

SBS Engineering Status

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Kinematics of SBS

•SBS Program is defined by three experiments, each with multiple configurations of equipment. Each configuration has been modeled and the required layout of the Hall has been determined.

G_E^n

09016

Polarized He3

Q^2 [GeV ²]	θ_{BB} [deg]	d_{BB} [m]	θ_{48D48} [deg]	d_{48D48} [m]	d_{HICAL} [m]	Beam Line Configuration #
1.46	40.0	1.50	39.4	2.8	17	2
3.68	34.0	1.50	29.9	2.8	17	2
6.77	34.0	1.50	22.2	2.8	17	2
10.18	34.0	1.50	17.5	2.8	17	2

G_E^p

07109

Hydrogen

Experimental Points

40cm Hydrogen

Q^2 [GeV ²]	$\theta_{electronarm}$ [deg]	θ_{48D48} [deg]	d_{48D48} [m]	$d_{electronarm}$ [m]	d_{HICAL} [m]	Beam Line Configuration #
5.0	29	25.7	1.6	9	6.8	1
8.0	26.7	22.1	1.6	6.5	6.8	1
12.0	29.0	16.9	1.6	4.5	6.8	1

G_M^n

09019

Hydrogen/Deuterium

Experimental Points

10cm Hydrogen/Deuterium

Q^2 [GeV ²]	θ_{BB} [deg]	d_{BB} [m]	θ_{48D48} [deg]	d_{48D48} [m]	d_{HICAL} [m]	Beam Line Configuration #
3.5	32.5	1.80	31.1	2.0	7.2	3
4.5	41.9	1.55	24.7	2.25	8.5	3
5.7	58.4	1.55	17.5	2.25	11	3
8.1	43	1.55	17.5	2.25	11	3
10.2	34	1.75	17.5	2.25	11	3
12.0	44.2	1.55	13.3	2.25	14	3
13.5	33.0	1.55	14.9	3.1	17	4

Calibration Points:

10cm Hydrogen

Q^2 [GeV ²]	θ_{HRS} [deg]	θ_{48D48} [deg]	d_{48D48} [m]	d_{HICAL} [m]	Beam Line Configuration #
4.4	39	25.5	3.1	17.	4
4.4	42	25.5	3.1	17.	4
6.0	61.1	14.9	3.1	17.	4
6.0	64.3	14.9	3.1	17.	4
6.0	67.5	14.9	3.1	17.	4
6.0	69.1	14.9	3.1	17.	4

GEn polarimeter Layout

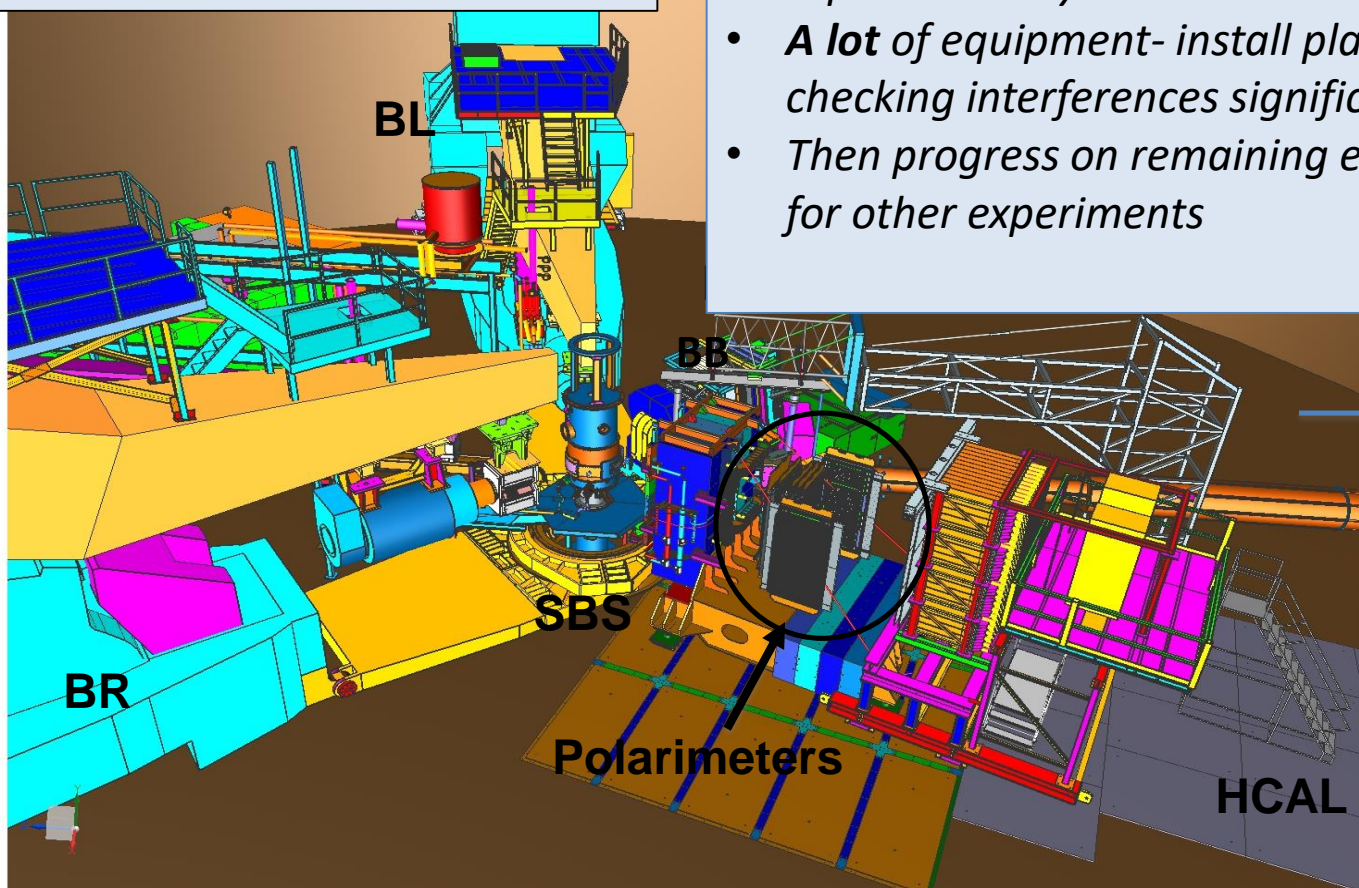
G_E^m/G_M^m **17004** **Hydrogen/Deuterium**

