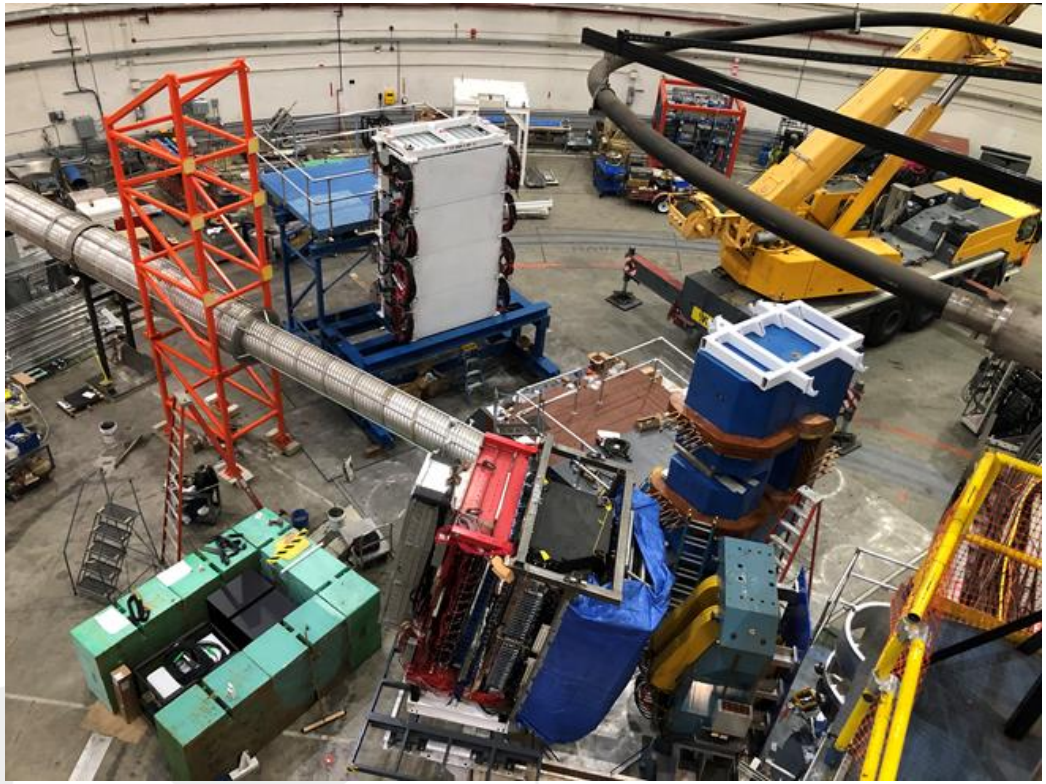
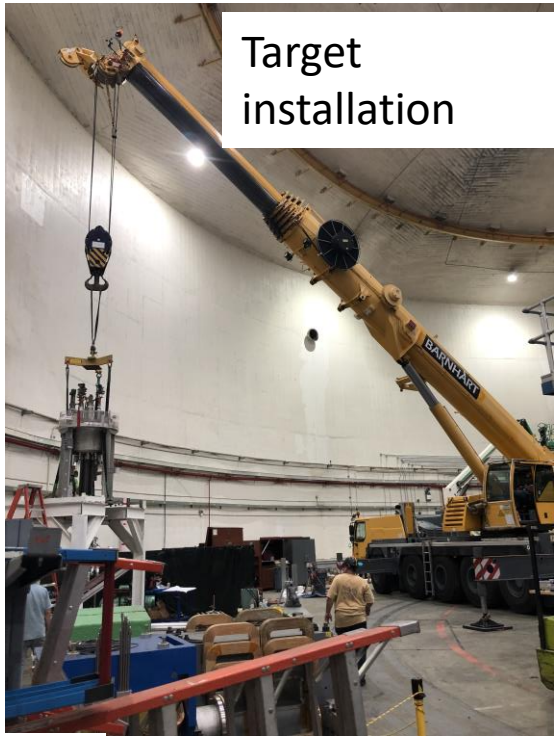
Hall A Status



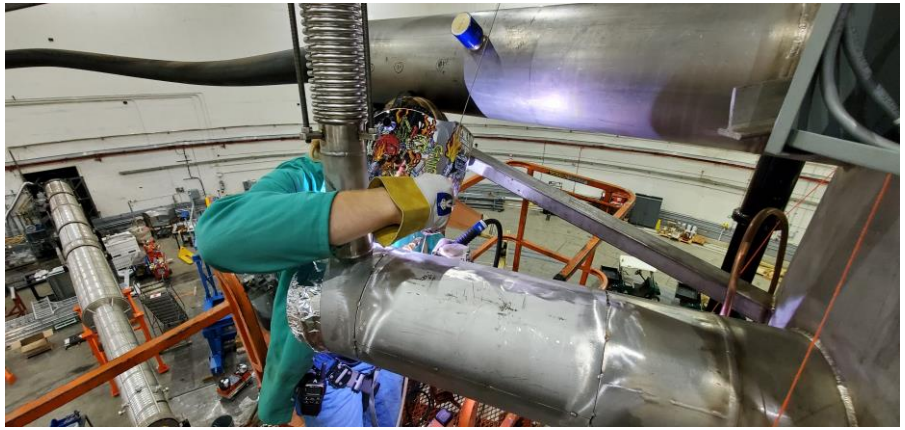
Installation of the BigBite and SuperBigBite magnets and detector systems

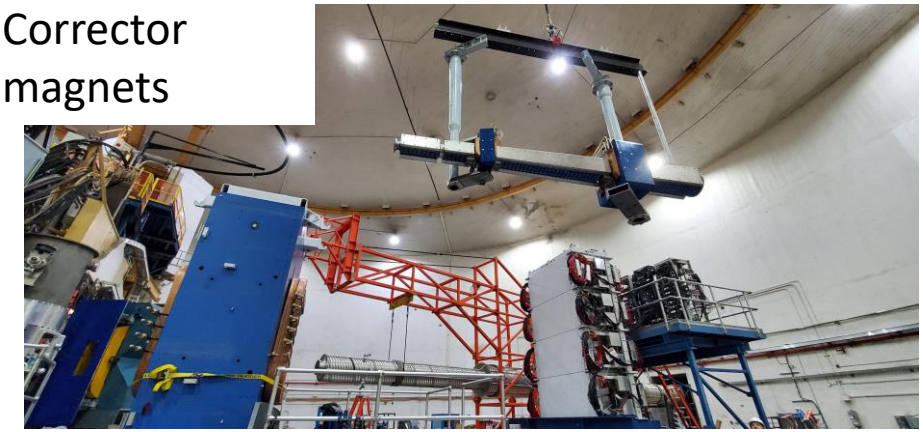
February 2022 Hall A Collaboration Meeting

