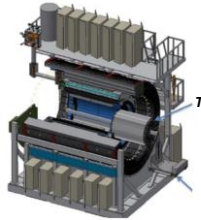
Results from an sPHENIX OPERA EM FEA

(11) EMCAL and TPOT, IR



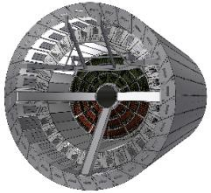
New place in schedule

(12) TPC, IR

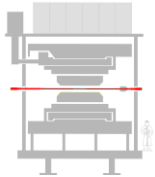


TPC slides in the EMCAL bore from North

(13) INTT Supports, IR

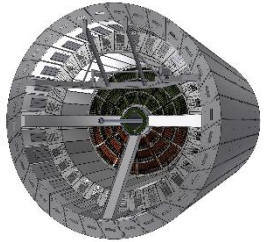


(14) Beam Pipe Install and Bake. IR



Beam pipe is supported temporarily

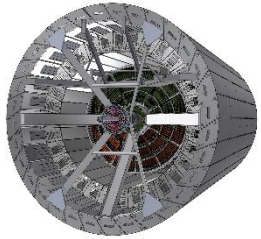
(15) INTT Device, IR



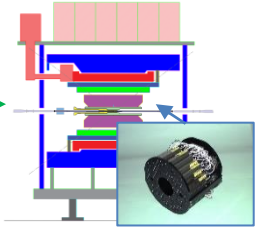
(16) MVTX and Supports, IR

MVTX has a 2mm clearance to the beam pipe

(17) Secure Beam pipe, IR

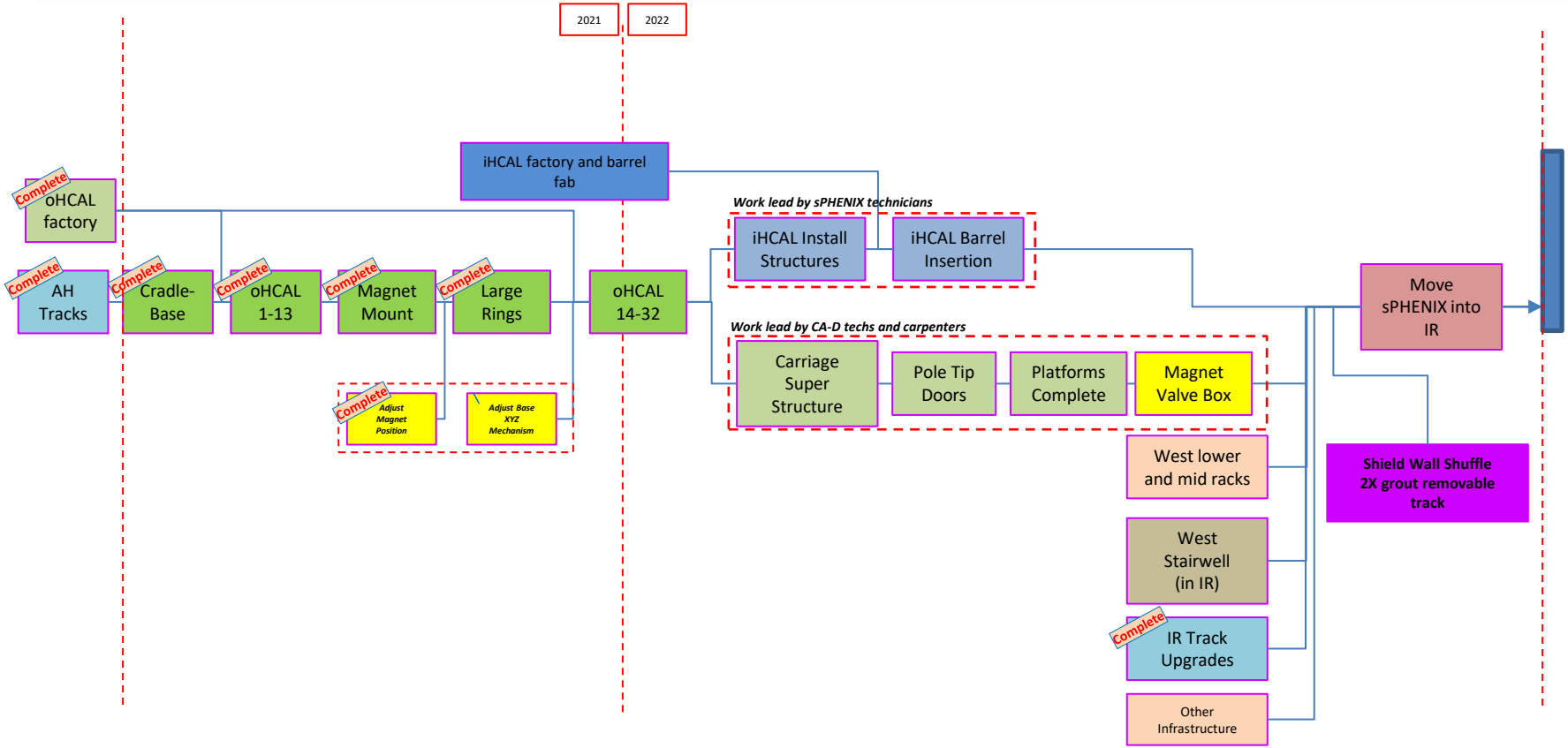


(18) MBD and sEPD, IR



+MBD supports

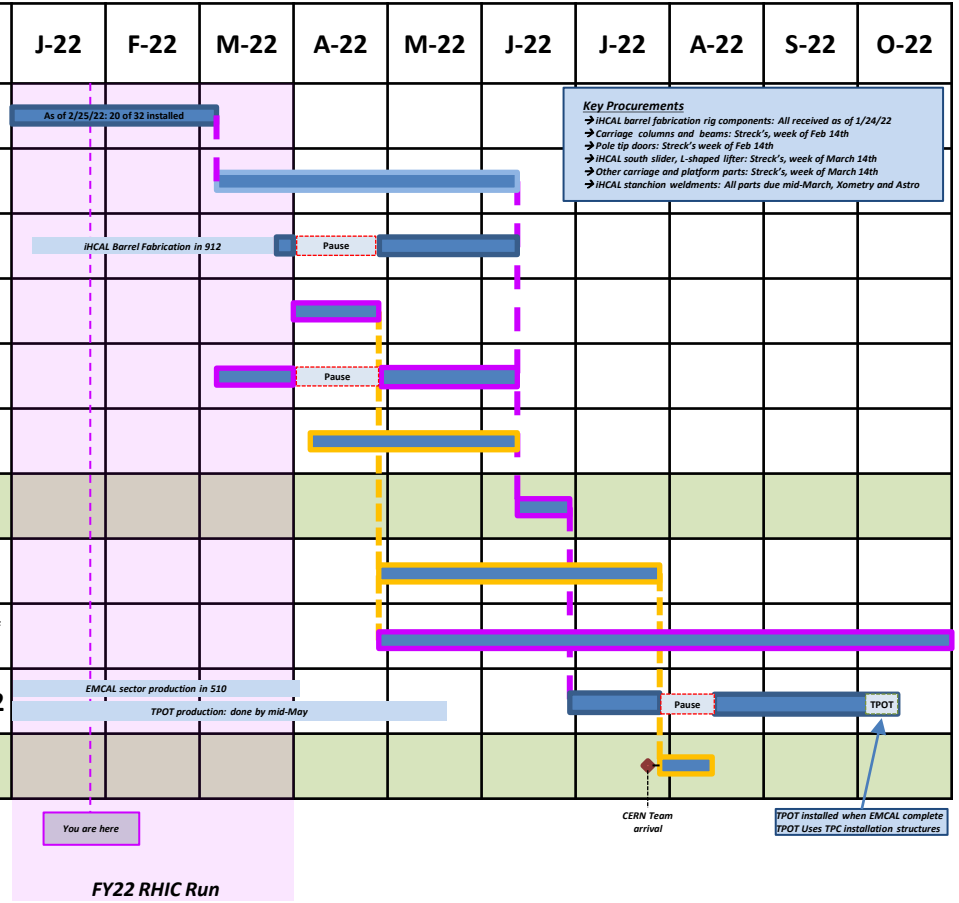
1008 Assembly Hall (AH) Installation Sequence



