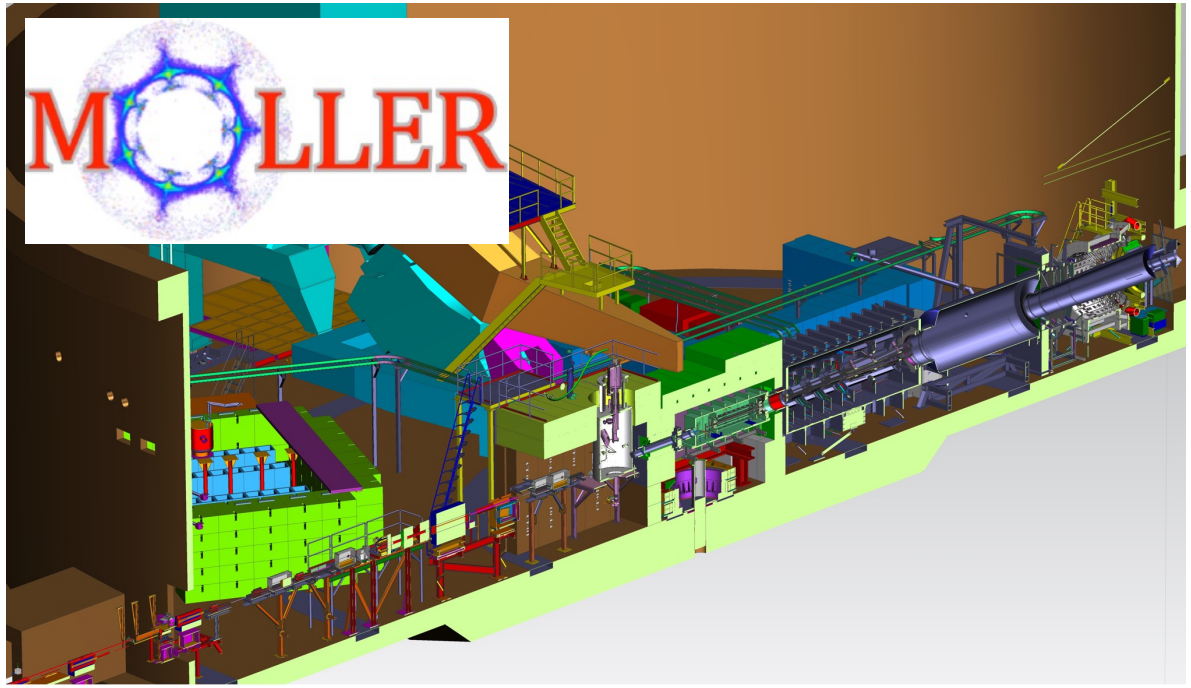
MOLLER Infrastructure and beamline

Hall A collaboration meeting

Jan 15 2025

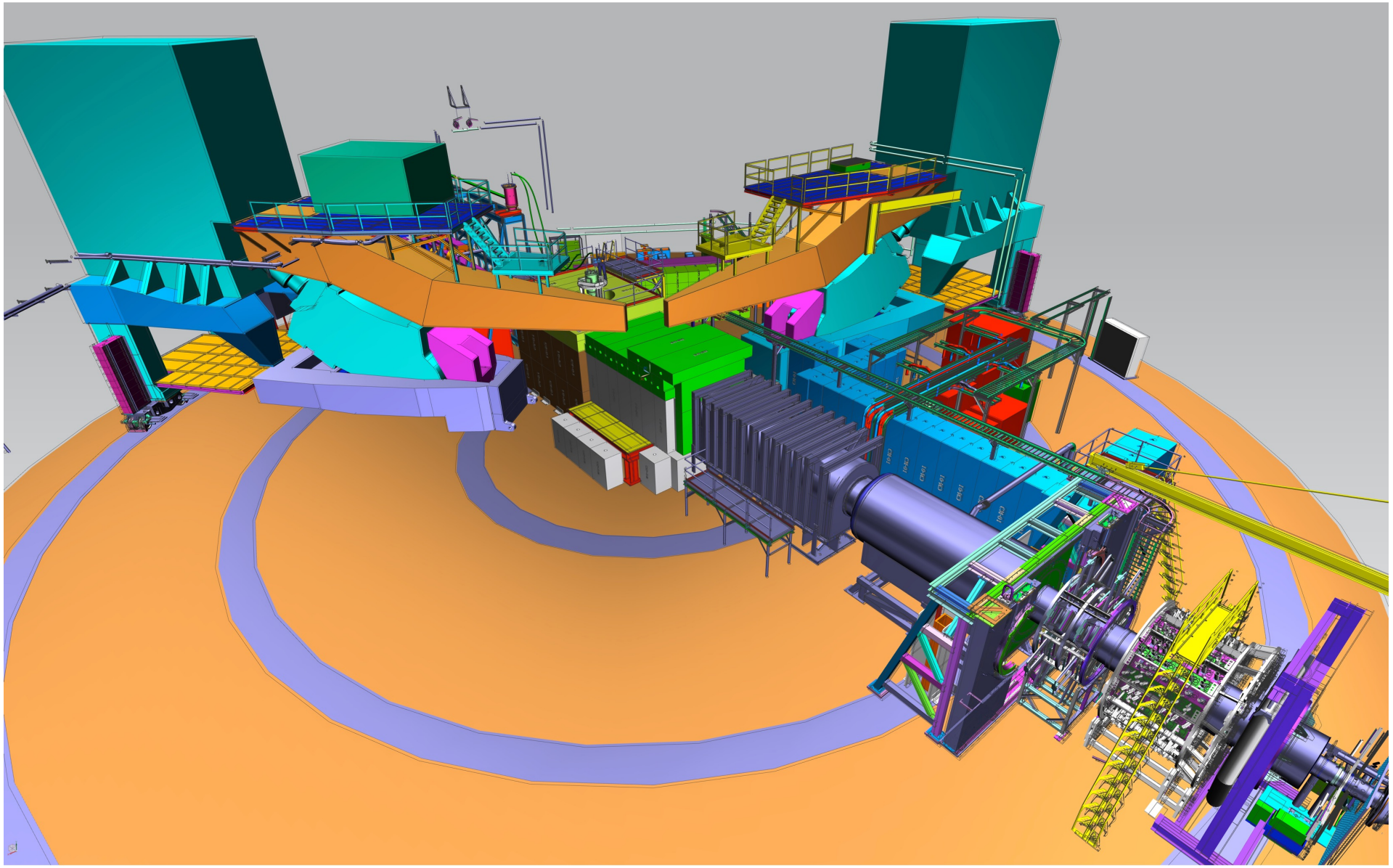


Vladimir V. Berdnikov (MOLLER Assembly CAM)

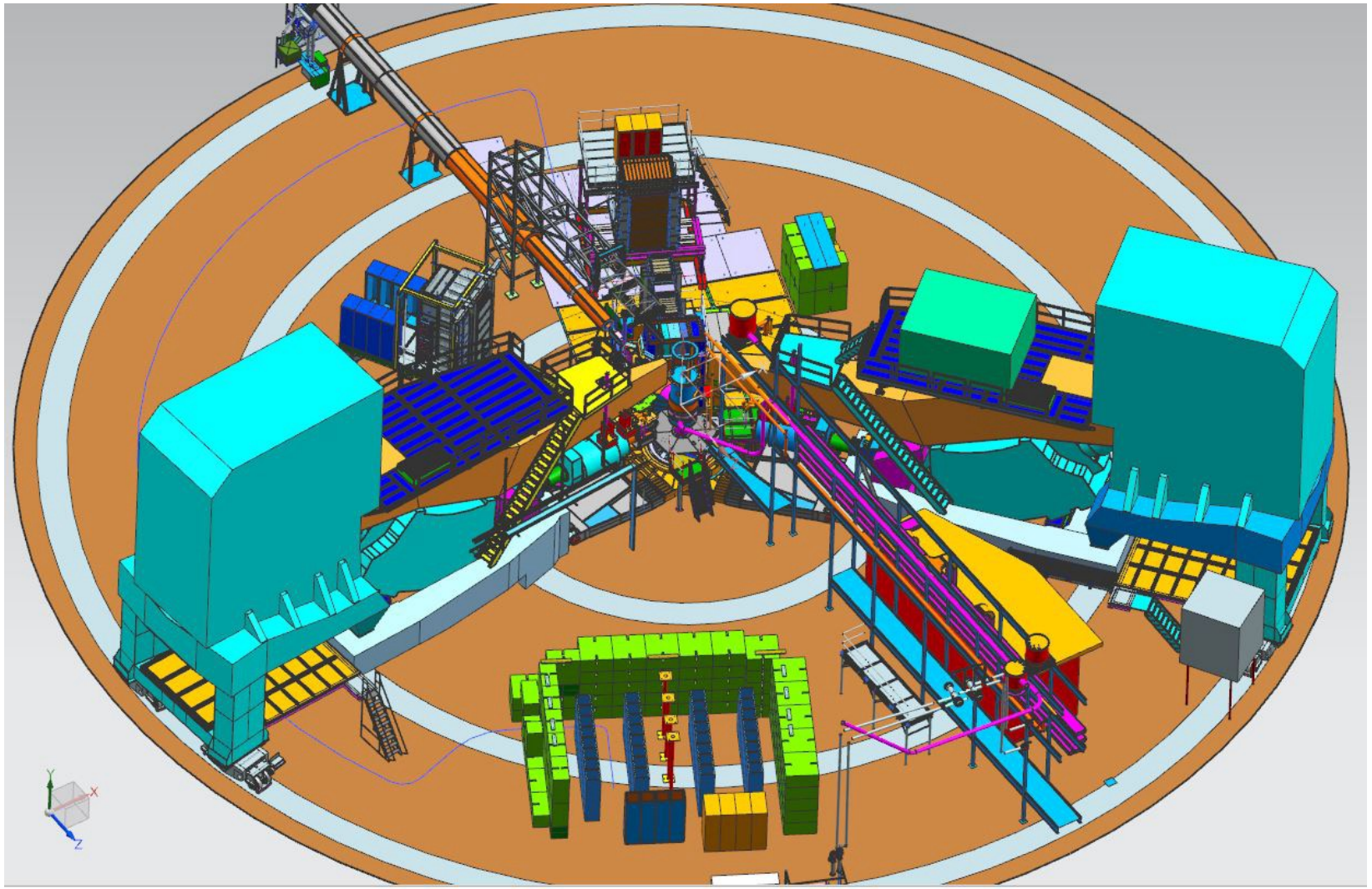
Outlook

- HRS work
  - Quadrupoles
  - HRS pivot
  - HRS-R link
- Blue utility platform removal
- New cryo distribution system
- VAC infrastructure
- LCW system
- H2 supply system
- Jib crane
- MOLLER upstream beamline