Experimental Points

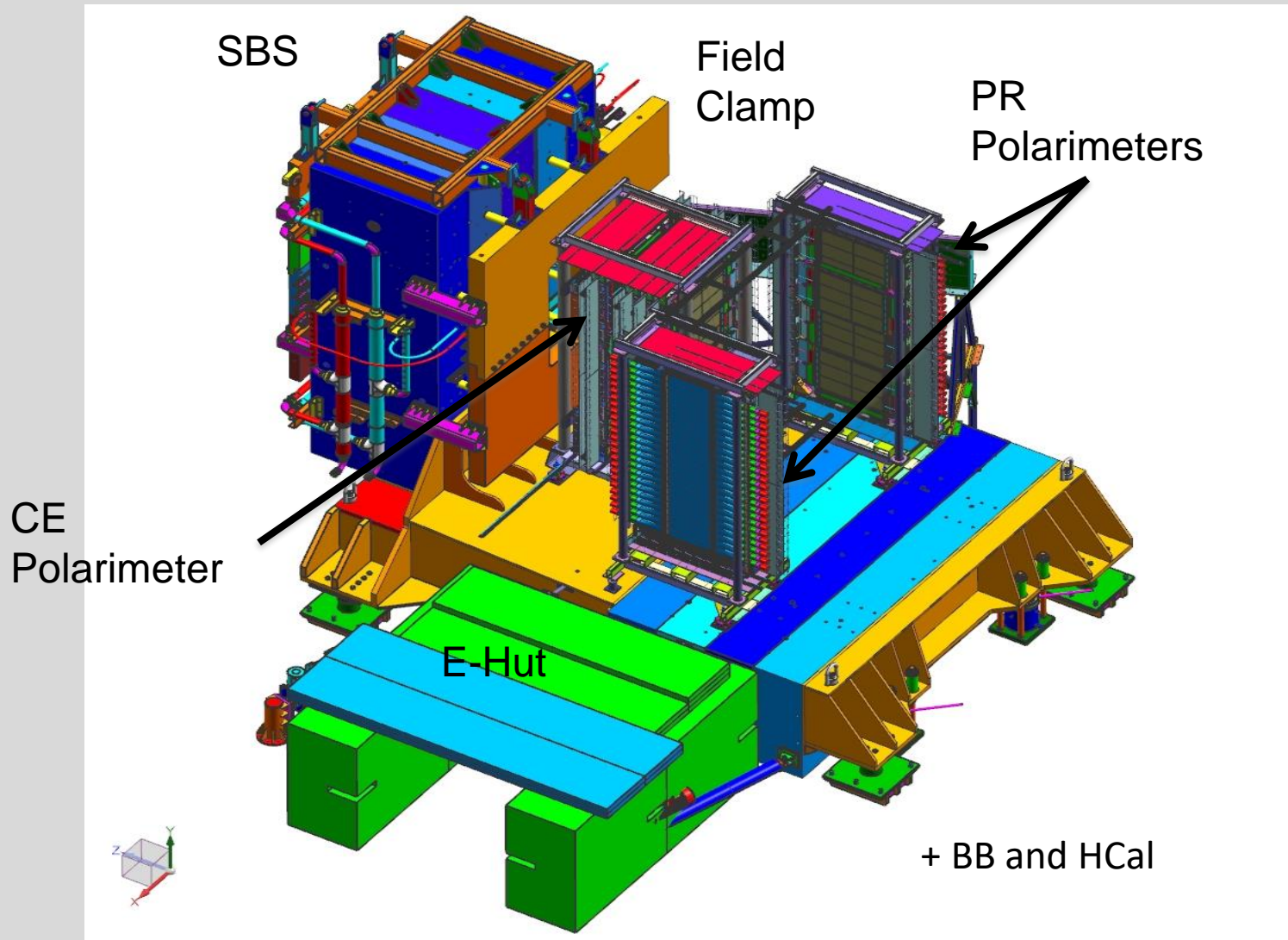
10cm Hydrogen/Deuterium

Q^2 [GeV ²]	θ_{BB} [deg]	d_{BB} [m]	θ_{48D48} [deg]	d_{48D48} [m]	d_{HCAL} [m]	Beam Line Configuration #
4.5	41.9	1.55	24.7	2.25	8.5	3

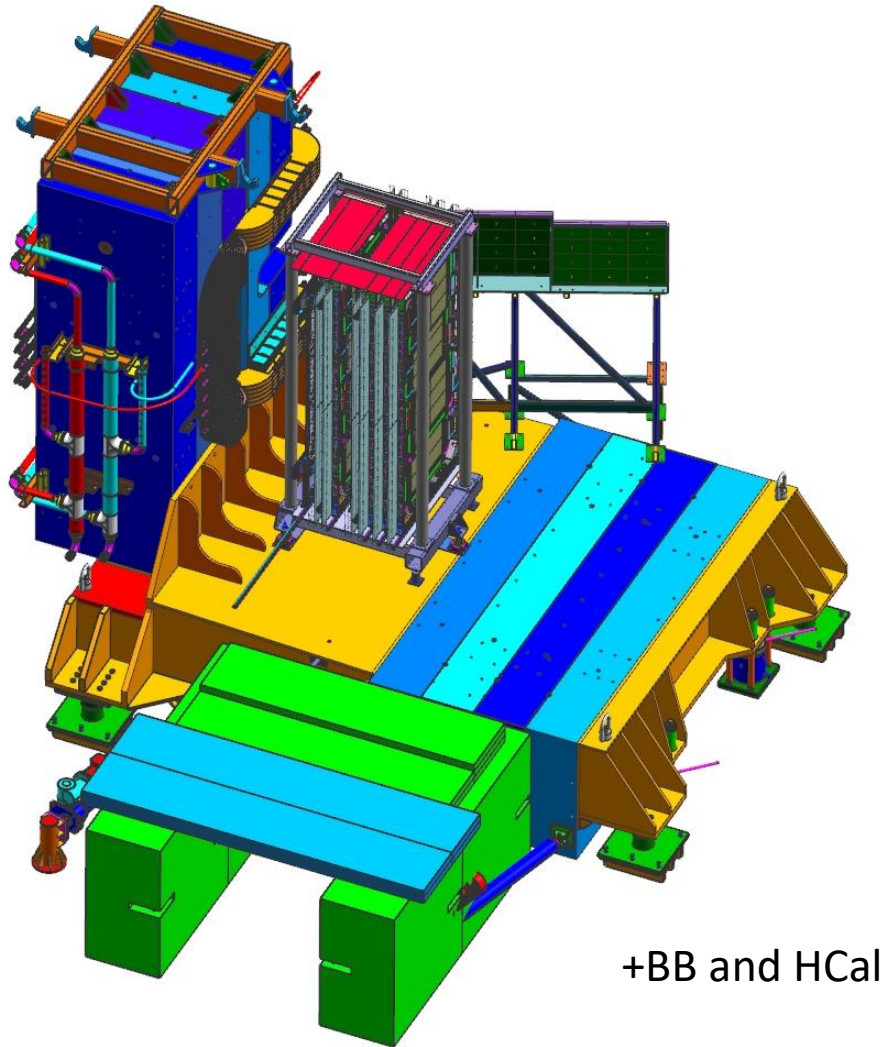
- *1st to run will be GEn-RP*
- *Our focus has been on getting all equipment ready for GEn-RP and GMn experiments by October 2020*
- ***A lot** of equipment- install plans & checking interferences significant effort*
- *Then progress on remaining equipment for other experiments*



Gen-RP equipment- 1st setup



Gen-RP equipment-2nd setup

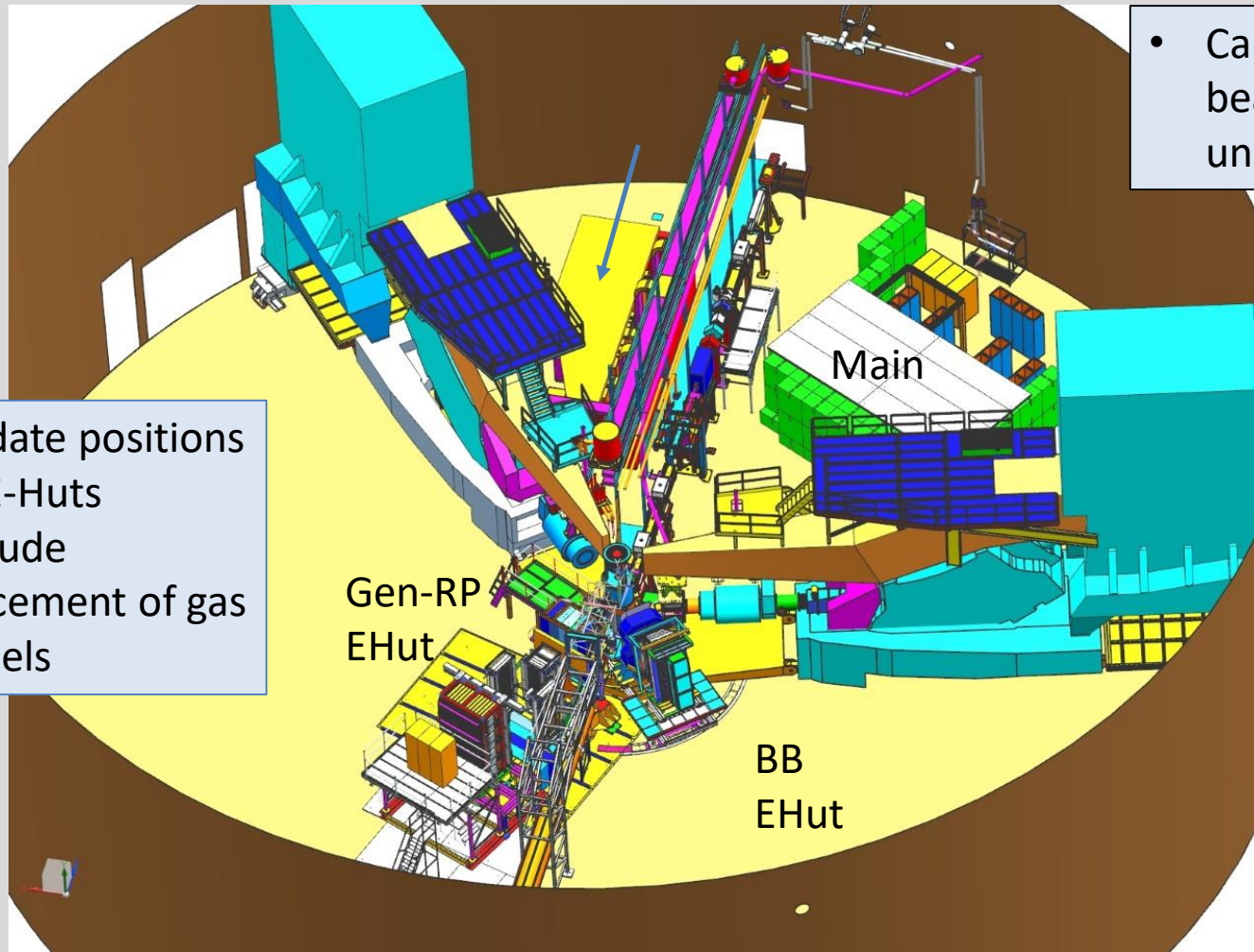


- Requires removal of Field Clamp, Fe Analyzer, CH Analyzer and PR Polarimeters

GEn-RP equipment status

- CE Polarimeter
 - FE Analyzer material delivered
 - CH Analyzer existing
 - GEMs in fabrication
 - GEM frames delivered
 - Main frame/support- parts delivered, weldment in fabrication
- PR Polarimeters
 - GEMs in fabrication
 - GEM frames delivered
 - Scintillators existing
 - Scintillator frames delivered
 - Main frame/support- parts delivered, weldment in fabrication
- Field clamp existing
- Shielding wall & support modifying existing design
- Ehut parts exist, needs layout for location