Long SBS Installation without overhead crane

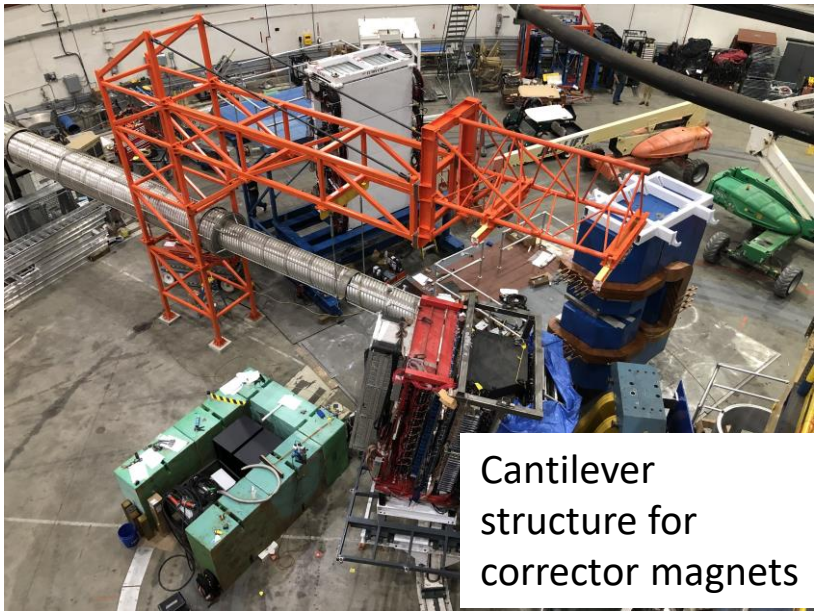


Target installation





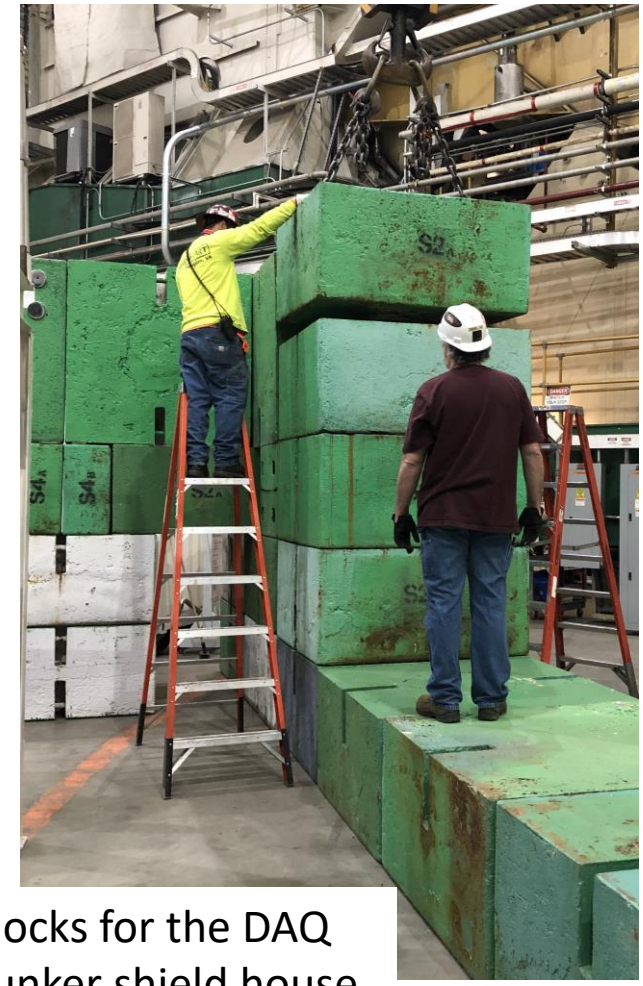
Corrector magnets



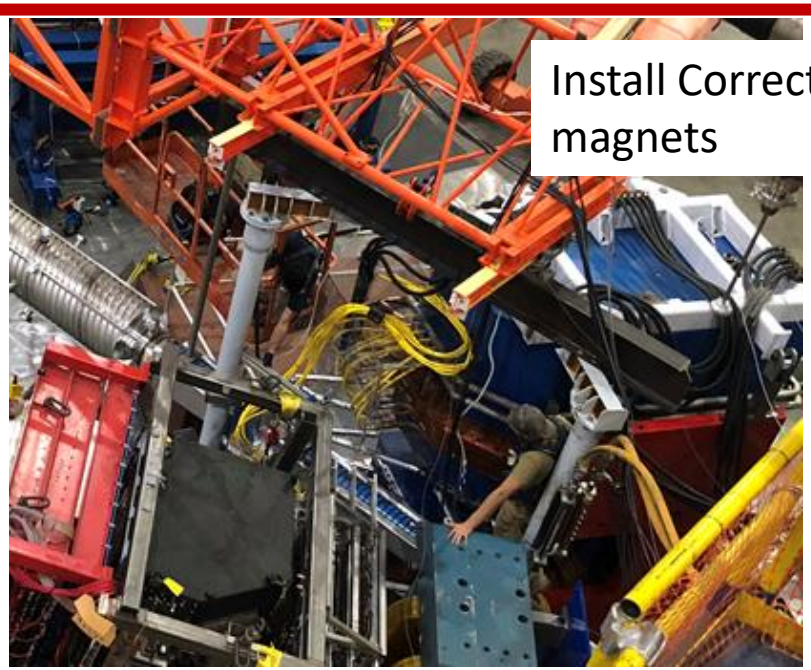
Cantilever structure for corrector magnets

Jefferson Lab

SBS installation



Blocks for the DAQ bunker shield house



Install Corrector magnets

Counting House makeover

Before

Hall A Counting House makeover

After

Thanks to Ole Hansen for organizing the renovation and completing it with the help of the Hall A techs and many others.