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

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
Complete oHCAL Sector Installation	AH	12/16/21 *Actual*	3/4/22
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	6/10/22
Install the iHCAL Barrel *Install structures, barrel insertion into magnet bore*	AH	3/21/22	6/10/22
Remove the Shield Wall *sPHENIX moved East → West → East → West two times to get all shield wall parts out*	AH/IR	4/4/22	4/22/22
On-carriage detector infrastructure AH installs *Cable trays, piping, rack installations*	AH	3/7/22	6/10/22
Magnet and Cryo Infrastructure AH Installs *Valve stem, cold box and other upper platform installations*	AH	4/4/22	6/10/22
Move sPHENIX To the IR *sPHENIX moves west and north to final IR position*	AH/IR	6/13/22	6/24/22
Magnet Cryo, Power, Cool Down and Testing *Complete upper platform, IR mezzanine connections, power connect*	IR	4/25/22	7/22/22
Detector Infrastructure AH and IR installs *New AH chiller platform, cables, piping, racks on carriage, etc…*	IR	4/25/22	Through end of project
EMCAL, TPOT, and TPC support frames install in IR *TPOT installed last in order to use TPC installation structures*	IR	6/27/22	10/14/22
Magnet Mapping (as early as possible)	IR	7/25/22	8/12/22



Key Procurements
- *iHCAL barrel fabrication rig components: All received as of 1/24/22*
- *Carriage columns and beams: Streck's, week of Feb 14th*
- *Pole tip doors: Streck's week of Feb 14th*
- *iHCAL south slider, L-shaped lifter: Streck's, week of March 14th*
- *Other carriage and platform parts: Streck's, week of March 14th*
- *iHCAL stanchion weldments: All parts due mid-March, Xometry and Astro*

sPHENIX Detectors → sPHENIX Techs
sPHENIX Structures → CA-D Techs
Infrastructure
Magnet and Cryo

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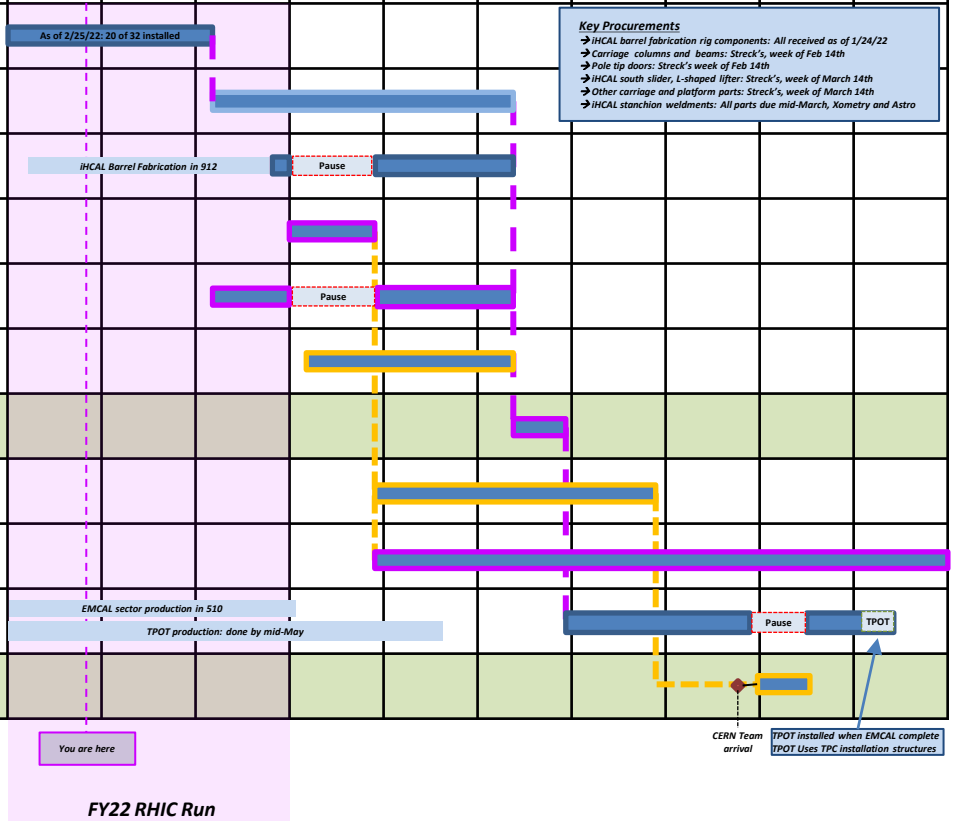
Detector Infrastructure AH and IR installs *New AH chiller platform, cables, piping, racks on carriage, etc…*	IR	4/25/22	Through end of project
EMCAL, TPOT, and TPC support frames install in IR *TPOT installed last in order to use TPC installation structures*	IR	6/27/22	10/14/22
Magnet Mapping (after 52 EMCAL sectors install)	IR	8/29/22	9/16/22