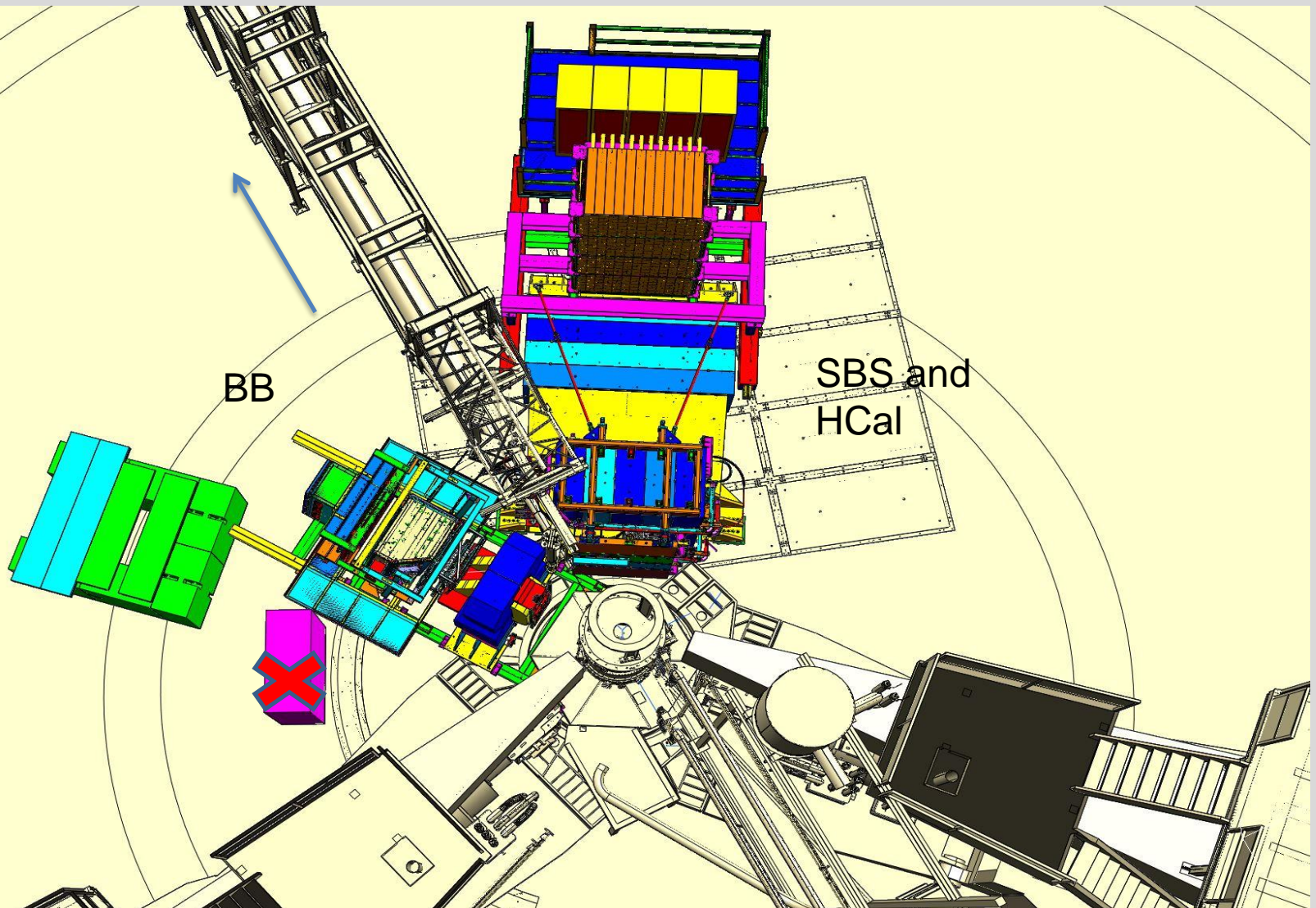
EHuts



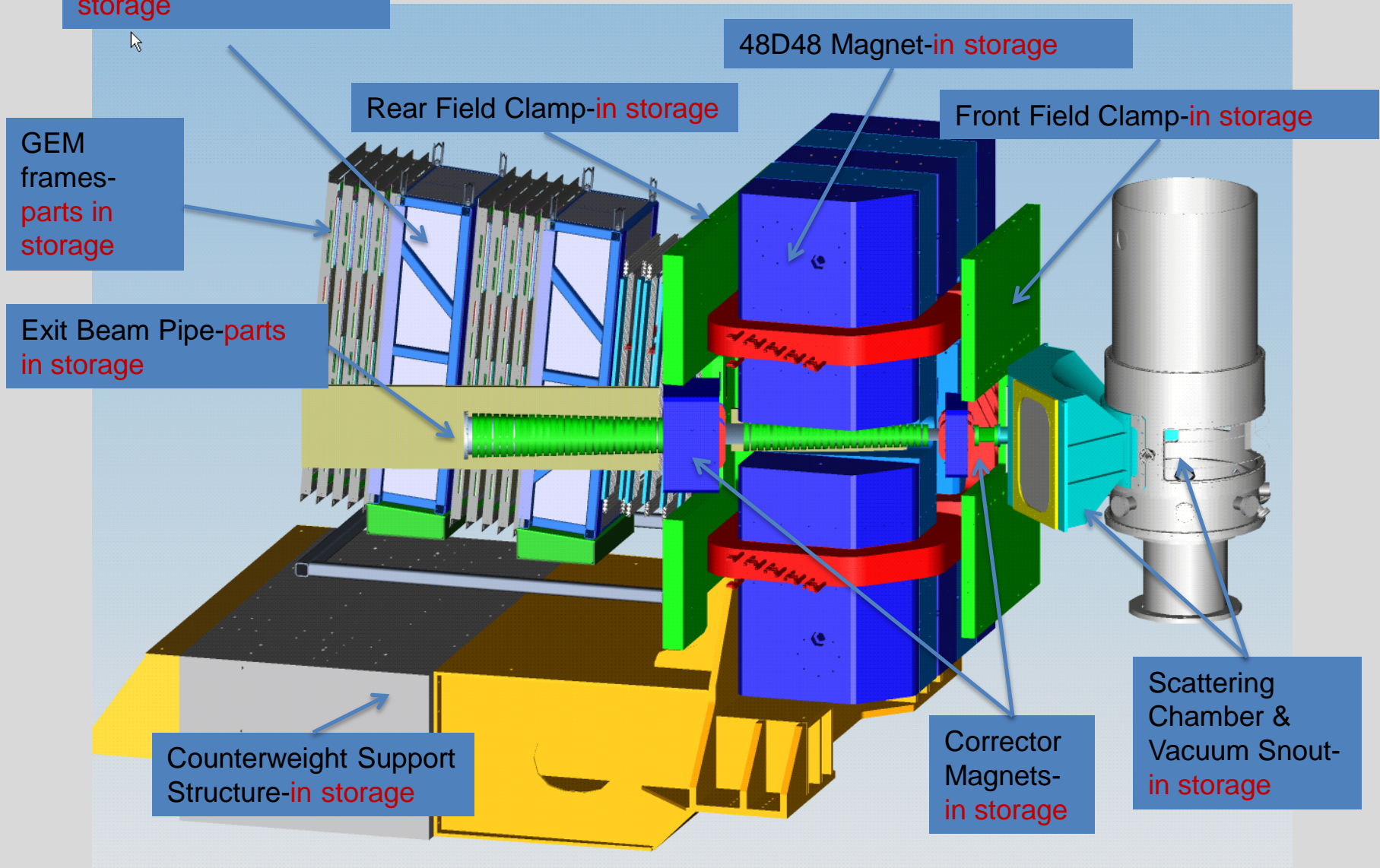
- Update positions of E-Huts
- Include placement of gas panels