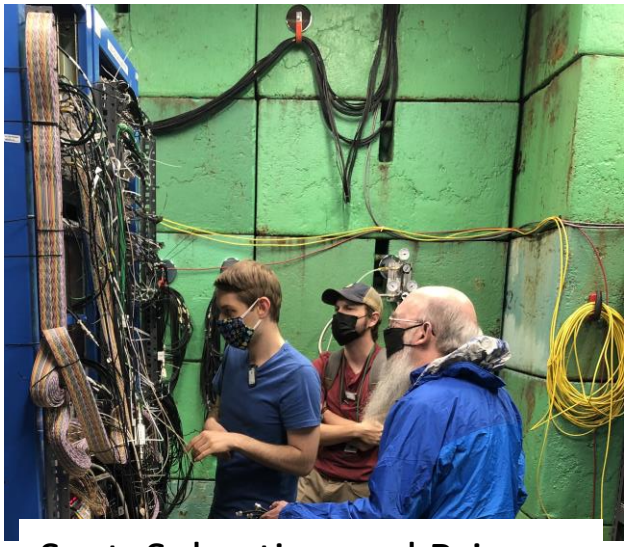
Some of the many people involved in SBS

Ralph

Provakar

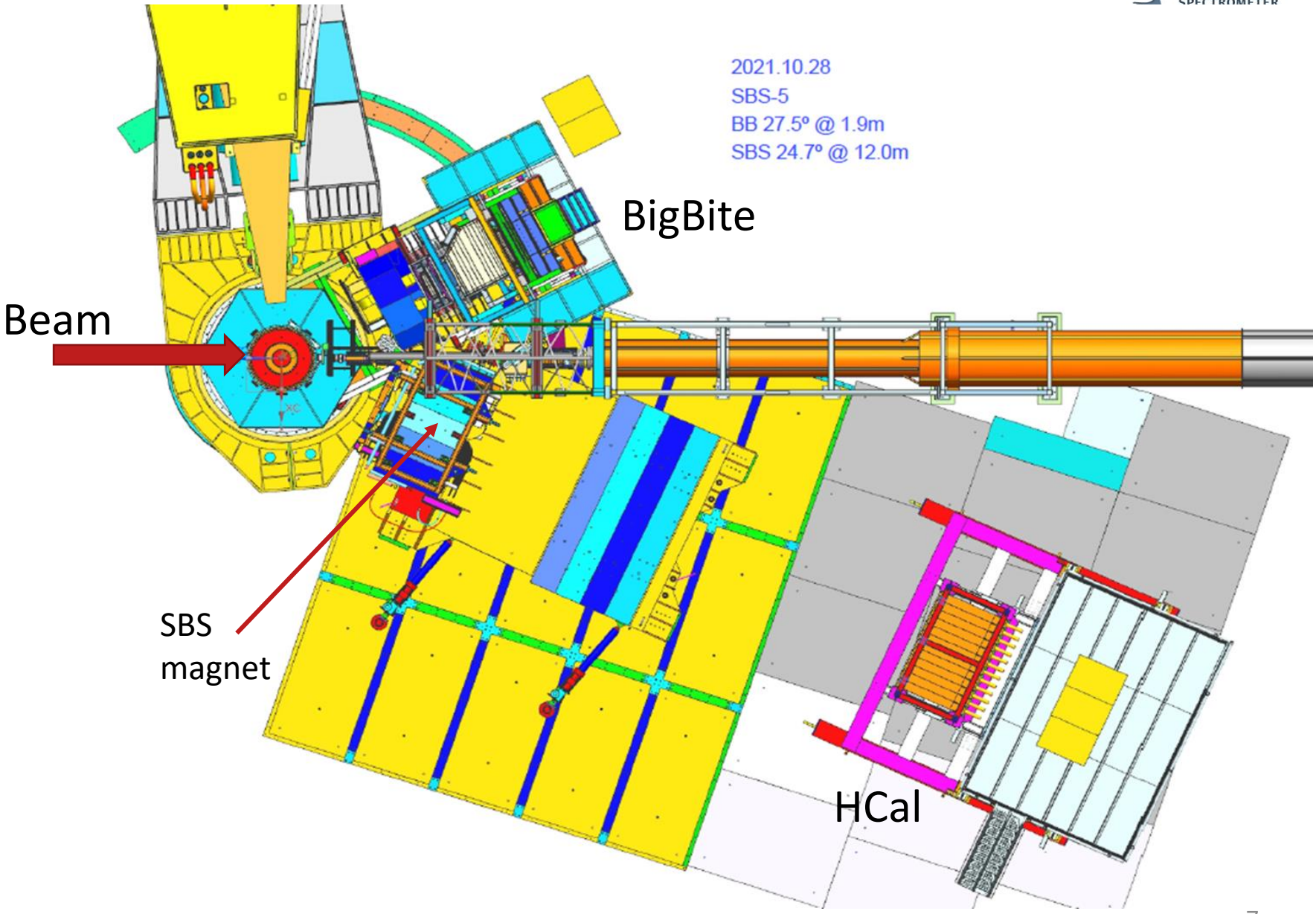
Arun

Holly, Anu, Zeke, Kondo, Thir, Sean and John



Scot, Sebastian and Brian

Upgraded BigBite and new SuperBigBite

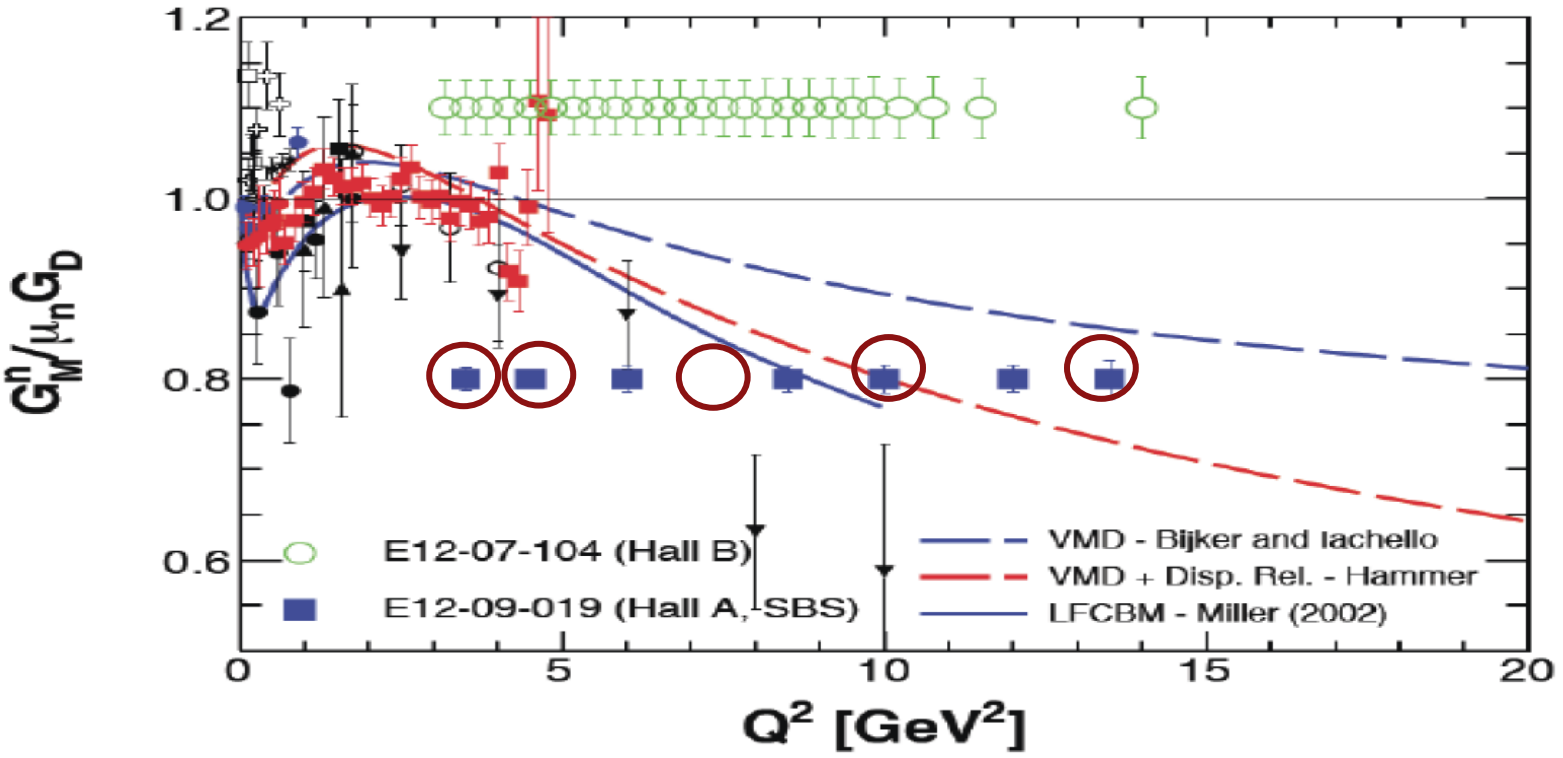


GMn experiment

- Delayed start up to Oct 14th with initial commission with 1 pass beam
- Data taking for Q^2 = 3.0 point was completed
- Setup for the Q^2 = 6.5 point on Oct 26th
  - Waiting for beam and doing cosmic runs with BB magnet on and SBS at different field settings. SBS magnet had a temperature warning. Turned SBS off.
  - Found that the BigBite had moved towards the SBS
  - Lucky that it was not a larger problem
  - Formed a 3 person review panel
    - For each SBS/BB configuration
      - new calculations of forces between BB Magnet and SBS magnets.
      - Braces and stops designed to fix BB in place.
  - Review panel approved implementation and Nov 12th run permit granted
- Resumed at the Q^2 = 10
  - Problems with 4 pass separator meant that significant amount of days were lost
- Had to move on to Q^2= 13.6 on Nov 22nd and completed Dec 21st.
- In Jan/Feb running
  - Completed Q^2 = 7.5
  - Completed both epsilon points at Q^2 = 4.5 for the neutron two-photon experiment.