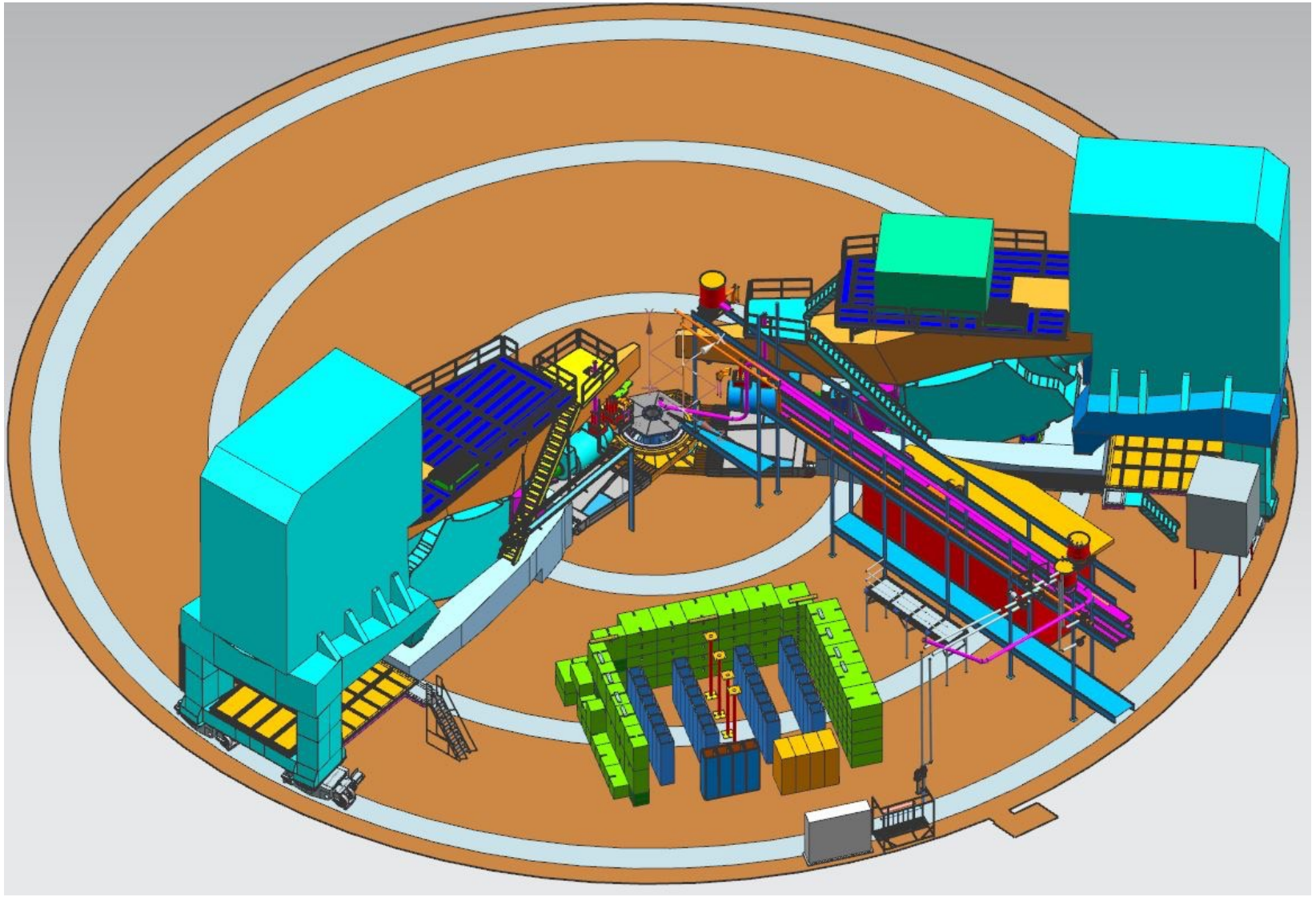
MOLLER apparatus assembled in Hall A



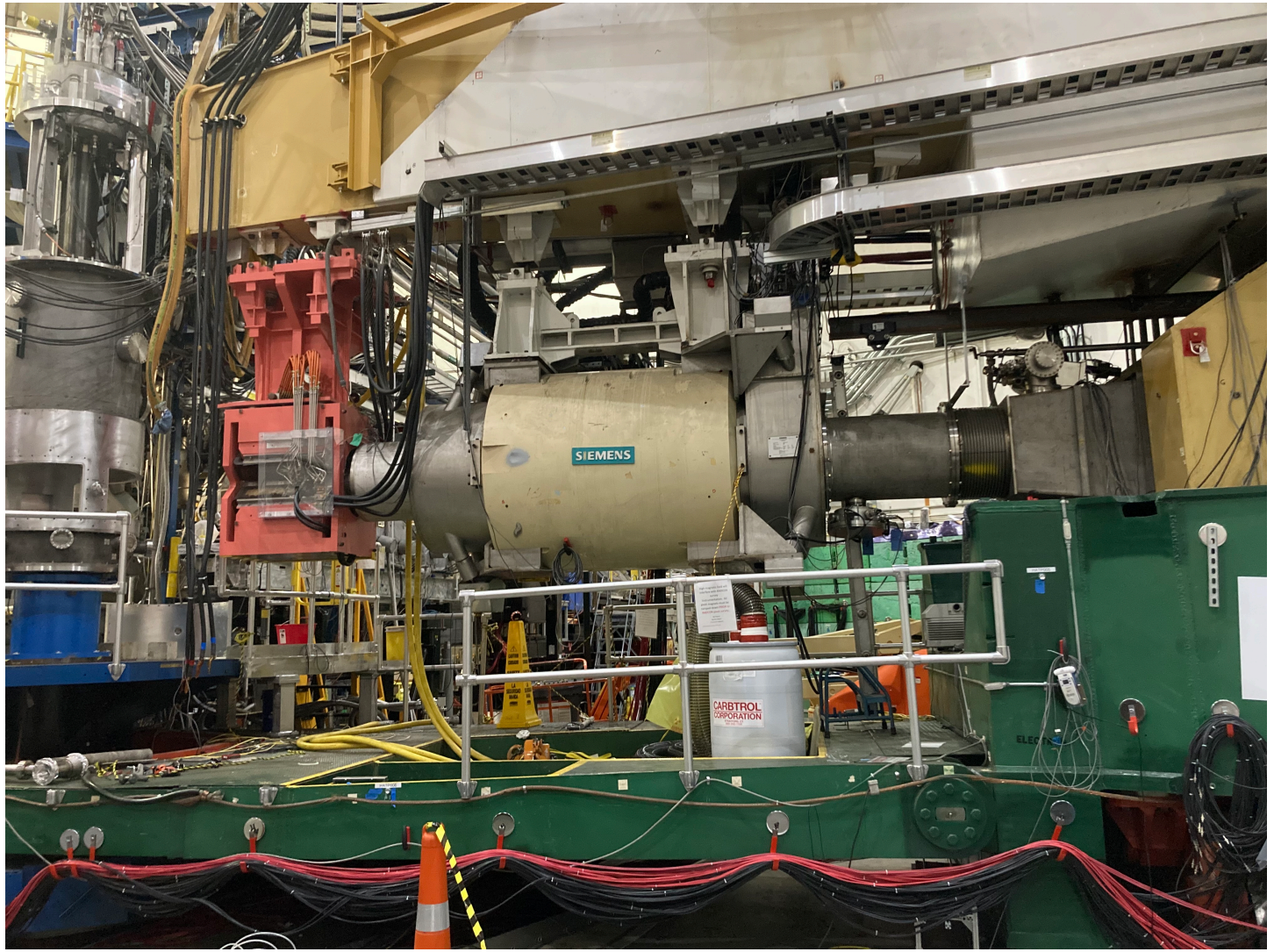
GEp experiment



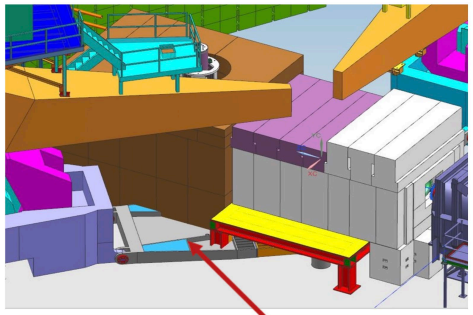
GEp removed from Hall A



HRS Quadrupoles

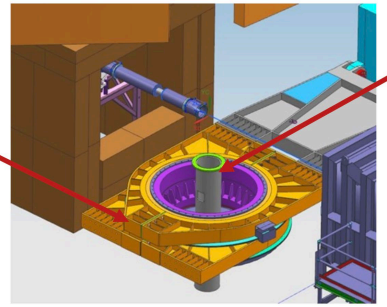


HRS pivot and HRS-R link

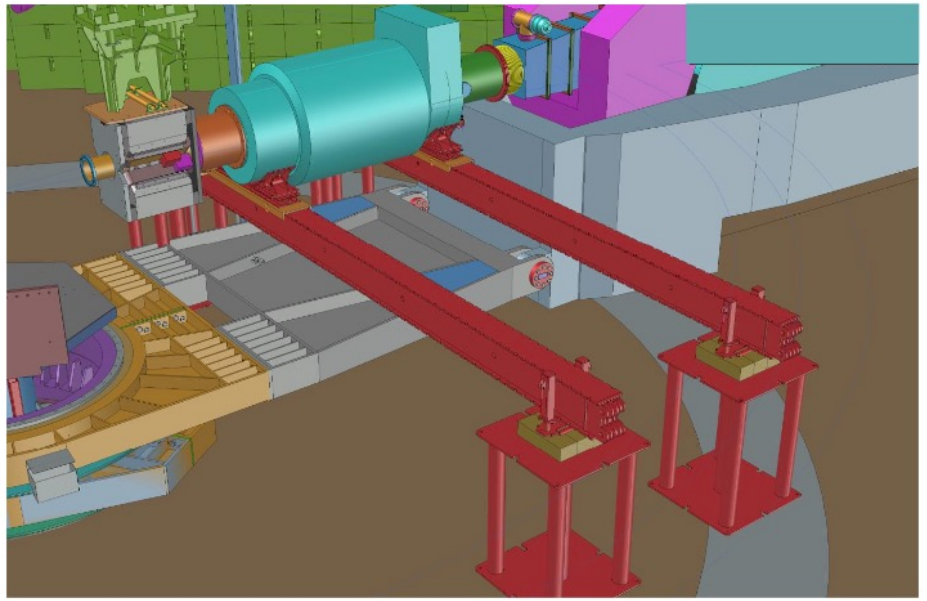


Existing HRS-R link to pivot bearing is not designed to carry additional vertical loading. Link interferences with target support, shielding and shielding support