- Cables routed to beam left side under HRS-L

GMn



SBS status- main components complete and in storage



Beamline Support

Main tower

Vertical supports in storage.
Tower extension in storage

Corrector

SBS beam line

Corrector

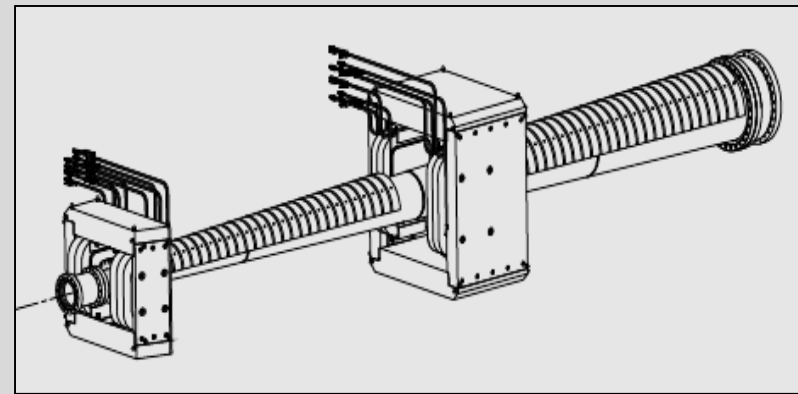
Radiation shielding & supports to
be modified

Existing beam line

- Kinematics of experiments require 4 beamline configurations. Tower support fabricated and in storage . Spacer pieces in fabrication.

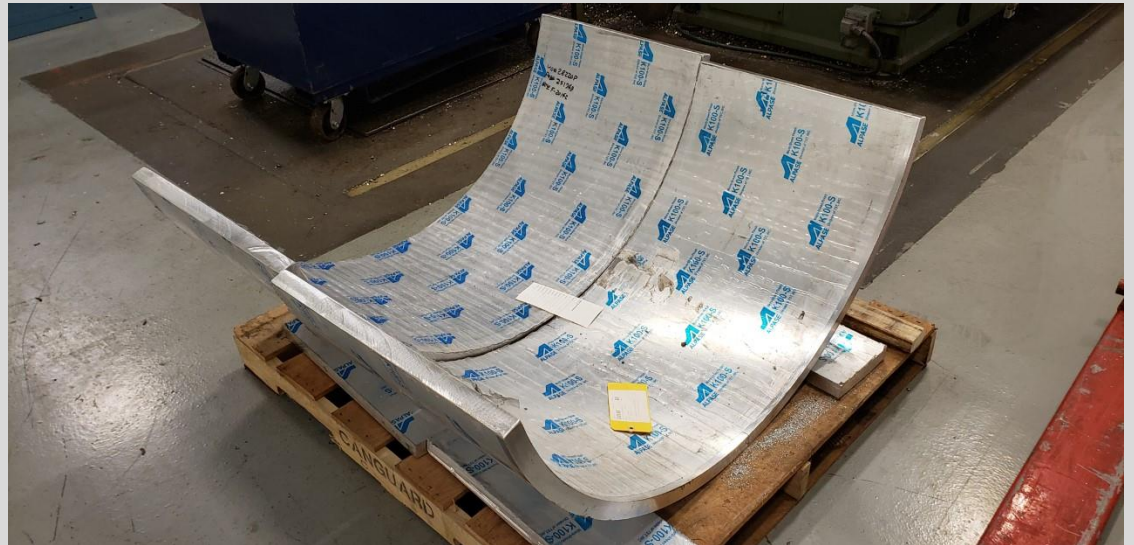
Beamline Shielding

- Conical beam pipe, correctors, shielding pieces and assembly hardware are in storage.
- Assembly drawings complete.
- During Trial assembly found beam pipe out-of-round, modifying pipe to better fit shielding
- GMn requires use of BL3 & BL4, purchasing extra shielding pieces to make BL change meet ALARA principles
- Also need holding fixture for changing out shielding pieces

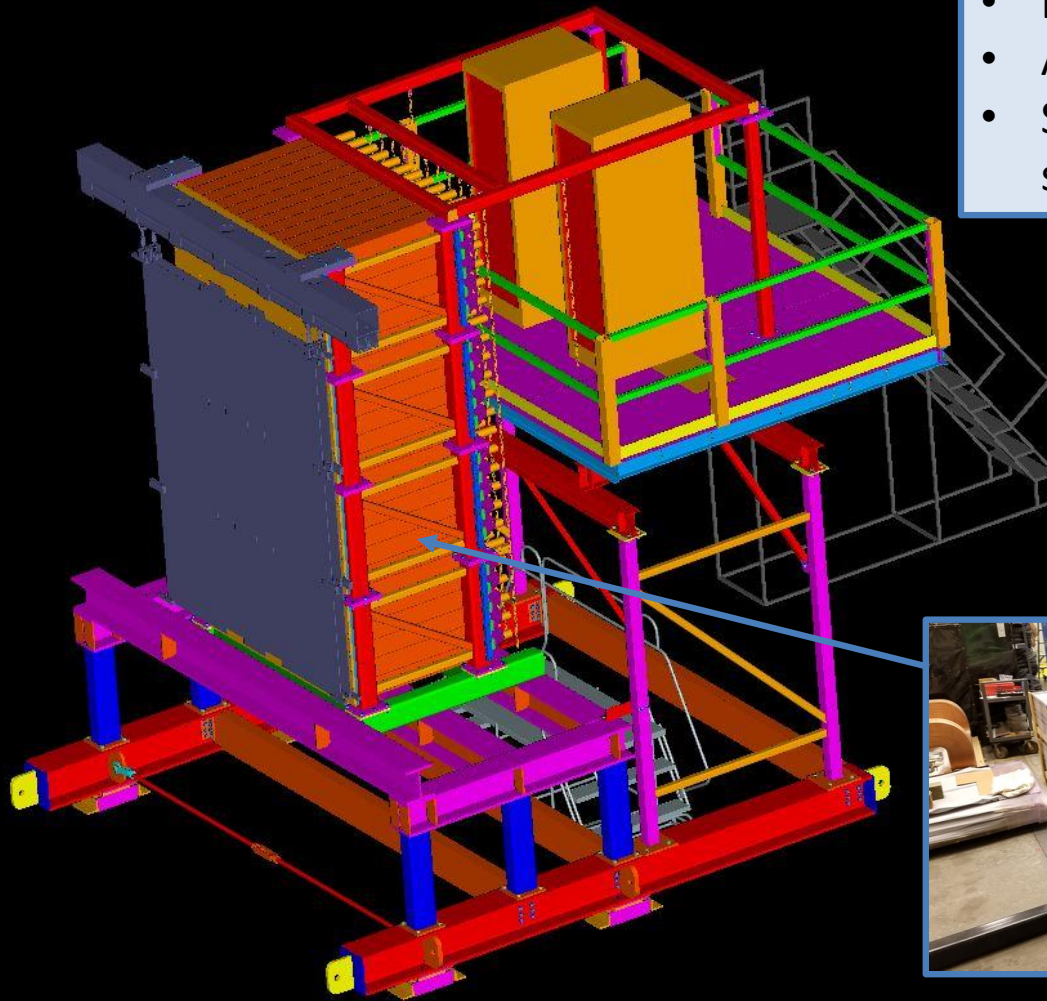


GMn target chamber

- New clamshells/windows needed for chamber
- Working with new vendor to fabricate, will weld in-house
- Delivery scheduled for late July.