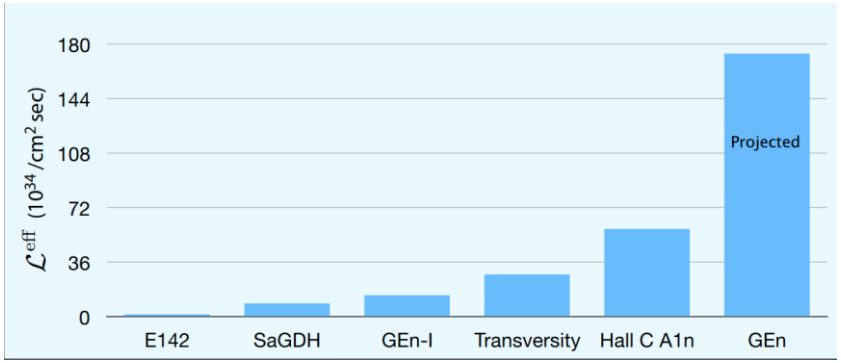
GMn status

- Completed Q^2 = 3, 4.5, 7.5, 10 and 13.6 GeV^2



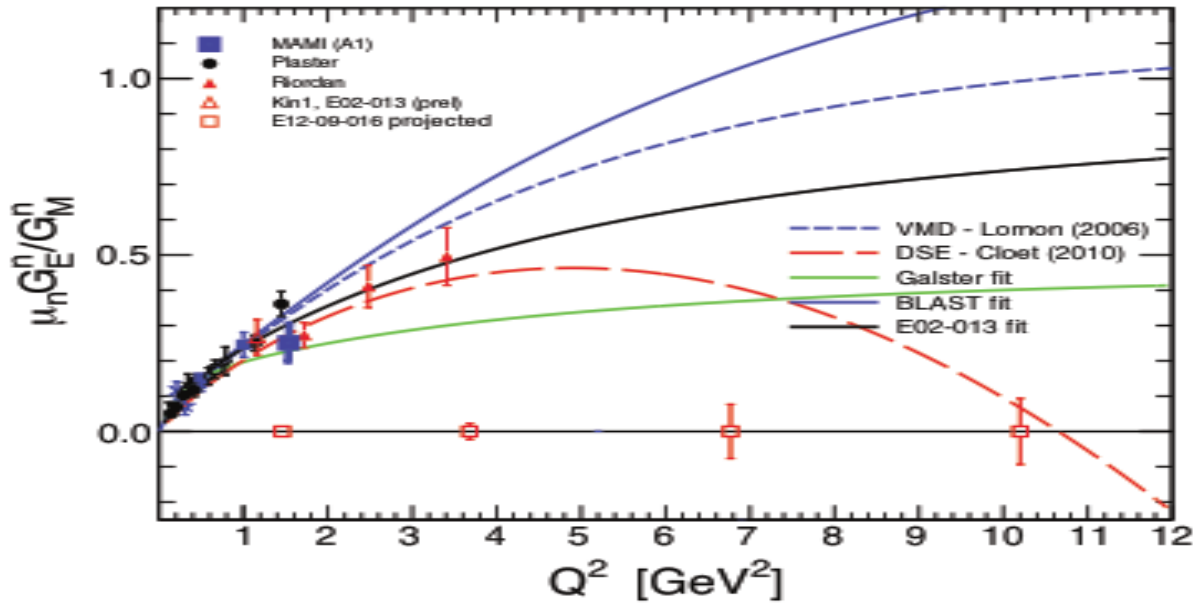
Next SBS experiment is the Neutron Electric Form Factor

- Polarized helium target
  - 60cm long
  - 55-60% polarization
  - 60μA



- Extract GEn from asymmetry in polarized electron scattering on polarized neutron

$$A_{phys} = A_{\perp} + A_{\parallel} = \frac{a \cdot G_E G_M \sin\theta^\star \cos\phi^\star}{G_E^2 + c \cdot G_M^2} + \frac{b \cdot G_M^2 \cos\theta^\star}{G_E^2 + c \cdot G_M^2}$$



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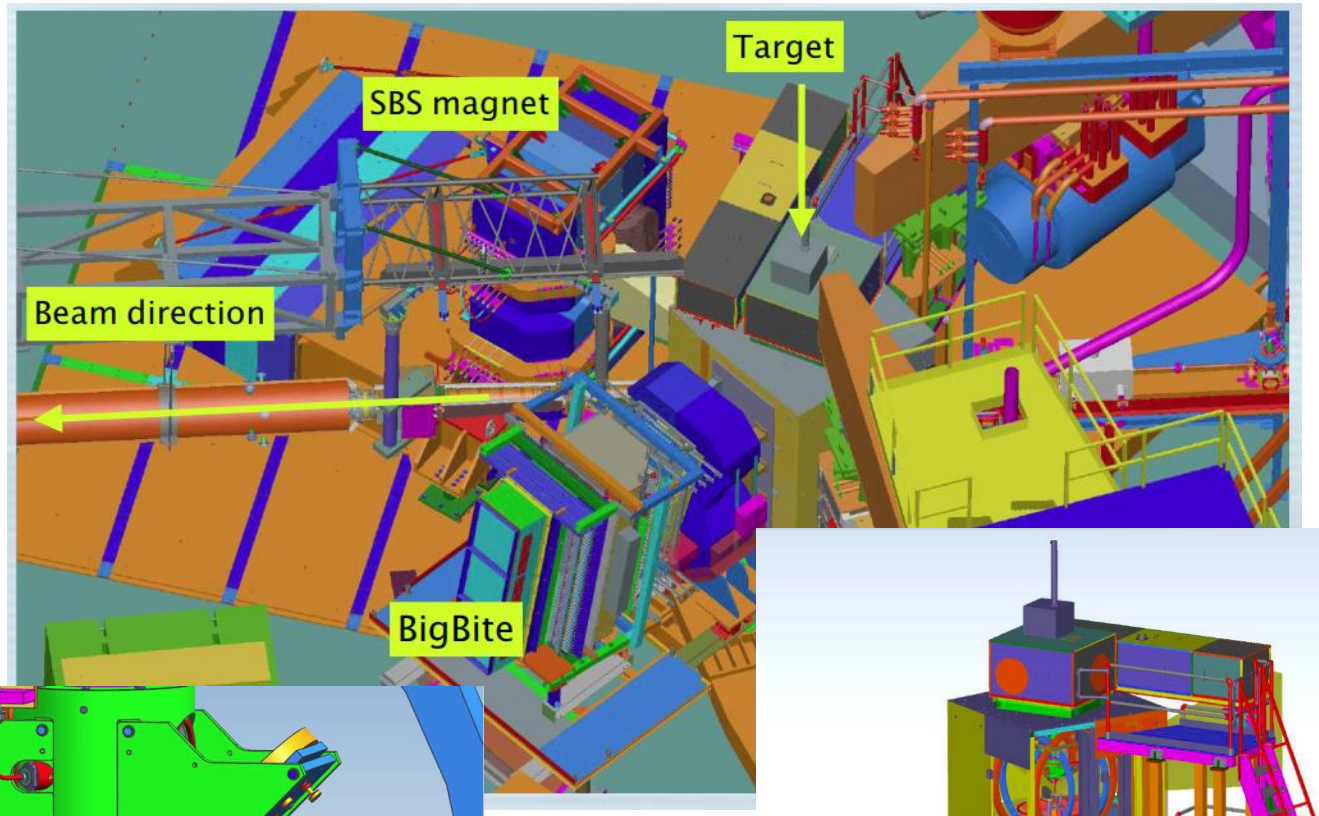
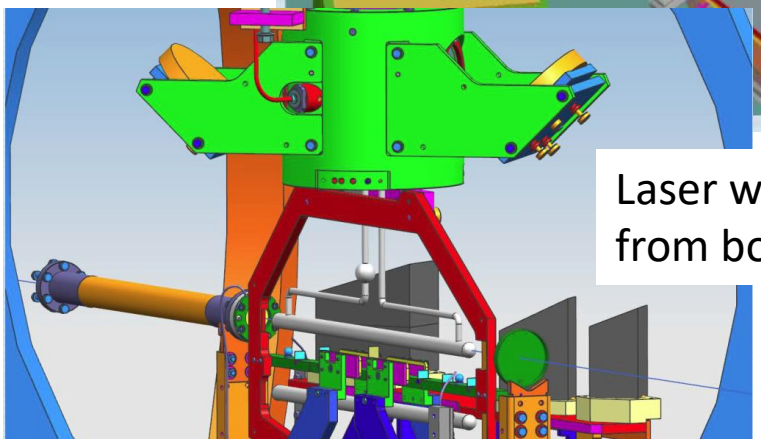
GEn experiment setup