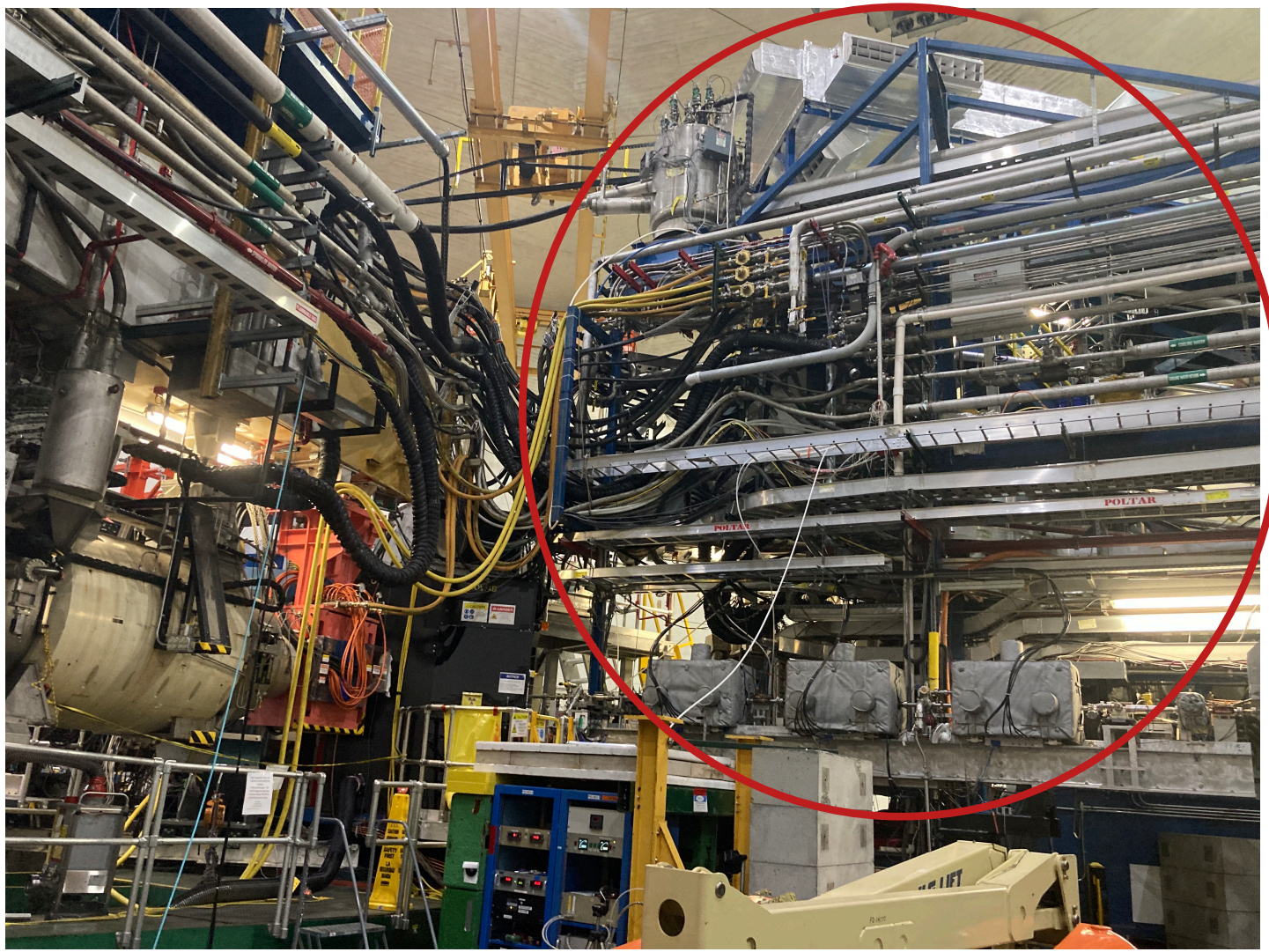
Solution- HRS-R remains stationary. Plan to remove HRS-R link and rotate bearing connection to remove interferences.

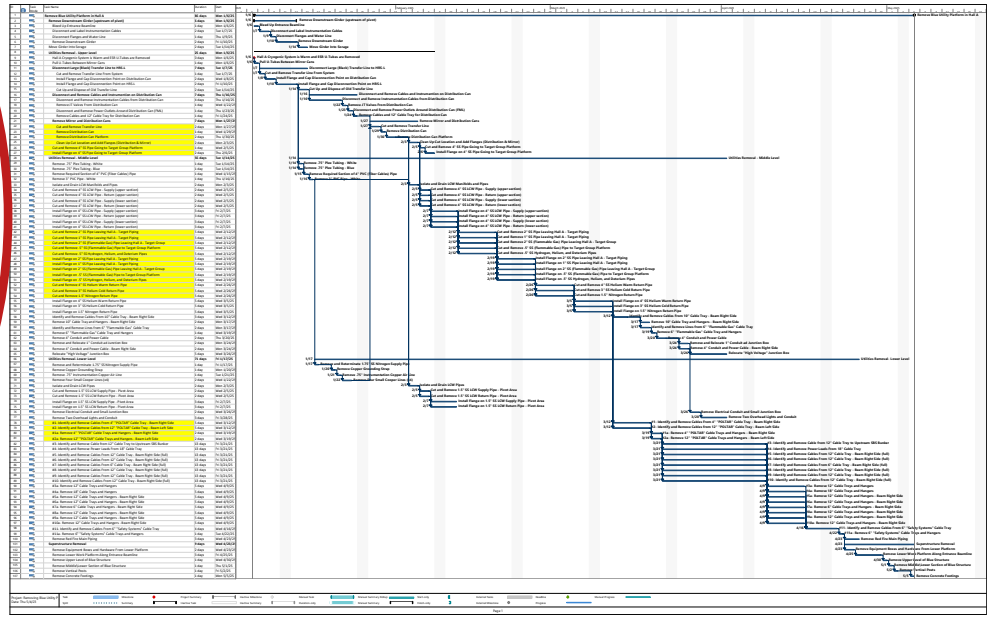


Existing pivot platform interferes with spectrometer shielding region, plan to remove.



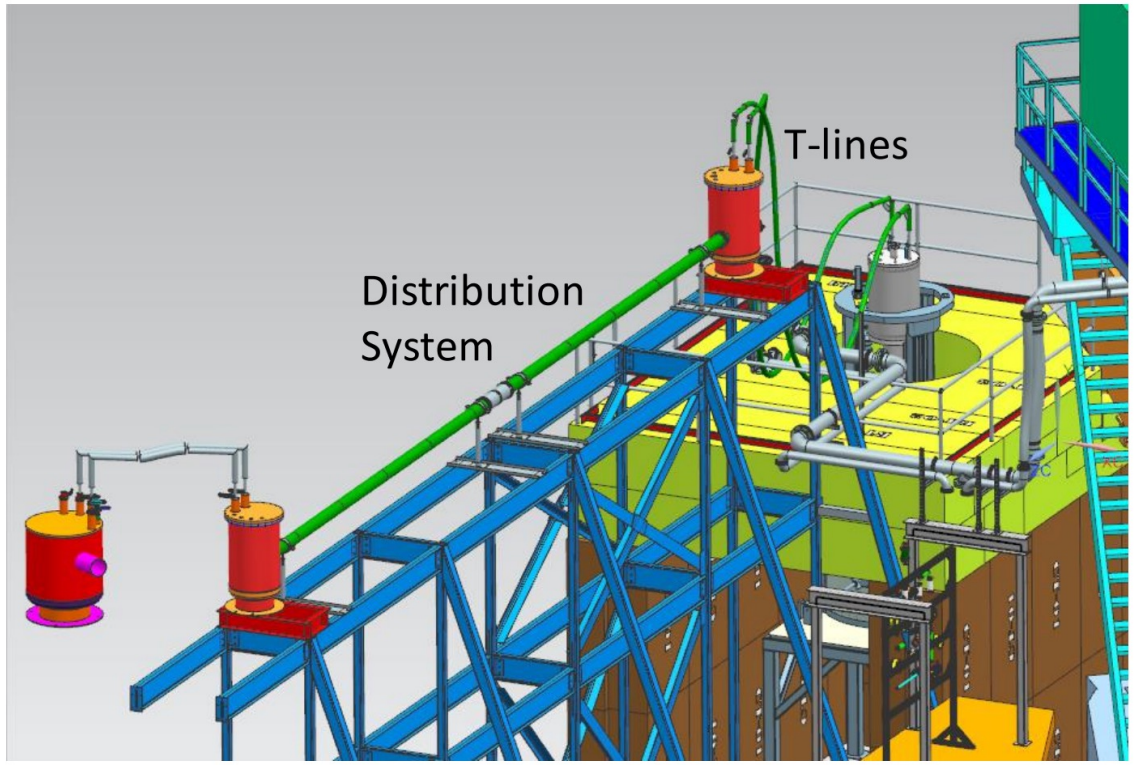
Utilities removal and platform superstructure cut



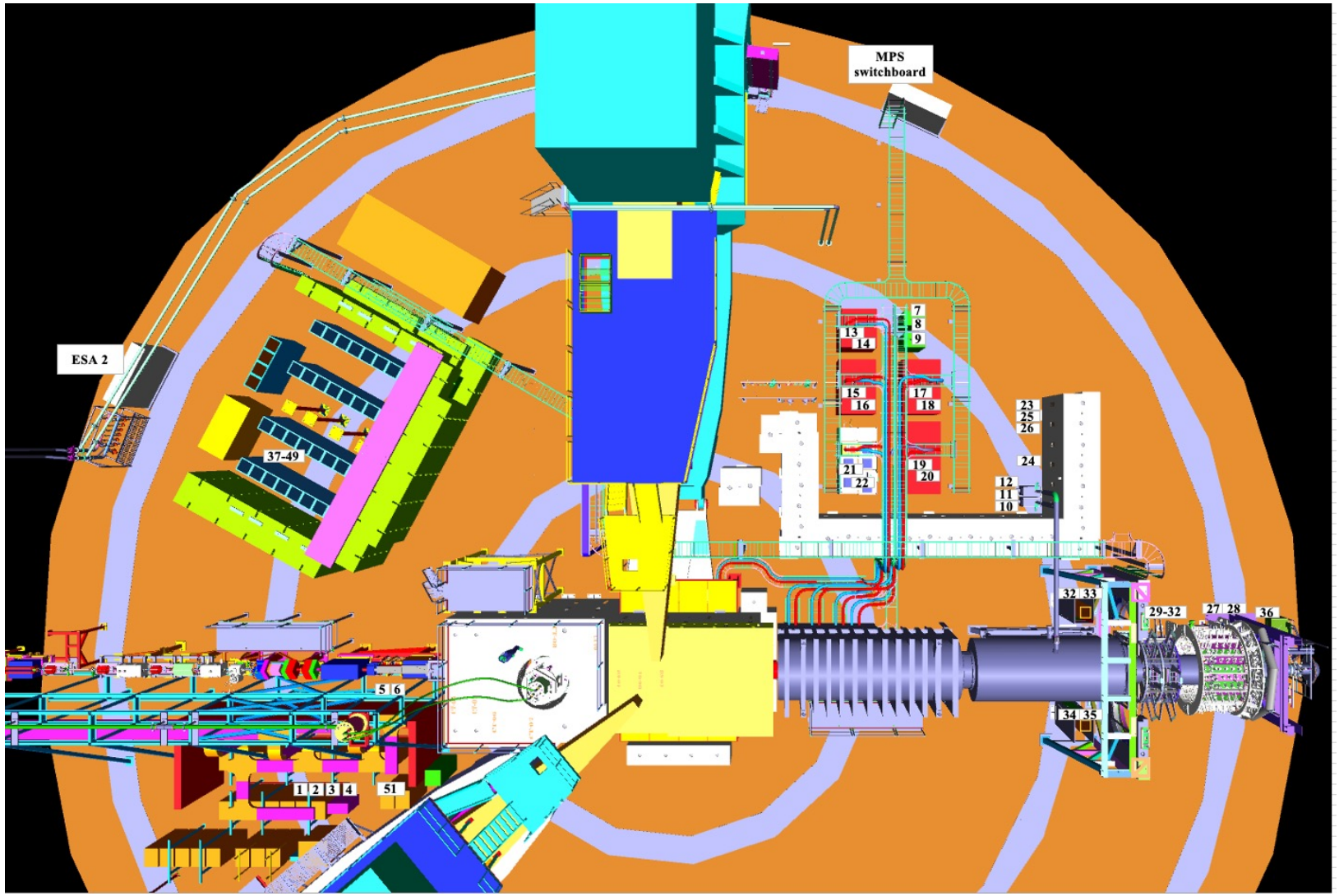


New cryo distribution system

- New distribution system
  - Added to WBS in FY23
  - Design is 100% complete
- New transfer lines
  - T-lines required redesign for new distribution system
  - Restarted design in FY23
  - Design is 100% complete
- Drawings are in DCG
  - Signed and filed
  - CAD models are in TeamCenter
- Cryostat
  - CAD models in UpChain