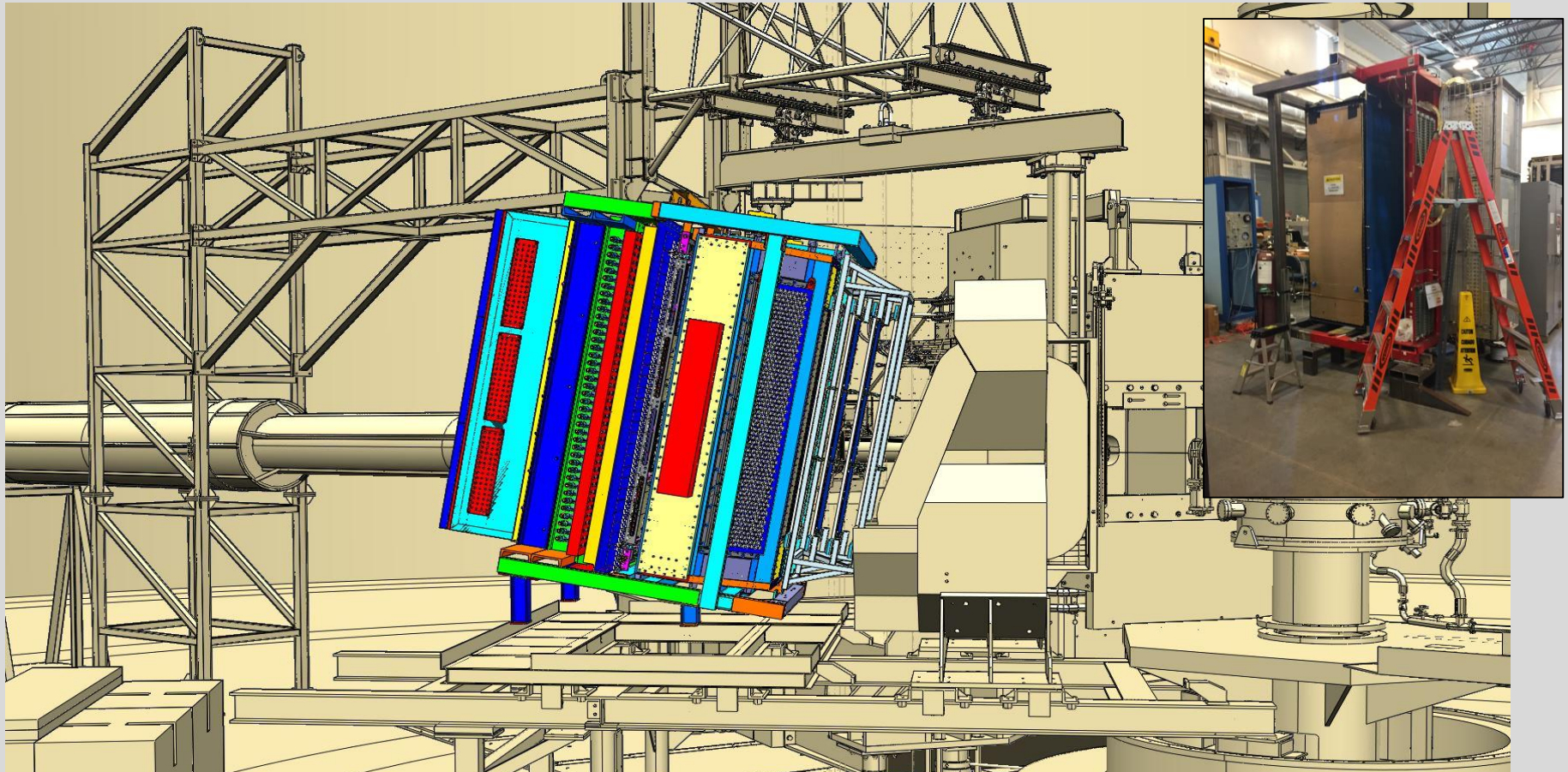
HCAL & CDET Support/ Access Platform



- HCAL is being assembled
- Access platform in storage
- Support platform in storage



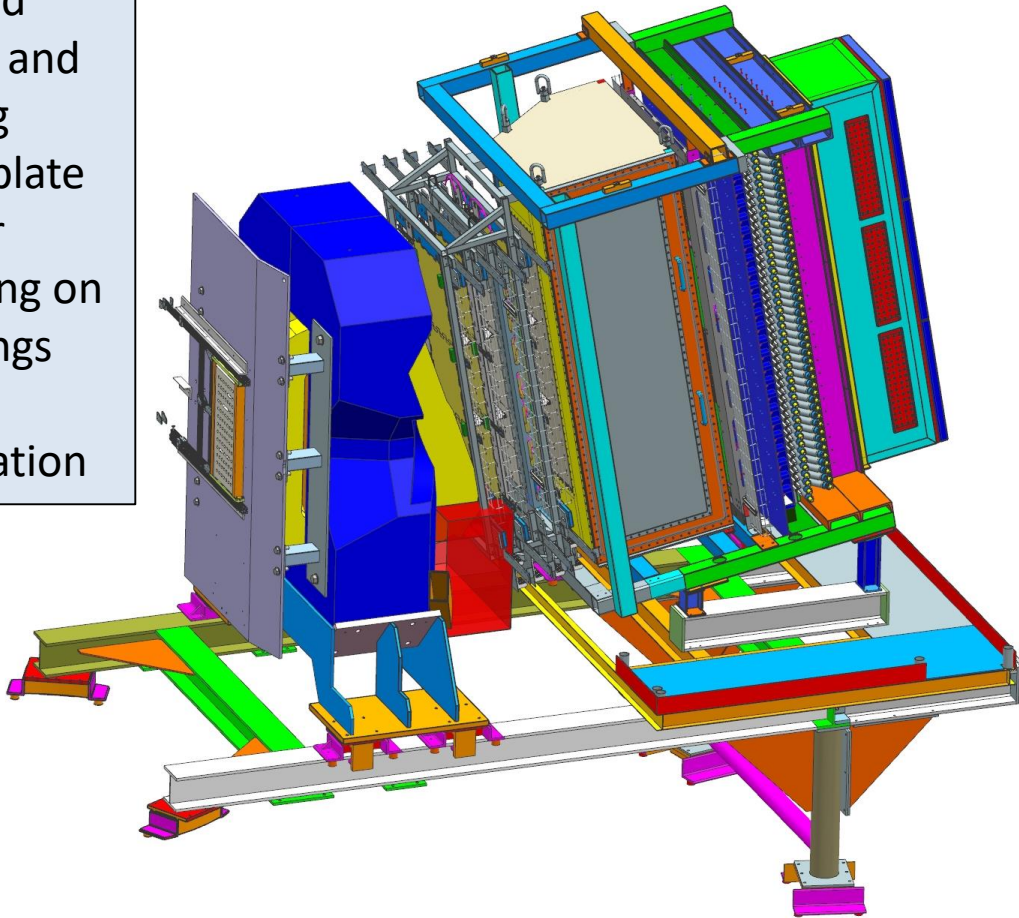
BigBite Detector Frame



- BigBite detector frame modifications are defined to include GEMs and GRINCH. Modifications have been completed.
- New BB electronics frame is complete.