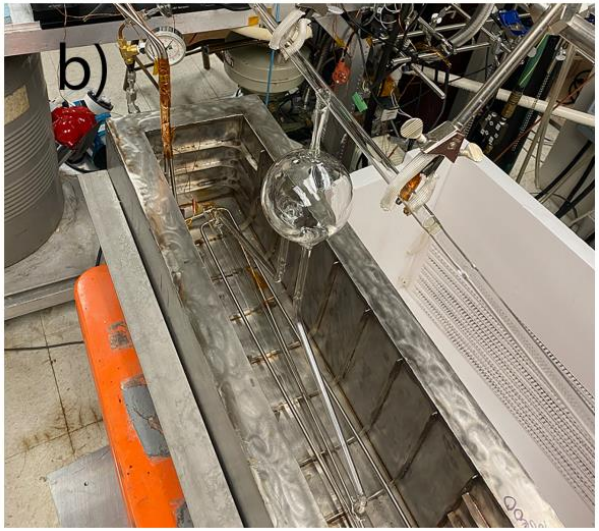


Laser will come from both sides

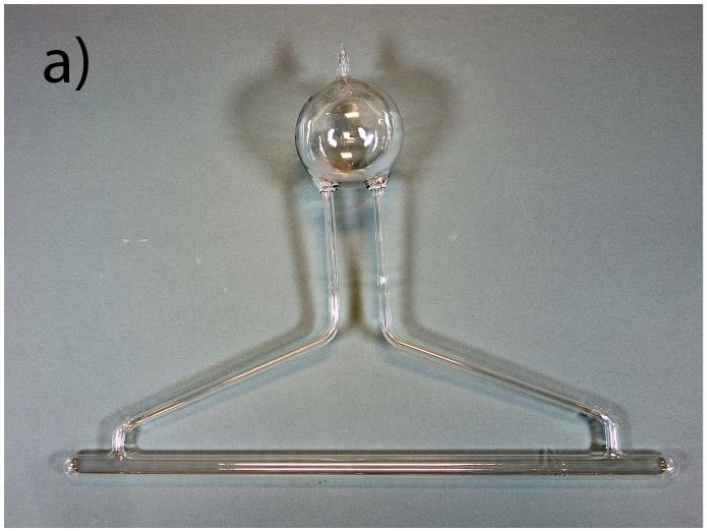
Target and platforms

GEn Installation

- Production of cells ongoing at UVa
- Installation schedule has beam starting on Aug 29th.
- Need to complete ERR process to be officially scheduled.
- Plan to install the GEN-RP setup of GEMs on SBS.