VAC infrastructure



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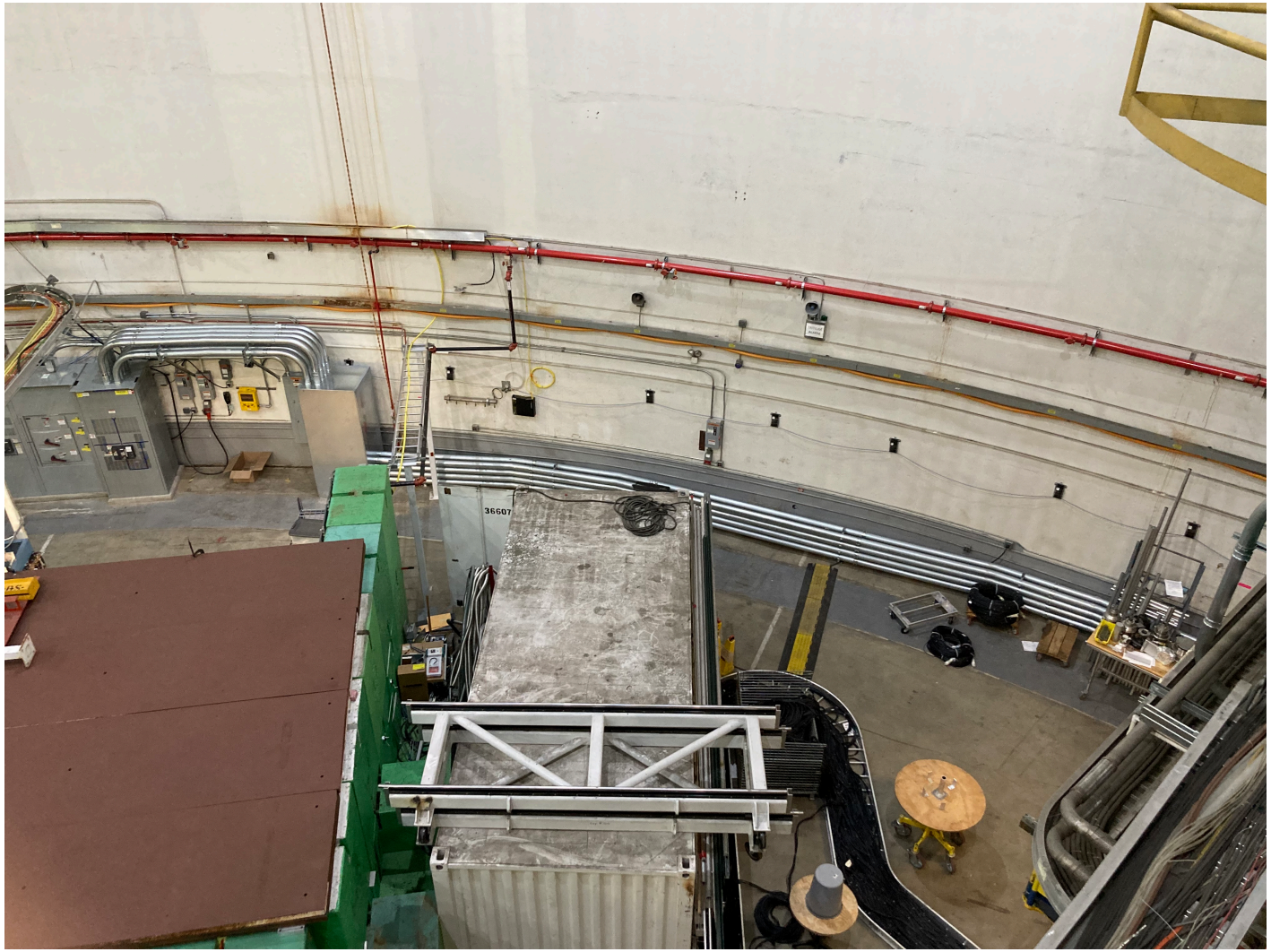
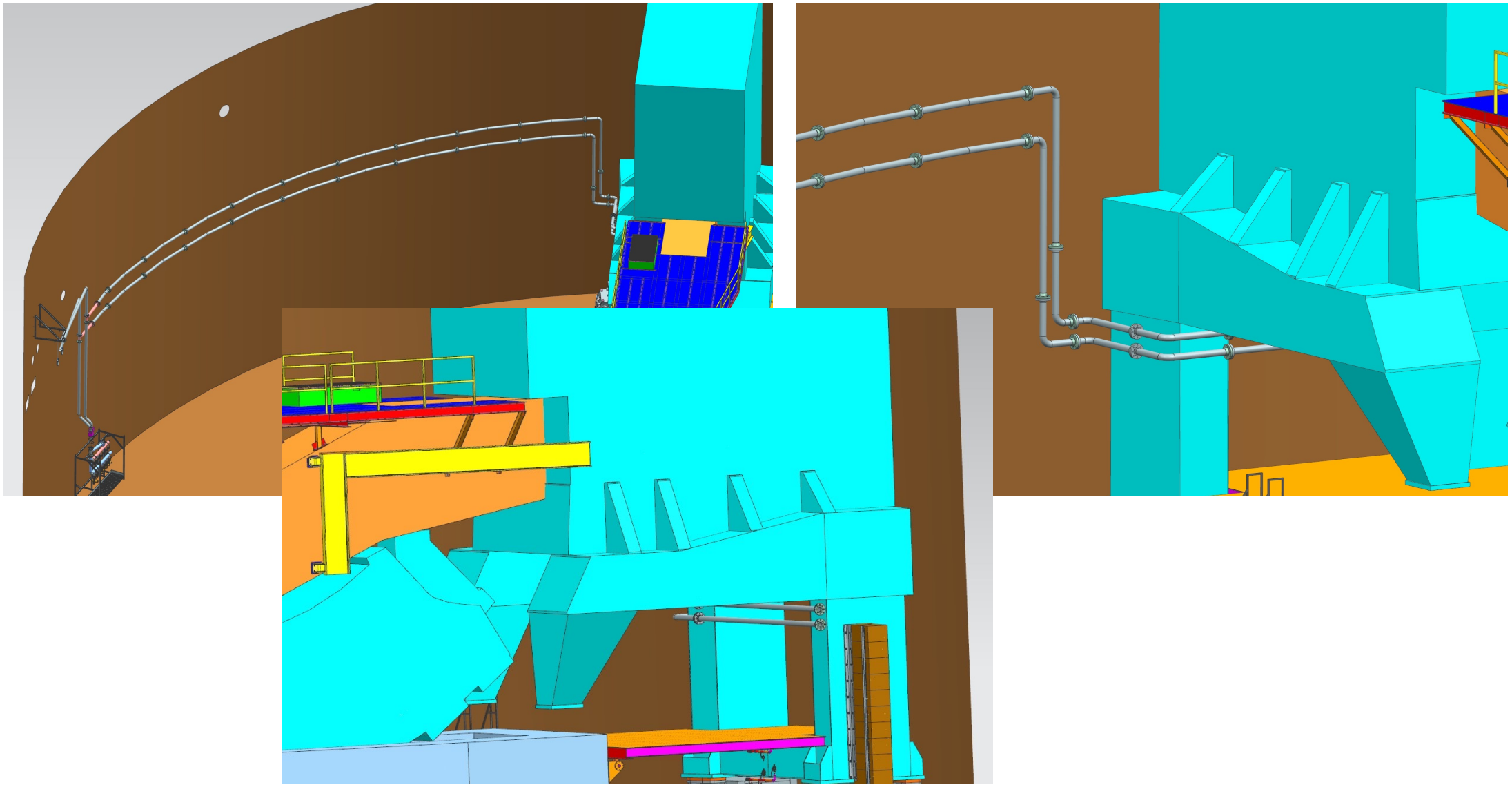
MPS switchboard installed