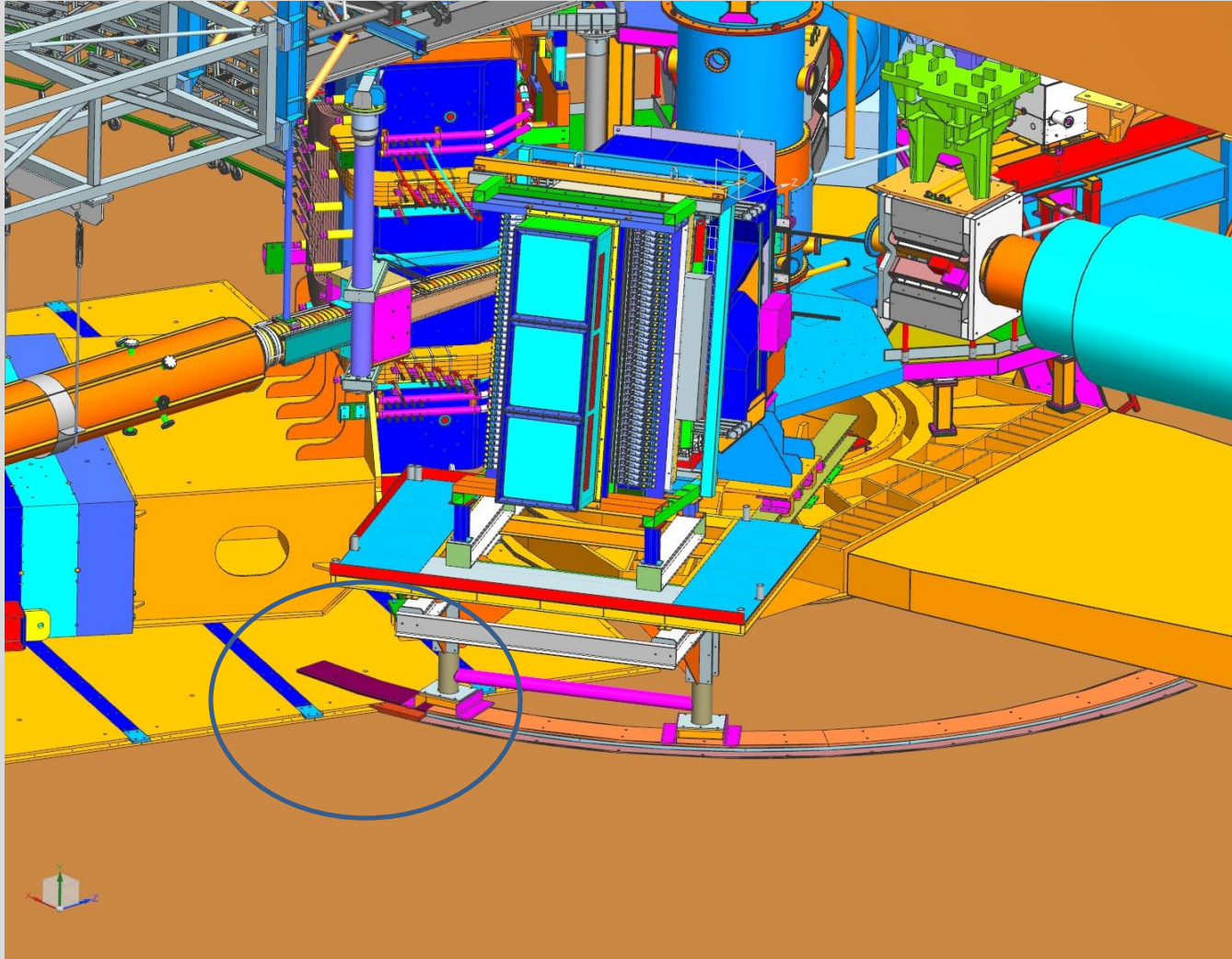
BigBite Magnet & Detector Support

- Modifying BB field clamp and adding sieve plate holder
- Working on drawings for fabrication



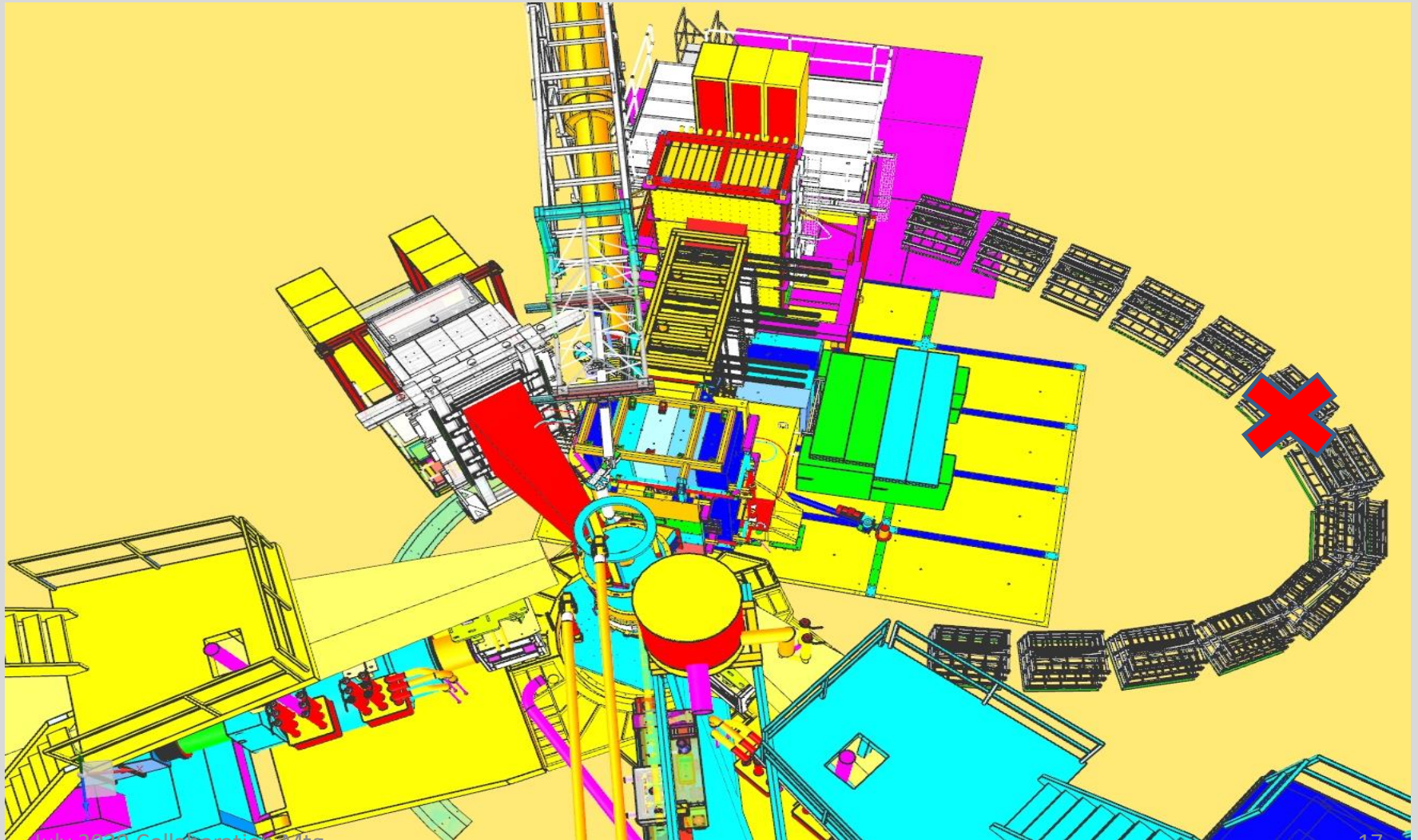
- Modifying support to allow BB distance to be beyond 1.55 m without adding/removing extension piece.
- Completed design of BB detector support to allow angle of detectors.
- Working on drawings for fabrication.

Interferences - BB rail

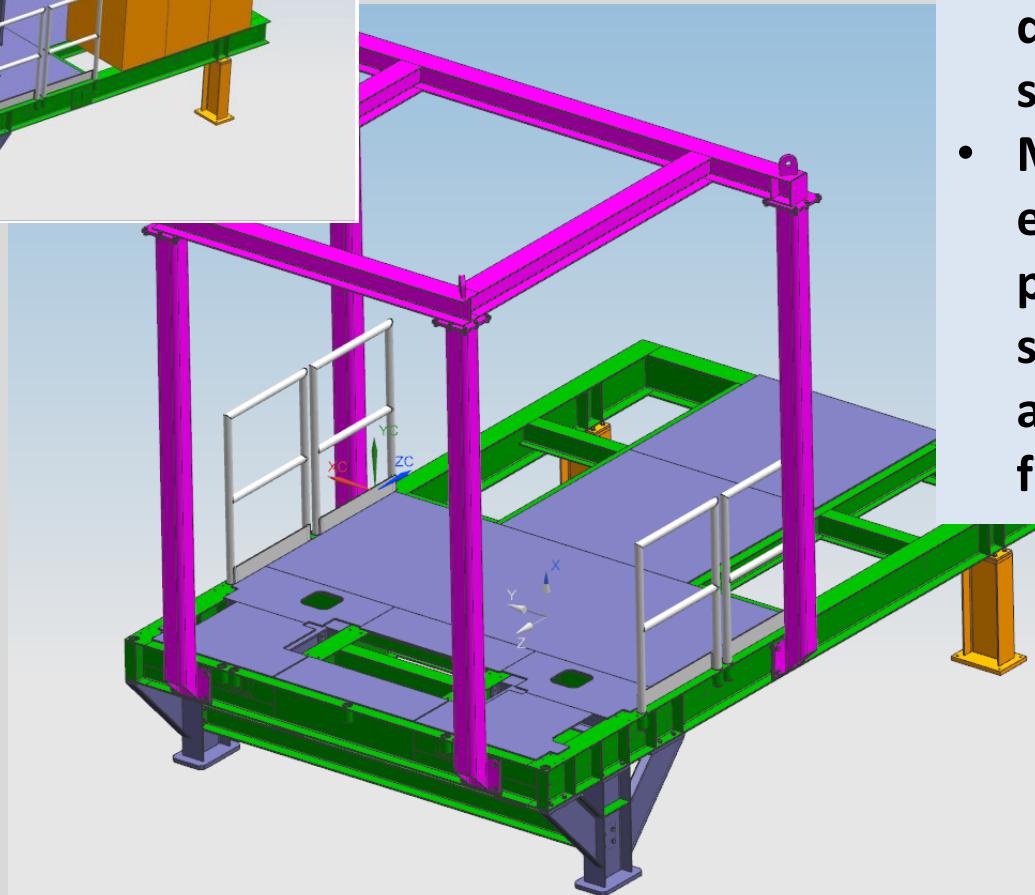
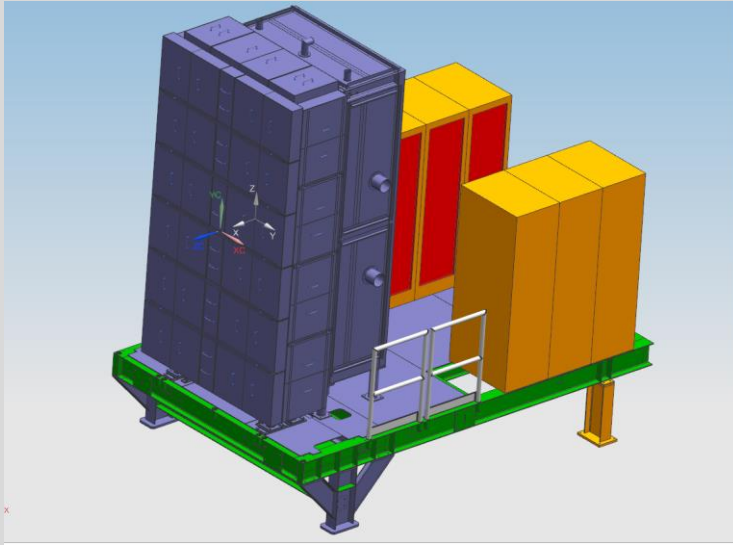