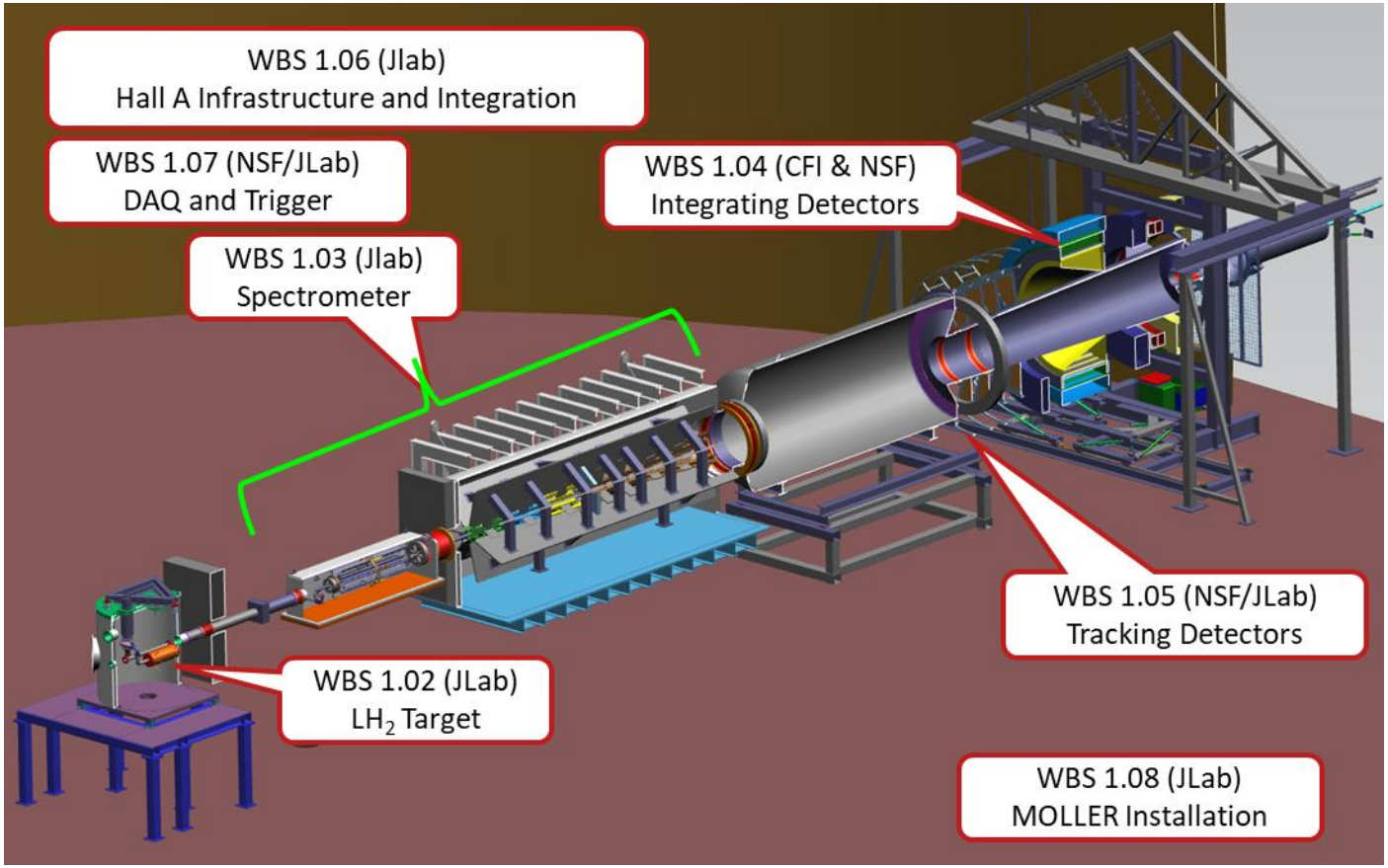


Production cell in helium dewar



MOLLER Project

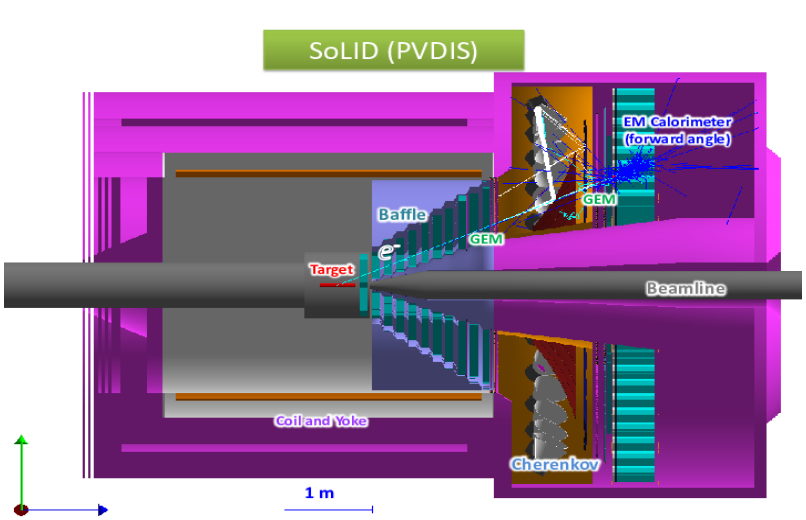
- Measurement of a Lepton-Lepton Electroweak Reaction (MOLLER) experiment proposes to measure the parity-violating asymmetry in electron-electron (Møller) scattering.
- Successful DOE Review in November 2021 . On track for CD-2

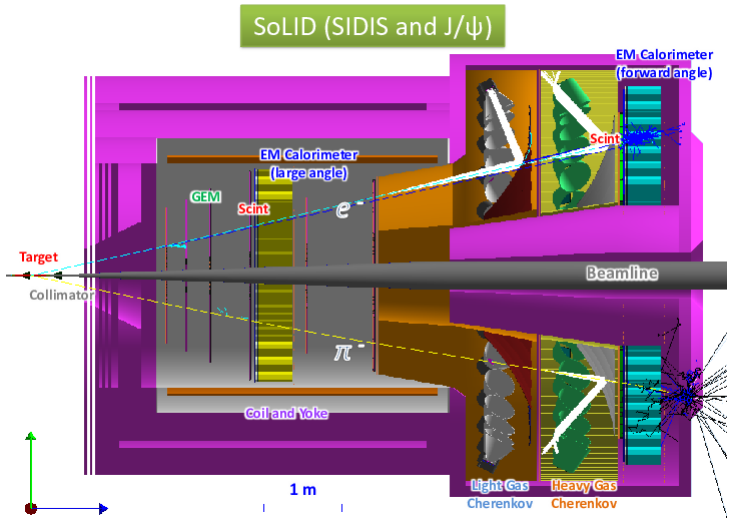


SoLID： Solenoidal Large Intensity Device

- A series of SIDIS experiments will probe the confined motions (3-D imaging) of partons inside protons and neutrons including orbital motion, and uncover the rich QCD dynamics such as spin-orbital correlations.