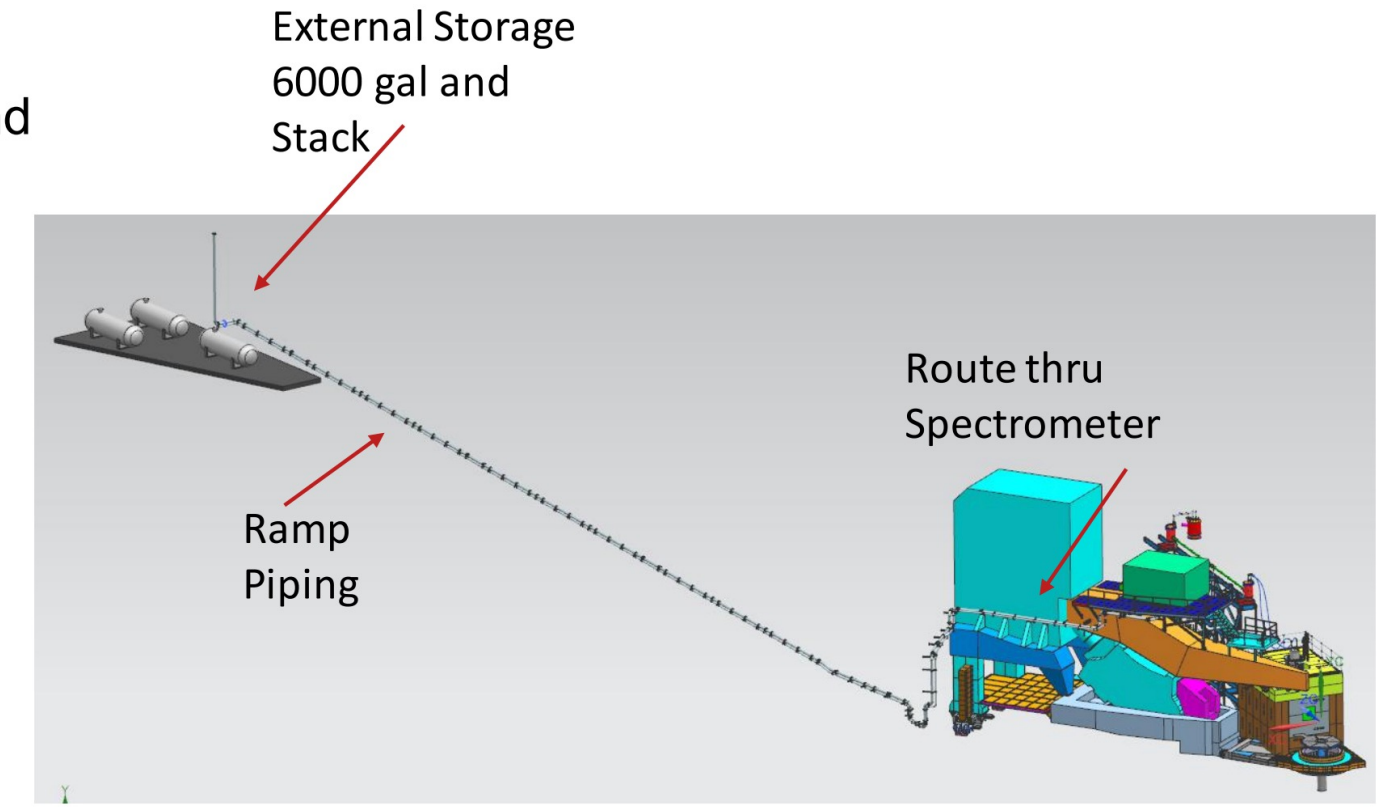


LCW system

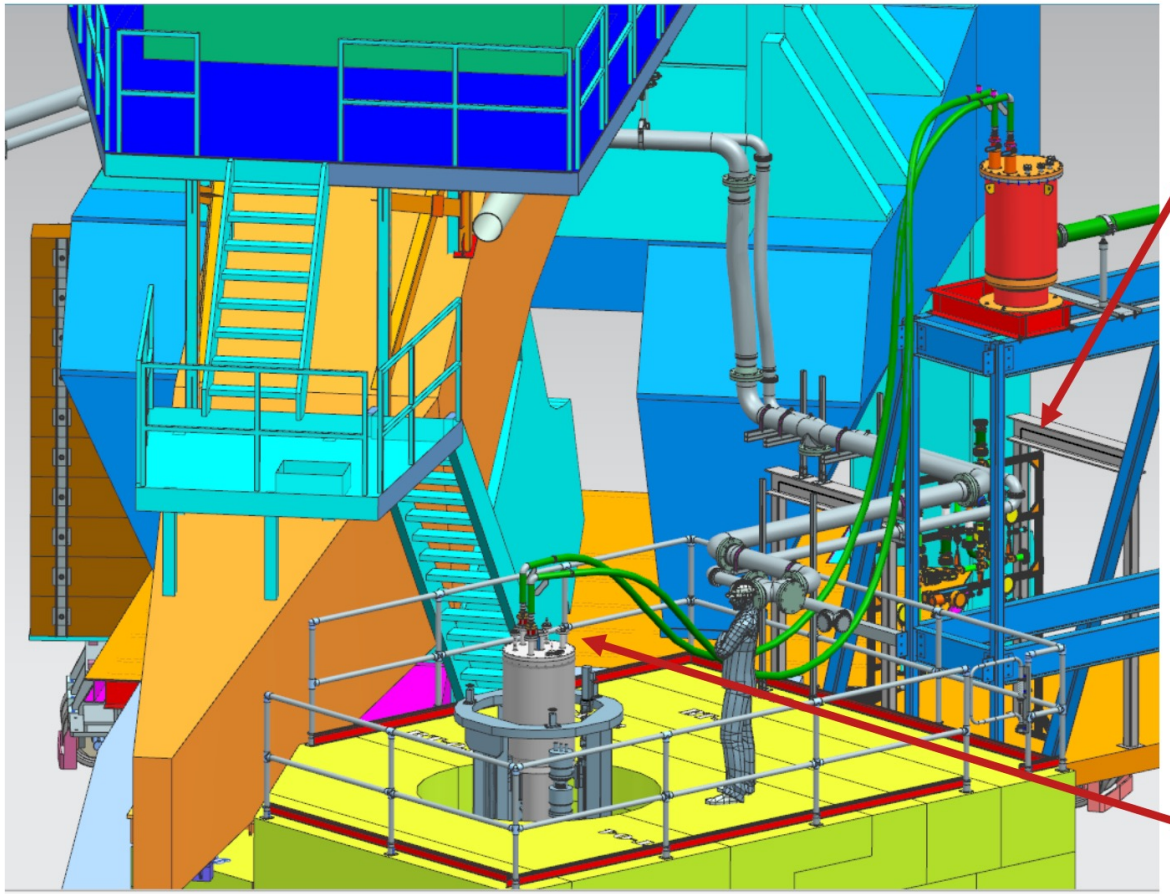


H2 supply system

- Gas Panel
  - 100% complete
- H2 storage system
  - 100% Facilities Management and Logistics (FML) is contracting
  - Vessels/piping design at 100%
- Supply/Return Piping
  - Design at 100%
- Overpressure protection
  - Relief devices to be specified
  - Capacity has been determined
- Exhaust system and vent
  - Design at 100%