- BB rail to be relocated to BL
- Adding wedge piece to allow rail to extend over SBS floor plates
- Working on drawings to fabricate
- Remaining floor plates on order
- Other small interferences found, resolved by in-house modifications

GEp

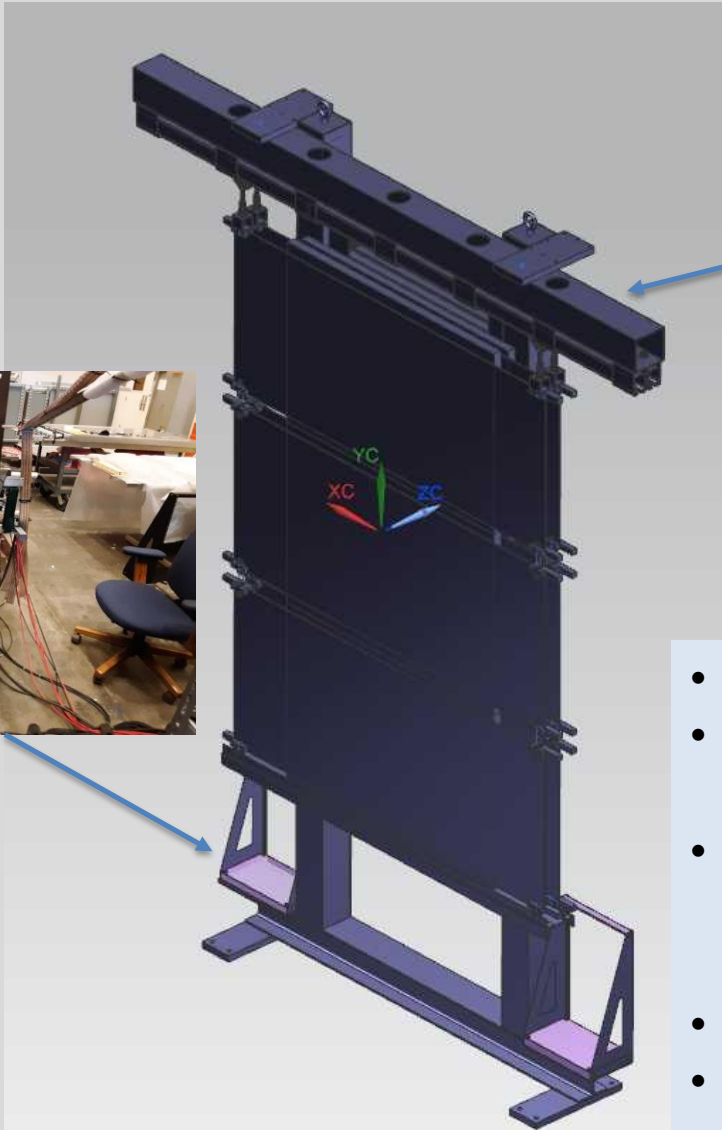


ECAL



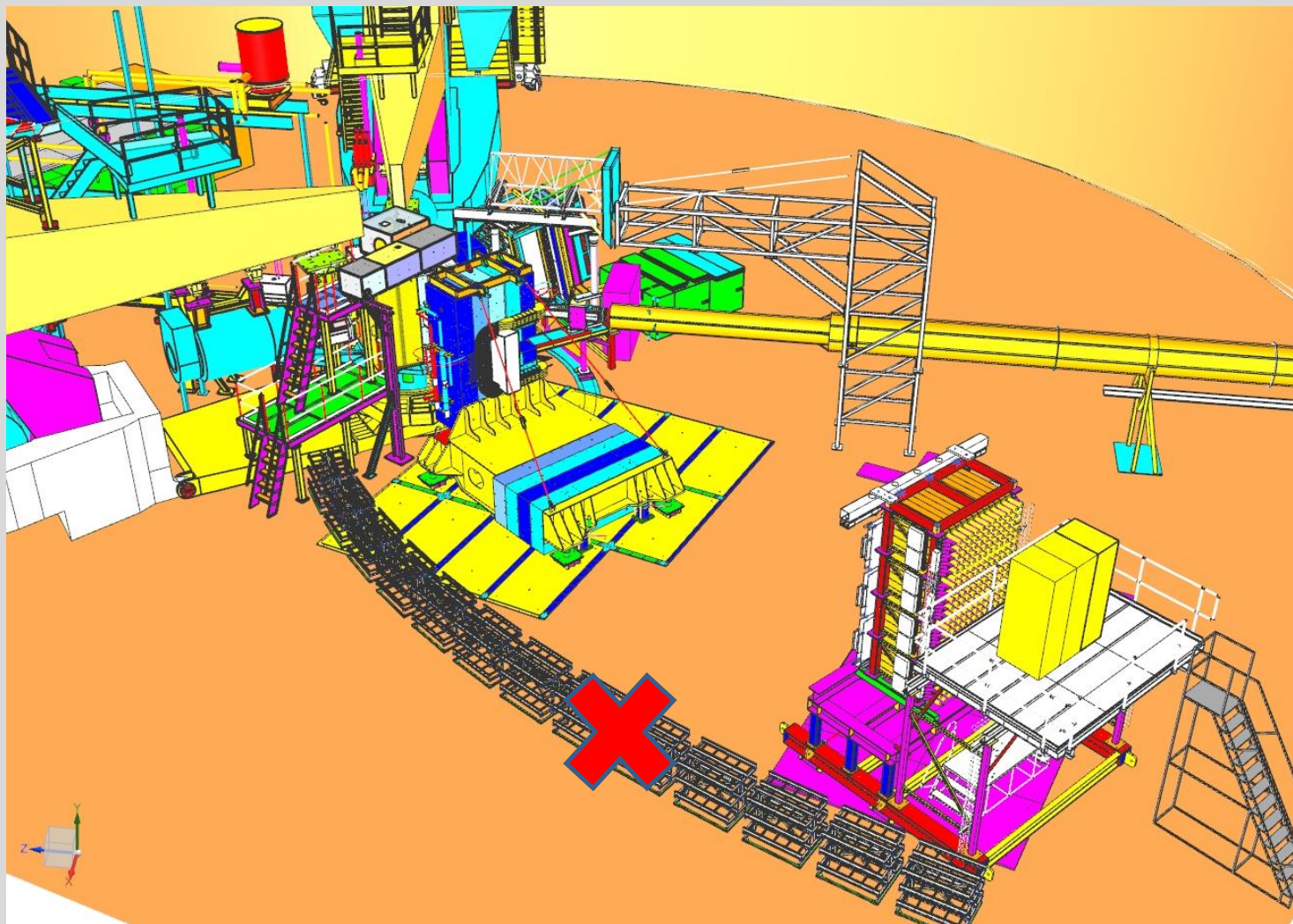
- Front frame has been delivered.
- Design of back frame near completion- needs access doors and support feet.
- Modifying existing platform- needs support feet and lifting frame