- Parity Violating Deep Inelastic Scattering (PVDIS) to search for new interactions beyond the Standard Model.
- J/Ψ production near threshold will provide information on the pure gluonic component of QCD

DOE MIE proposal submitted in Feb 2020. DOE Science Review in March 2021





Unique Capability:

- ✓High luminosity (10^{37-39})
- ✓ Large acceptance detector with full ϕ coverage
- ✓State-of-the-Art Technology

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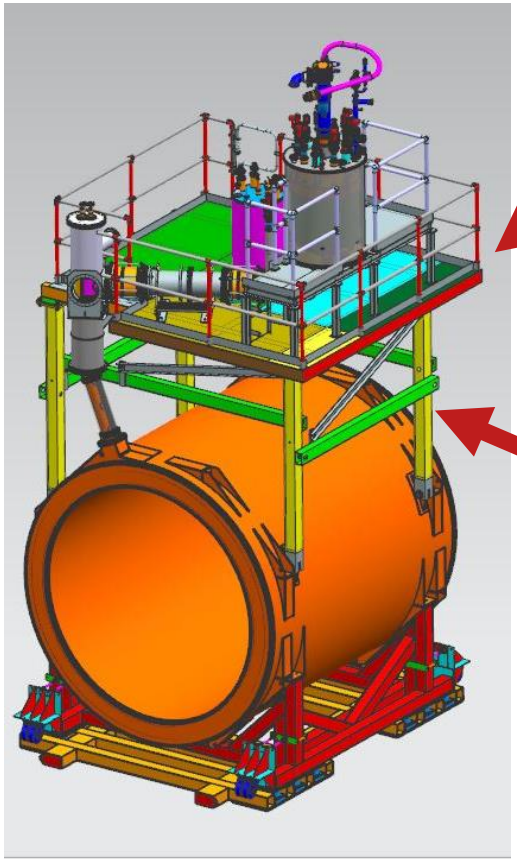
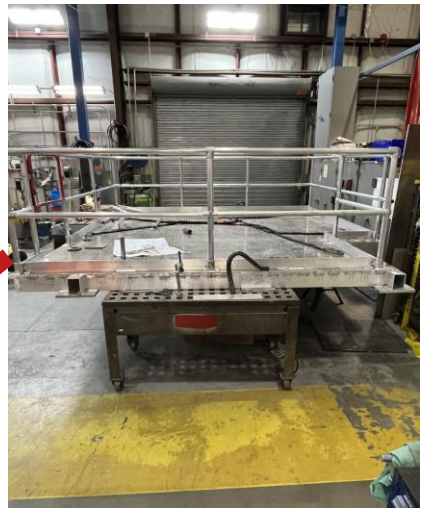
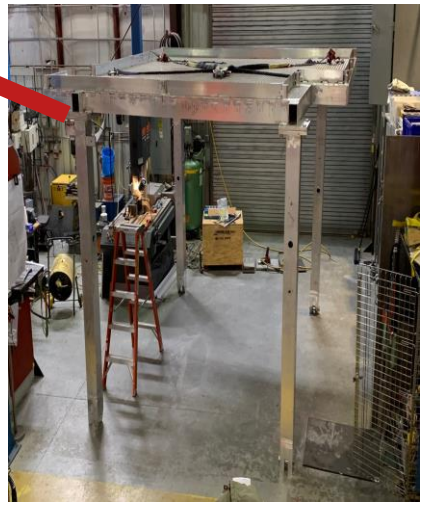
SoLID CLEO magnet test in TestLab HiBay