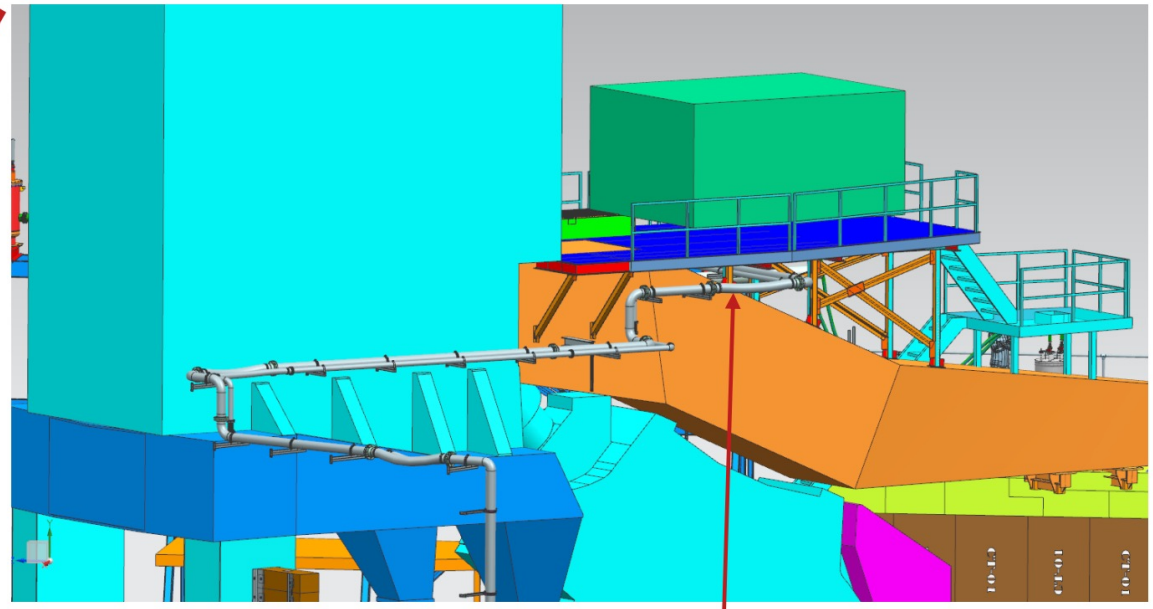


H2 supply system



Final design is complete

Gas Panel

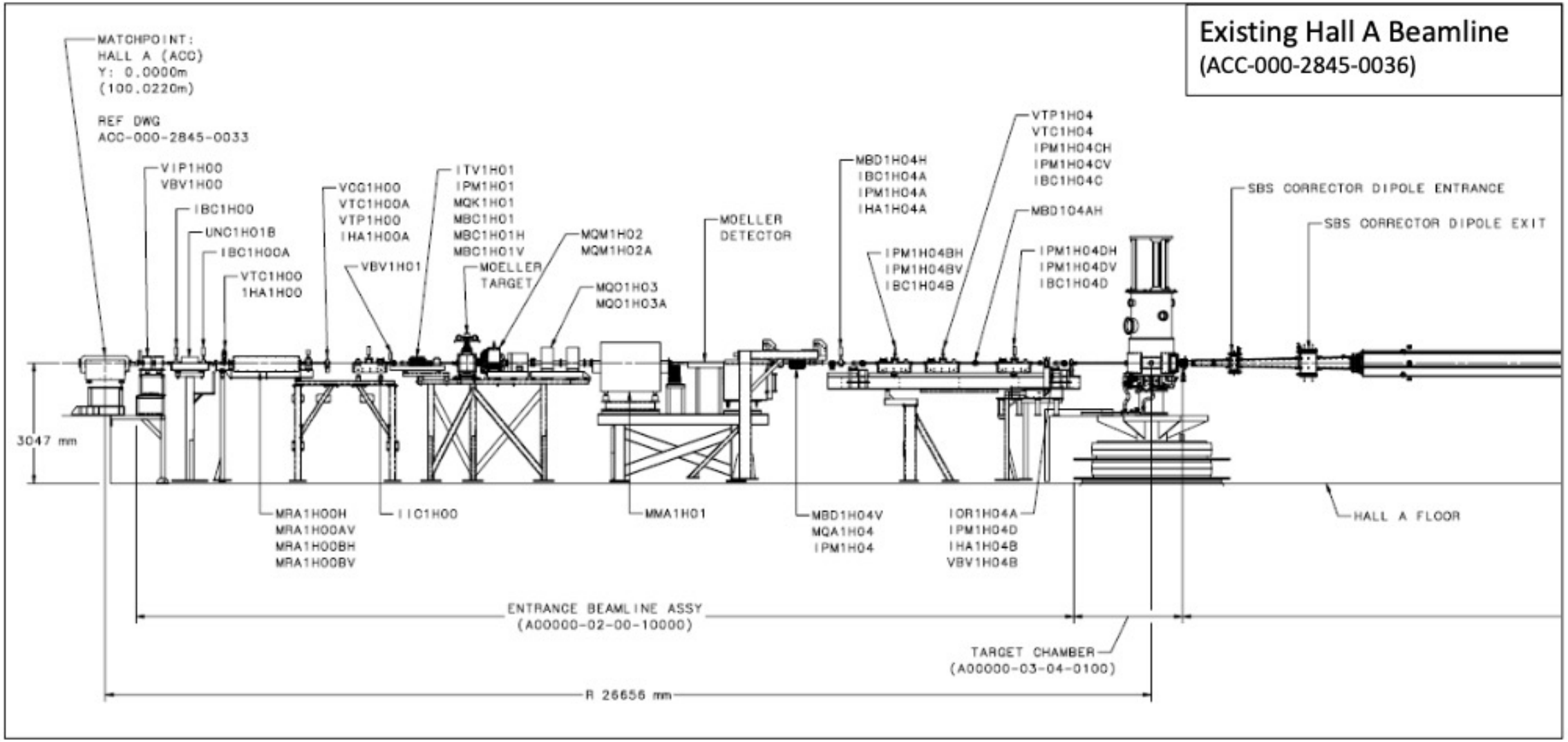


Details at Top of TGT

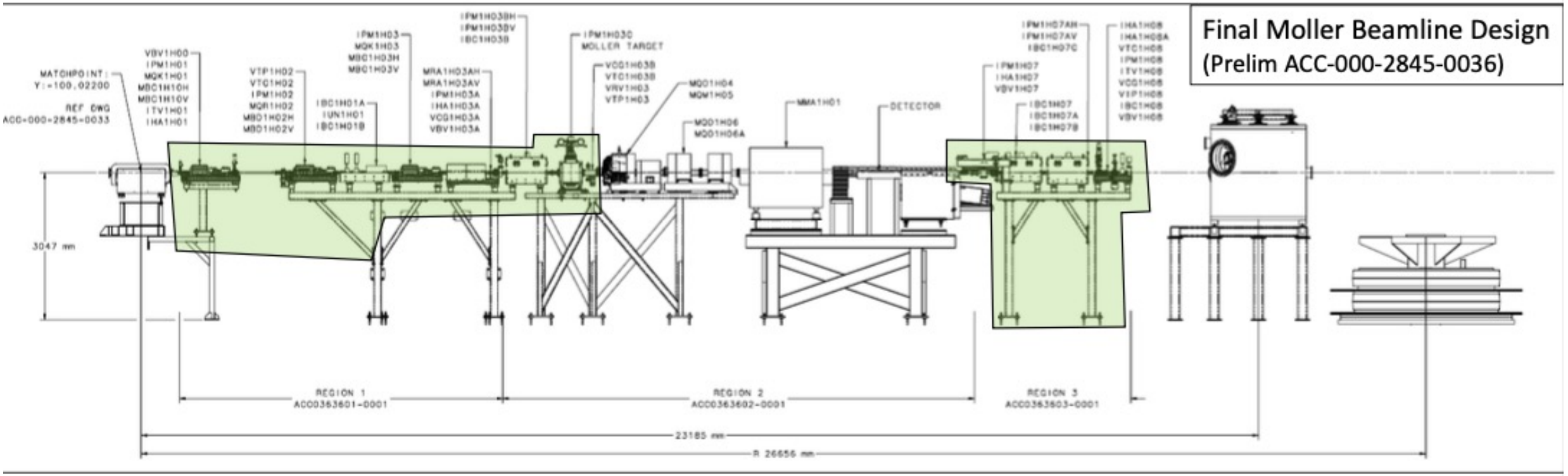
Details thru Spectrometer

Jib crane

Hall A Moller Entrance Beamline – Current Beamline Layout

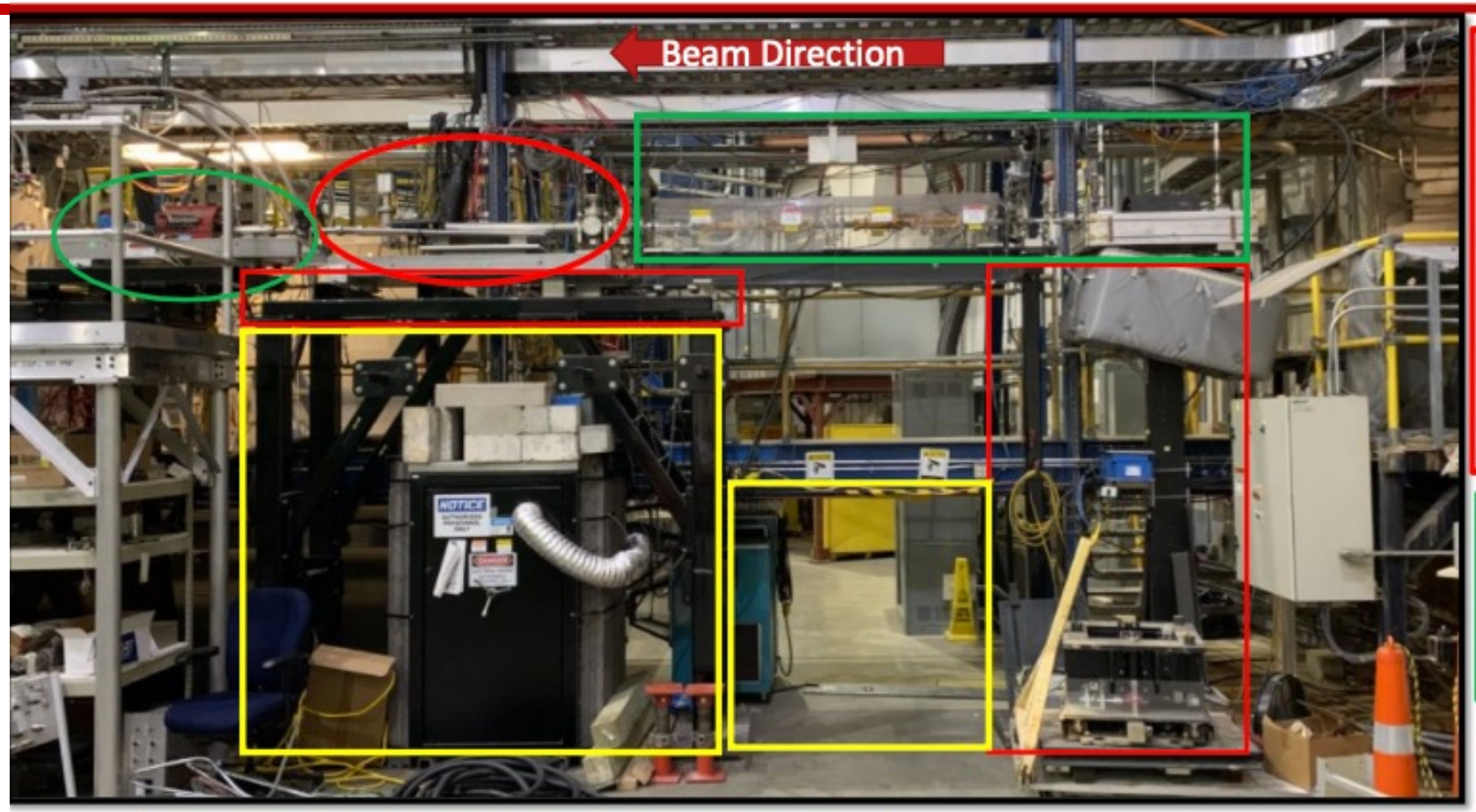


Hall A Moller Entrance Beamline – Hall A Moller Final Layout



Majority of New Design Scope is located in Regions 1 and 3. Existing Hall A Moller Quads, Diple and Detector box are unaffected and will remain in place.

Region 1: Existing Items to be Removed or Relocated



- Remove
  - Diagnostic Girder
  - DP Station Components/Drift
  - UNSER & Upstream Raster Stand
  - Previous Stand Top Weldment

Remove for Rebuild
- UNSER Girder
- Raster Girder
- Quad Girder

Other Notes
- Re-Using Stand Legs and Keeping location of electronics shielding box
- Preserved Walkway Access

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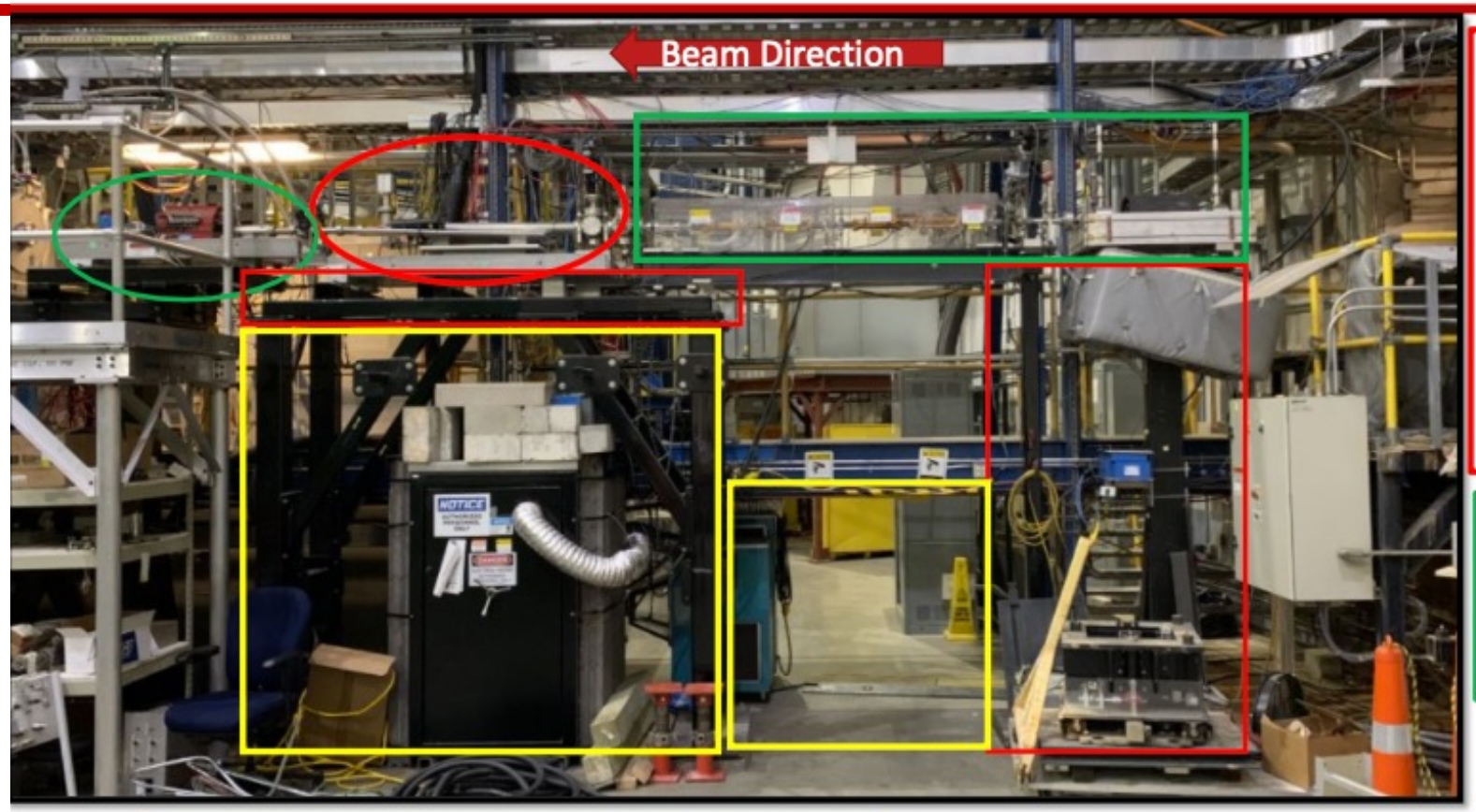