CDET

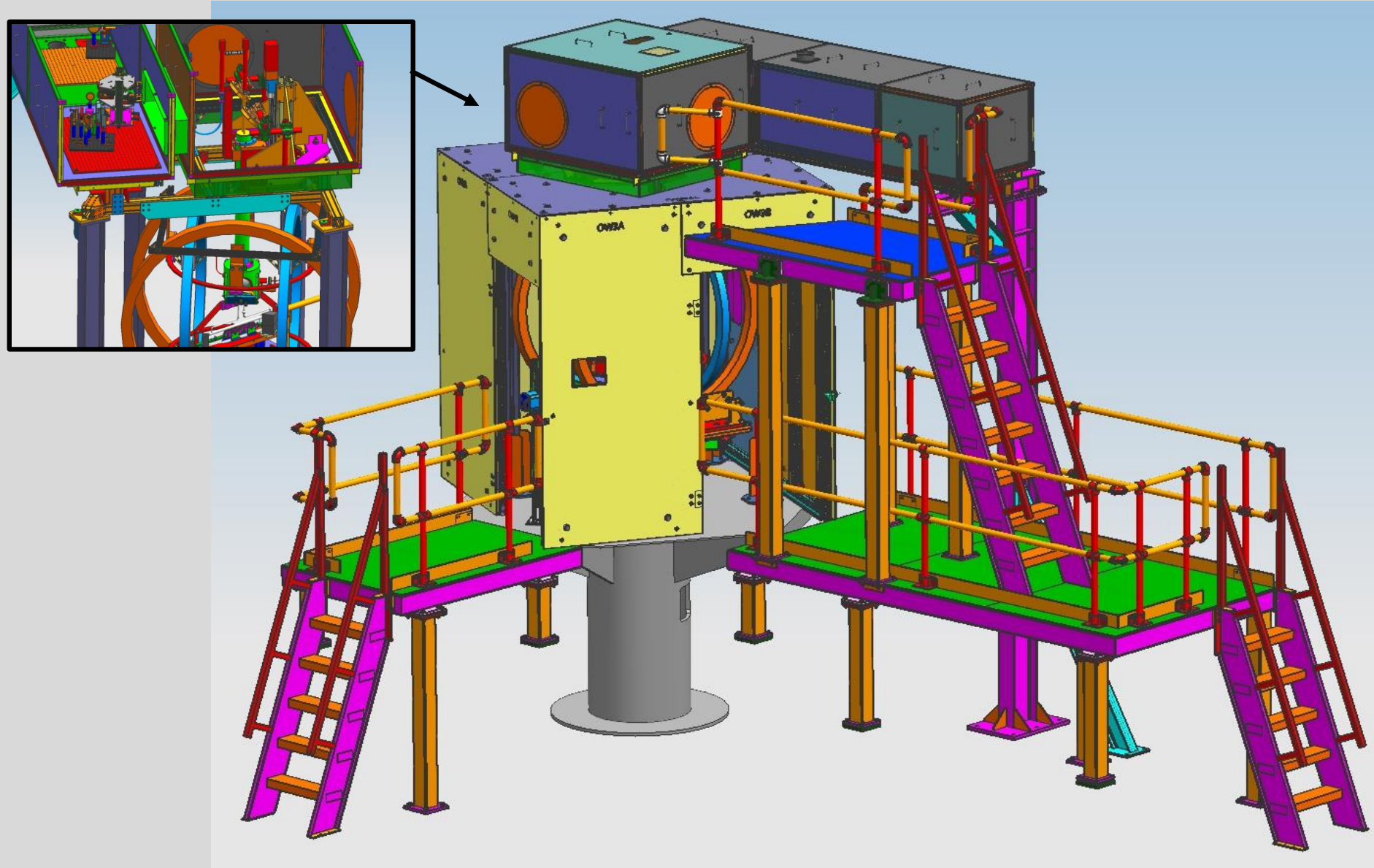


- Have CDet frame
- Added hardware design to mount detector modules to frame
- Added modifications to the frame for the addition of the post racks that house the cables
- Added strain relief bars for the cables
- Need to determine if width of frame is sufficient for access of the panels

GEn



Polarized ^3He Target



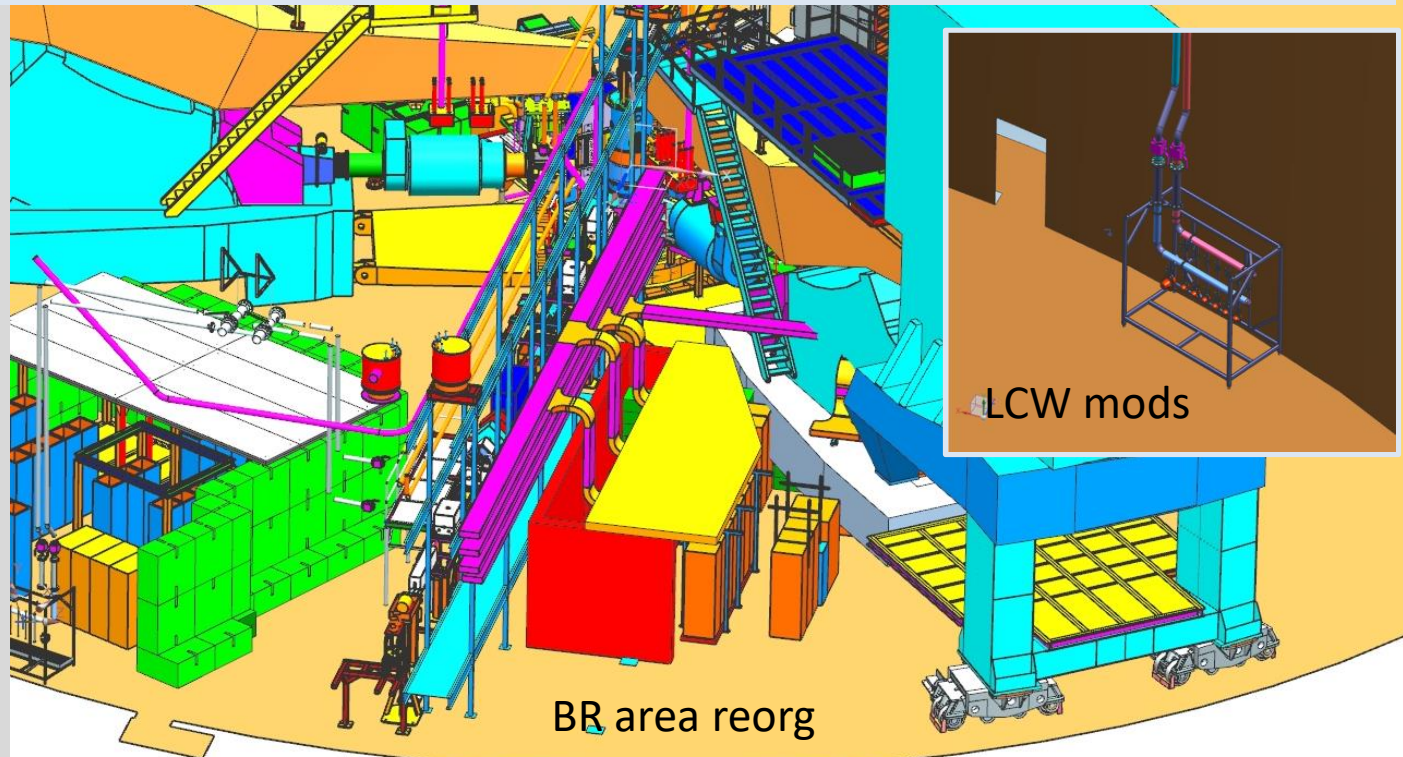
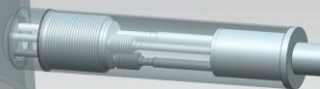
Polarized ^3He Target

- Design completed. Continue on drawings and procurements.
 - Oven material delivered
 - Be window telescoping beampipe in fabrication
 - Be window flange delivered
 - Cell glue fixture delivered
 - Alignment cartridge delivered
 - Telescoping exit beampipe weldment delivered
 - Magnetic shielding assembly in storage, working on modification to remove BB interference.
 - Working on access platforms drawings
 - Working on Target system drawings

Utilities

- **Electronics Huts** – Main hut to be located on beam left side of Hall. Two GEM electronics huts to be relocated as needed with use of BB, SBS detectors and GEn-RP detectors. All materials in storage.
- **Power Supplies**- SBS dipole power supply in-house. Corrector power supplies being procured.
- **LCW**- Upgrades to LCW system defined, materials purchased, fabrication started.
- **Alignment/Install** – supporting efforts to define install needs

Cryoline
disconnect



BR area reorg

LCW mods

SUMMARY of main components

Items remaining :

- Drawings & modifications of Ecal/ CDet support platform**
- ECal back frame and assembly drawings**
- Complete CDet hardware and frame modifications**
- Review of SBS detector frame**
- Procuring assembly parts & hardware (beamline flanges, tie rods, bellows, stand-offs, cylinder cart)**
- Modify lead wall**
- Modify polarized ^3He target field shield box**
- Fabricate BB support extension pieces**
- Fabricate corrector magnet support brackets**
- Update E-Hut layouts and cables**