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How to accelerate the sPHENIX construction schedule?

Can we get a month back?

1. **Do as much work as possible in parallel…with more people**
    1. sPHENIX technicians focus on detector assembly and installation, some infrastructure
    2. CA-D technicians and trades work on carriage, platforms, pole tip doors, infrastructure
        1. Working with Dave Chan and Fred Kobasiuk to organize
    3. Ensure that the magnet cryo and electrical team is ready to go by April → Jim Mills spearheading this

    Done
    4. EMCAL technicians will start to be available in April
    5. Relying on continued support (both teams have been very good) from Rigging and Metrology teams

2. **Add pre-planned bands of overtime, staggered overlapping shifts or a 2nd shift?**
    1. We are working on staffing models to support alternate shift models
        1. Safety, work planning, and supervision need to be maintained
        2. Need rigging and metrology *always available* for detector installation on multiple shifts
        3. Engineering and technician coverage for all shifts
    2. Uses of a 2nd shift
        1. Primary construction and installation → need rigging and metrology on all shifts
        2. On-carriage cabling and other infrastructure, detector testing and commissioning, rack prep work, work in the control room and DAQ room → only need technicians, work planning and safety coverage, engineering and physics staff

3. **Continue to look for ways to improve the schedule and work more efficiently**
    1. How to speed up oHCAL installation?
    2. Streamline the shield wall removal process and schedule?
    3. Prioritize upper platform construction in order to install magnet cryo equipment as soon as possible
    4. What is the most efficient way to install EMCAL in the IR while preparing for and performing magnet mapping? (Can CERN team work a 2nd shift with EMCAL on 1st shift?)
    5. Can we practice EMCAL installation in 912 to help increase the efficiency of the installation in the IR?

Cumulative Weight %-complete

	Weight (tons)	Cumulative (tons)	% of Total
Cradle-base halves	2 x 36.5 + equipt	73	8.1
Cradle-base other parts	60	133	14.8
oHCAL sector 1-13	13 x 16	341	37.9
Babar Magnet	14	355	39.4
Large Support Rings	4	359	39.9
oHCAL sector 14-32	19 x 16	663	73.7
iHCAL barrel	18	681	75.7
EMCAL sectors	32 (64 x ½ each)	713	79.2
Carriage and platforms	72 (various)	785	87.2
Pole Tip Doors	4 x 23	877	97.4
TPC, INTT, MVTX, MBD, Cryo Eqpt, Racks, Cables, Pipes, etc…	23	900	100

Move to IR

When the oHCAL barrel is built the project will be 73.7% complete by weight.

sPHENIX will be at 877 tons (97.4% of total weight) when we roll into the IR.