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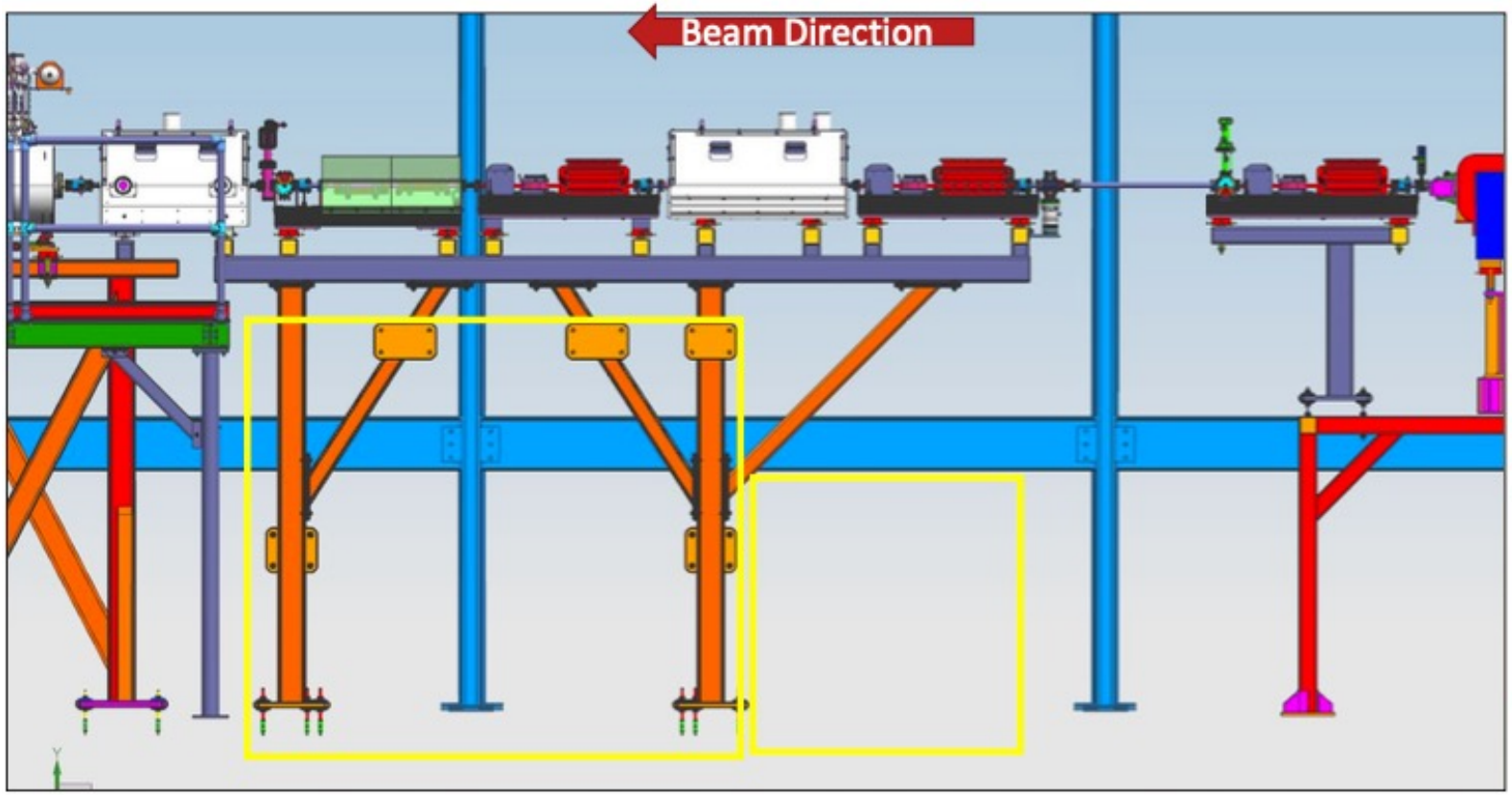
Hall A Moller Entrance Beamline – Region 1: Final Layout



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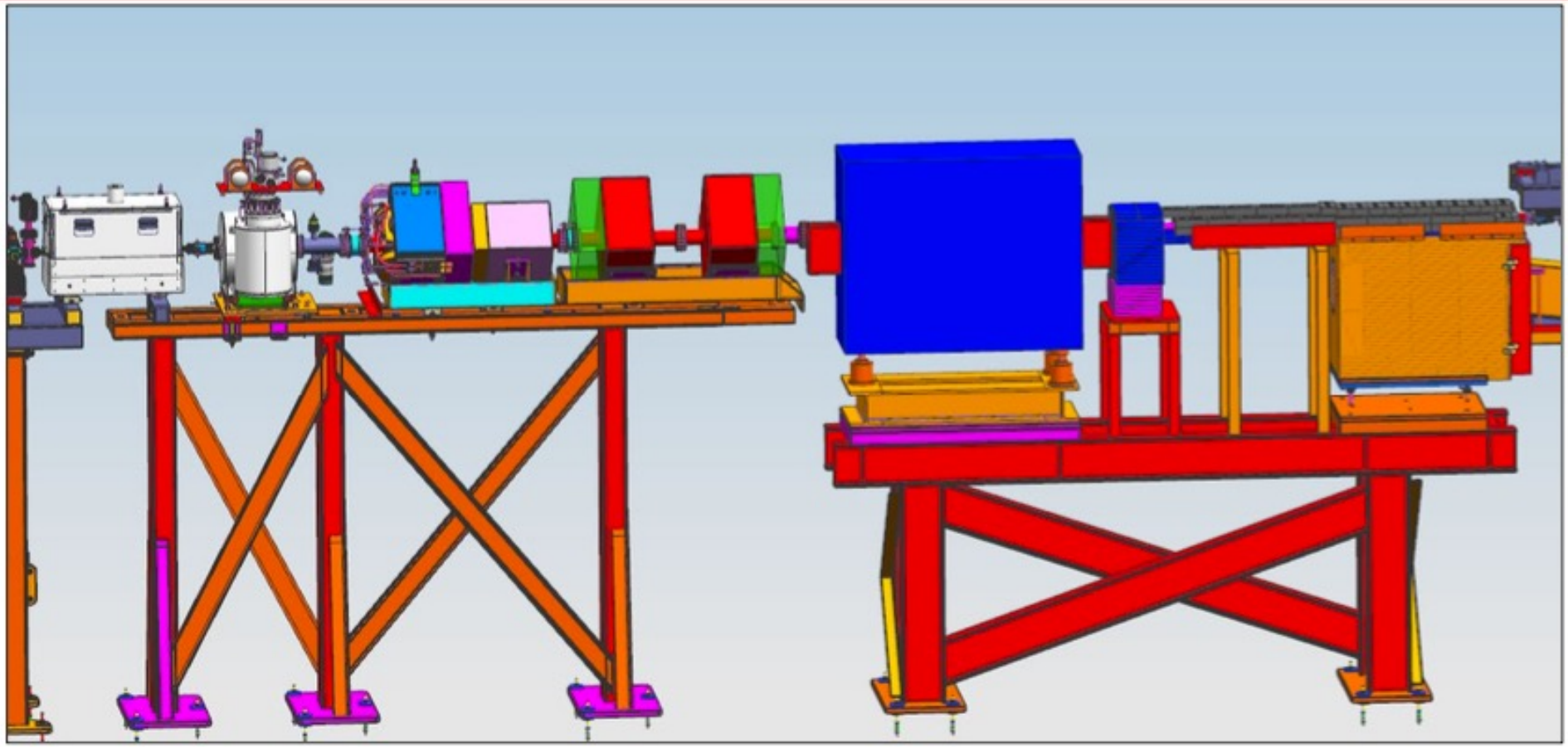
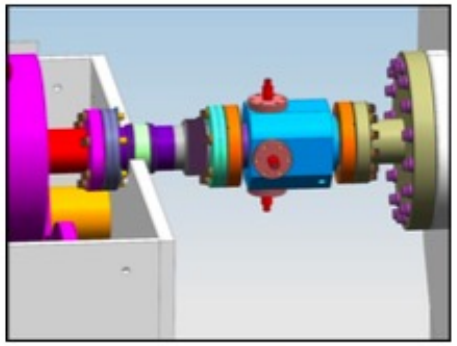
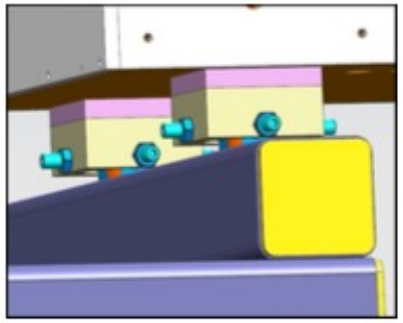
Hall A Moller Entrance Beamline – Region 2: ACC-036-3602-0001

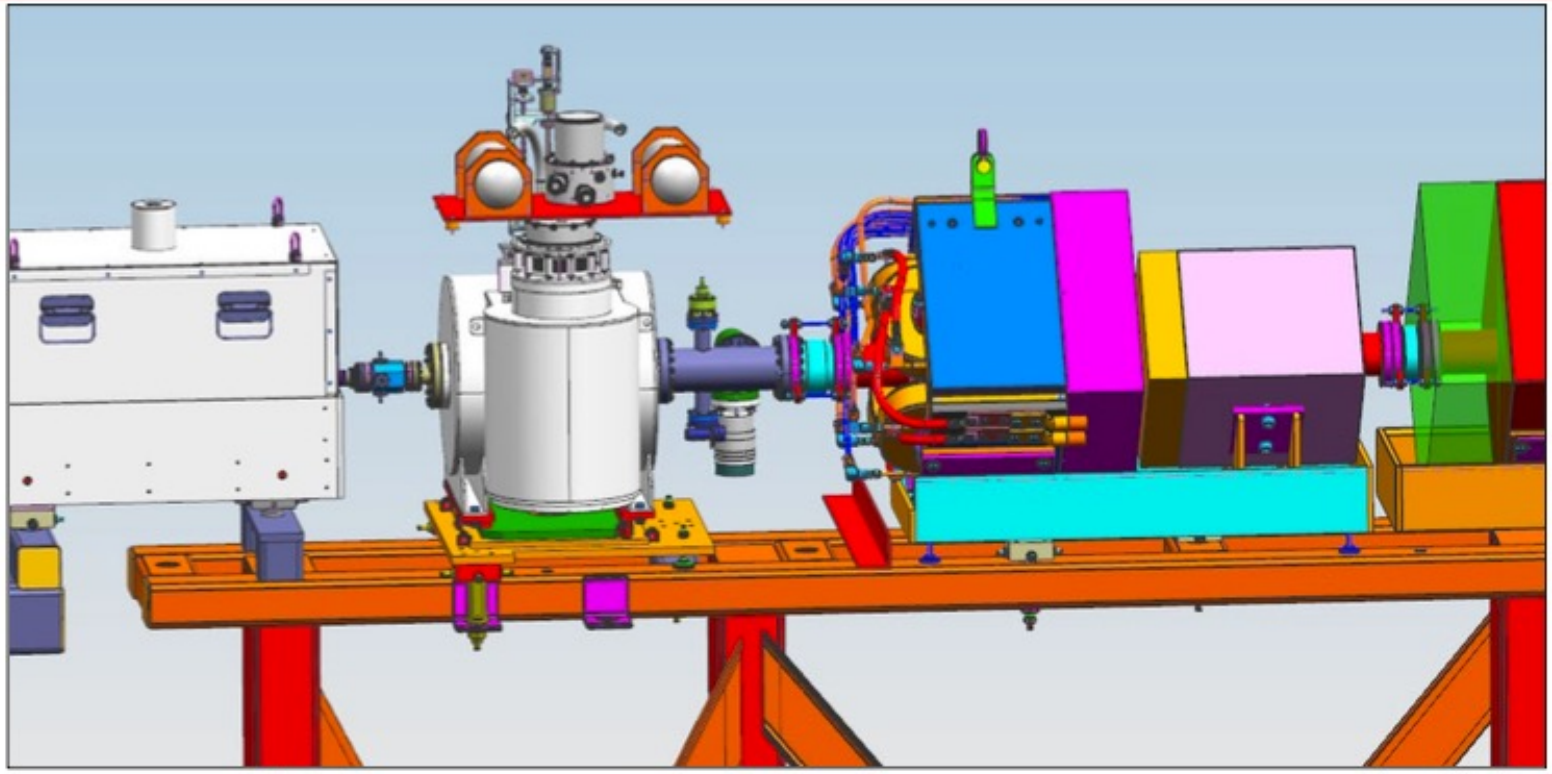


- nAmp BPM Relocated from Downstream
  - New Top Box
  - Electrically Isolated
- Shift of Moller Target
  - 30cm Upstream
  - New Downstream Diag/Vacuum Cross
- New Supports added to Existing Stand
  - Field Welds needed to support nAmp BPM and Moller Shift