- Moved magnet in place for test
- Platform has been completed.
- Wiring of the control racks is nearly complete.
- Prepping for the welding of the helium lines.

- Expect to do the magnet test in July or August.

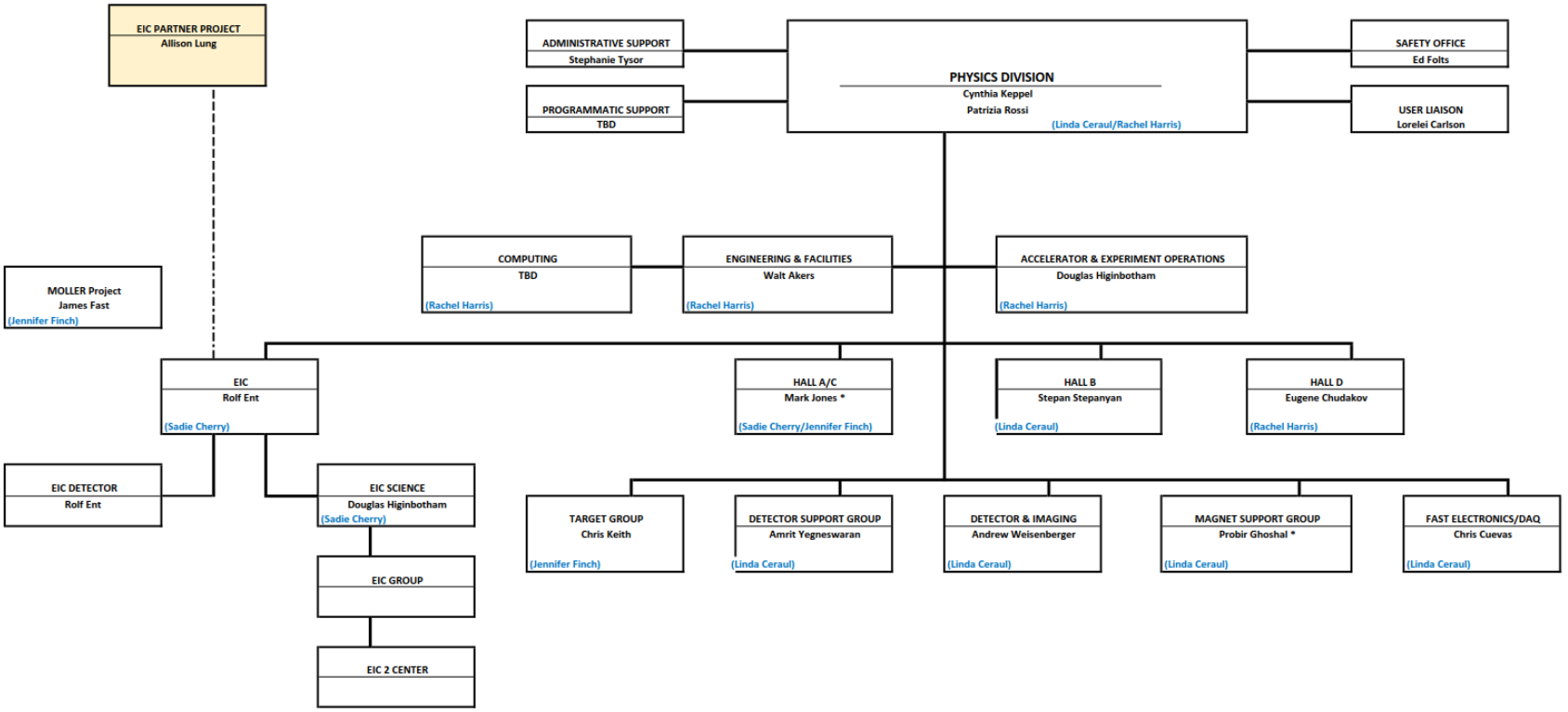






Changes within Physics Division

- Thia Keppel, new Physics Division Head
- Doug Higinbotham, new interface between accelerator and experiment operations
- Sadie Cherry and Jennifer Finch, new Hall A/C admin support



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Summary

Near term future

- GMn experiment, despite setbacks, was able to complete a wide coverage of Q2
  - Completed Q^2 = 3, 4.5, 7.5, 10 and 13.6 GeV^2
- nTPE experiment was completed.
  - First assessment of two photon exchange in electron-neutron scattering.
- With setbacks, needed to postpone the GEn-RP experiment
  - Plan to install the GEn-RP GEM setup during
- GEn experiment is starting installation.
  - Present installation schedule: Expect experiment to start Aug 29th.
- Hall A crane repair in the Spring 2023 down.

Mid to far term future

- Attend the Friday afternoon “Future Experiments” session
- Highlight Jay Benesch’s talk, “ 24 GeV Upgrade”.
  - Need to develop the physics argument.