Hall A Moller Entrance Beamline – Region 2: ACC-036-3602-0001







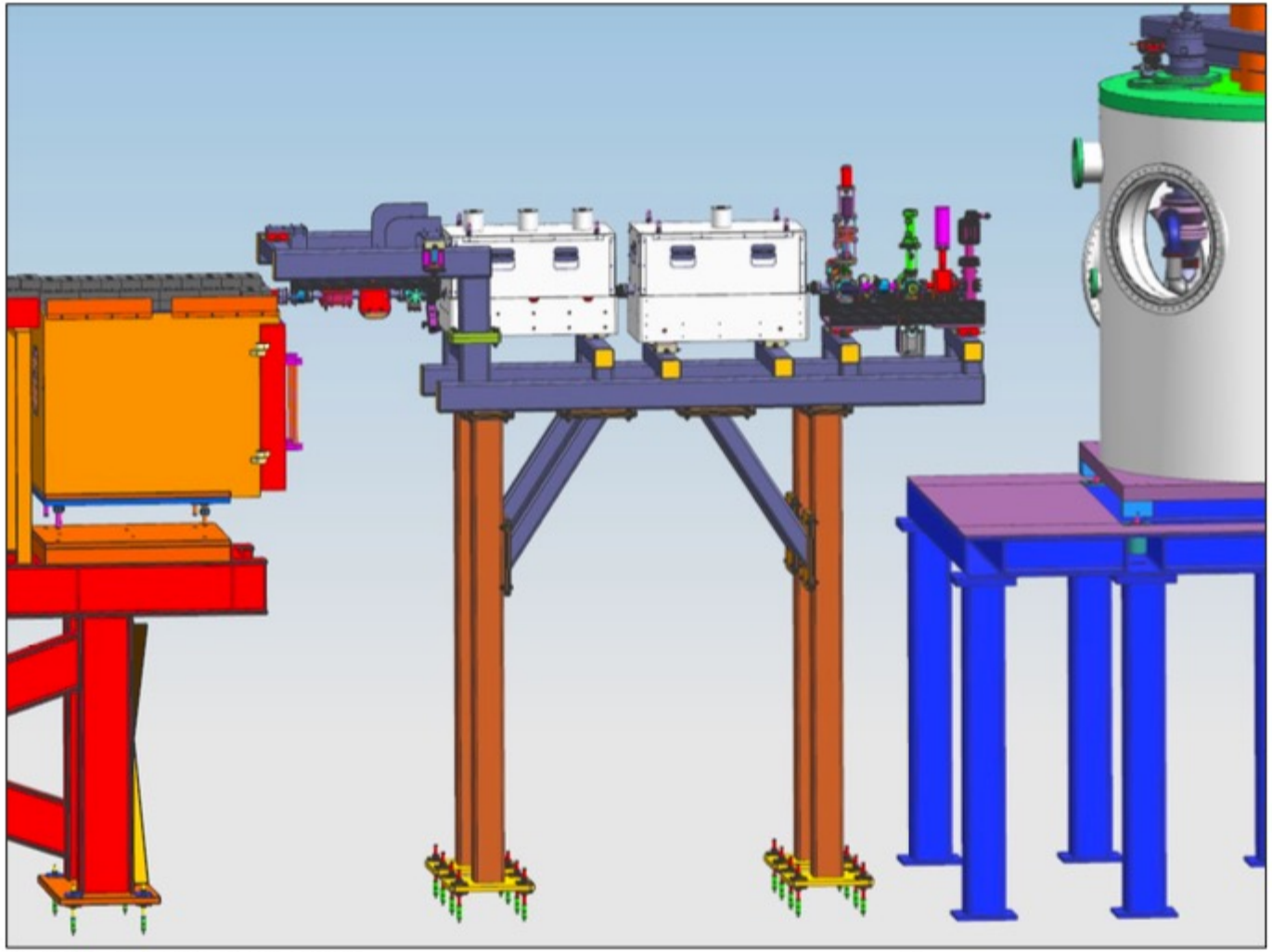
nAmp BPM Box Relocated from Downstream with new top box and isolating features

- Integrated Ceramic Bellows (Kurt Lesker)
- Electrical Isolation Pads on Cartridges.

Moller Target Shifting 30 cm Upbeam per Jay's Guidance. New Vacuum Diagnostic/Pump Cross will Fill gap.

Field Welds to be completed on Existing stand to support Moller Target Shift and BPM Box Relocation.

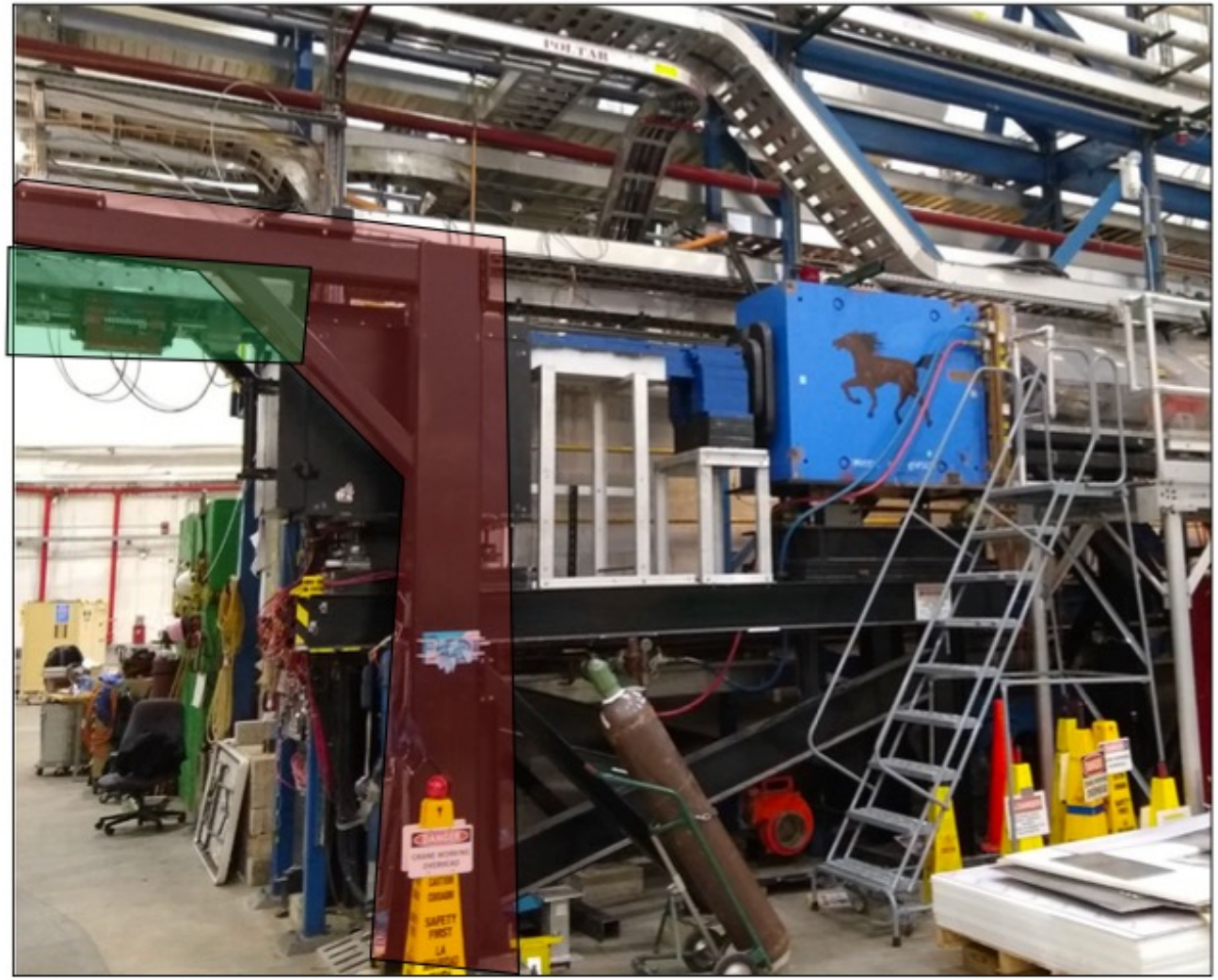
Hall A Moller Entrance Beamline – Region 3: ACC-036-3603-0001



Hall A Moller Entrance Beamline

- 2 New Diagnostic Girders
  - BPM, BDs, Harp
  - Dual Harp, BPM, Viewer, BCM
- New QQQ Girder & Box
- New Support Structure
  - Ensured would not interfere with upstream detector Box.
  - Doors will have full range and detector can be extracted fully.
- Existing nAmp BPM with new Top box to allow easier access without Crane.
- No Change to Upstream Lead or Beam Tube.

Region 3 – Existing Layout & Pre-Install Work



Remove for Rebuild

- Upside Down QA Girder
- Long Diagnostic Girder with nAmp BPMS, MBDs, and other Diagnostics

- Remove All Existing Stands and Girder Supports

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Jefferson Lab

Summary

- MOLLER project will provide
  - The incoming beam line to fit the MOLLER target location
  - Particle shielding for the experiment
  - Cables and detector power supplies
  - Detector support frames
  - Hall A infrastructure to support the experiment.
  - Engineer Hall A modifications are necessary to fit the MOLLER target, magnets, and shielding with the existing spectrometers, utility balcony, and floor loading.
  - Design and provide personnel access platforms needed to install, access, and service the detector systems, target and spectrometers.
  - Design electrical, LCW, and gas system required by the experiment.
  - Provide components needed for the gas system.

- MOLLER equipment assembly will start later this year (2025)
- MOLLER experiment will be assembled by end of 2026

Backup