

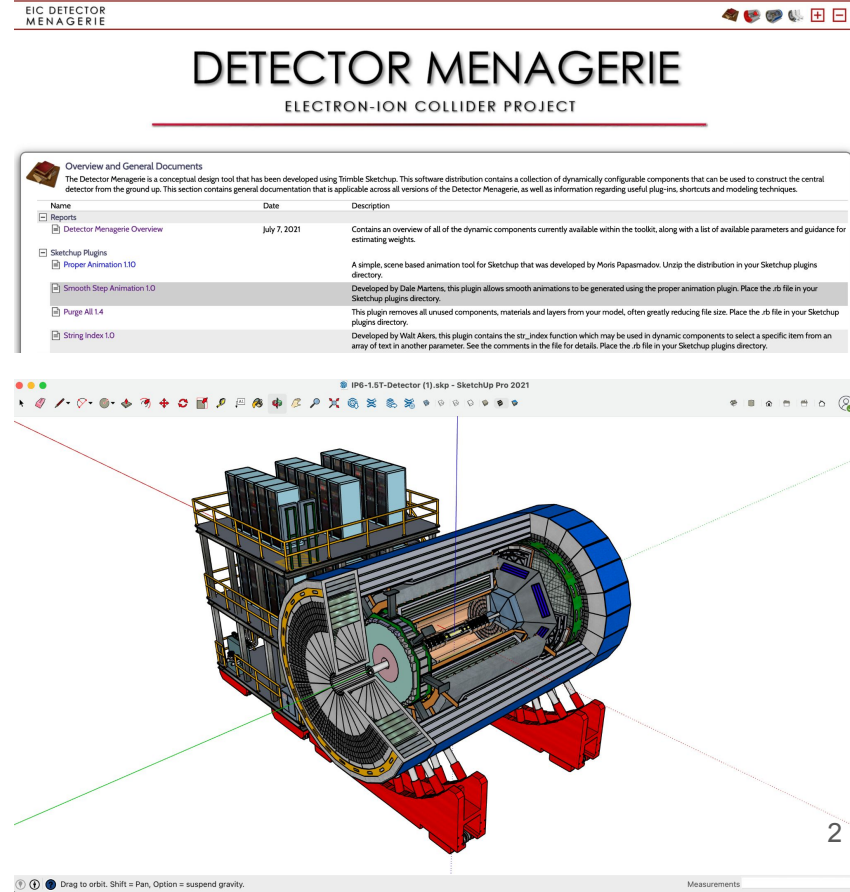
# Detector Team Update

2 August 2021



- 3D modeling software to give good approximation of the EIC detector layouts
- Student projects were based on enhancing/altering existing detector components in SketchUp
- New students were able to install SketchUp, do the tutorials and get to work in a few days.

Link to File and Tutorials: <https://physdiv.jlab.org/EIC/Menagerie/#Top>



# Electron-Ion Collider Detectors in Sketchup

## Jay Barreto

Hampton Roads Academy

## Erika Ramirez

Thomas Jefferson High School for Science & Technology

## Meleah Ognita

Commonwealth Governor's School at Colonial Forge High School

**Mentors:** Doug Higinbotham & Walt Akers

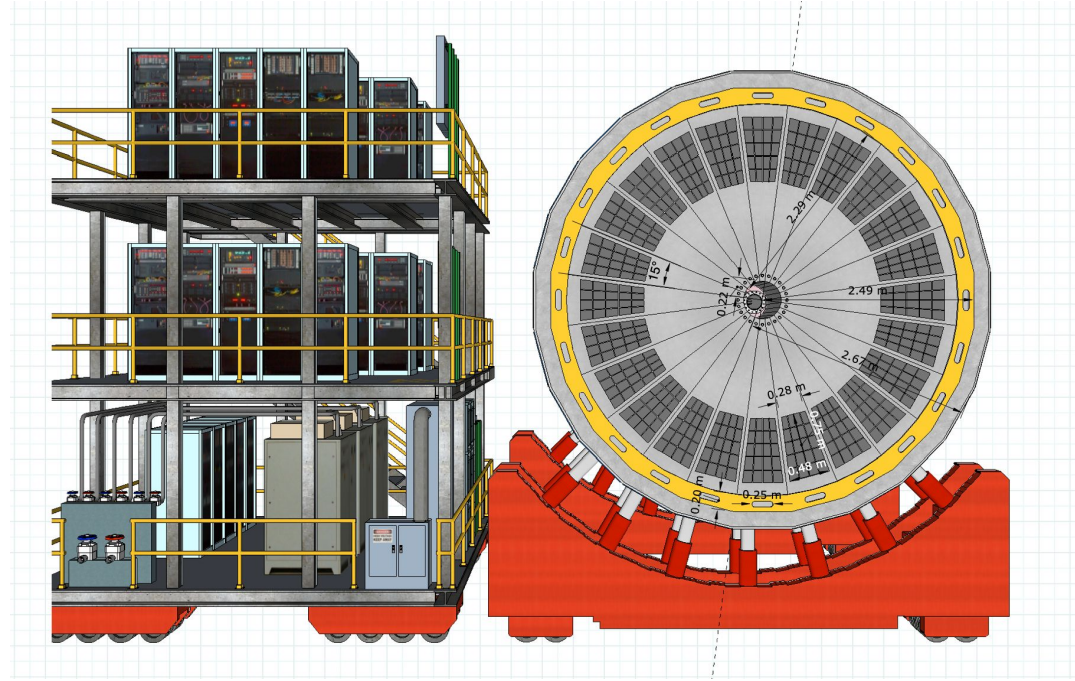
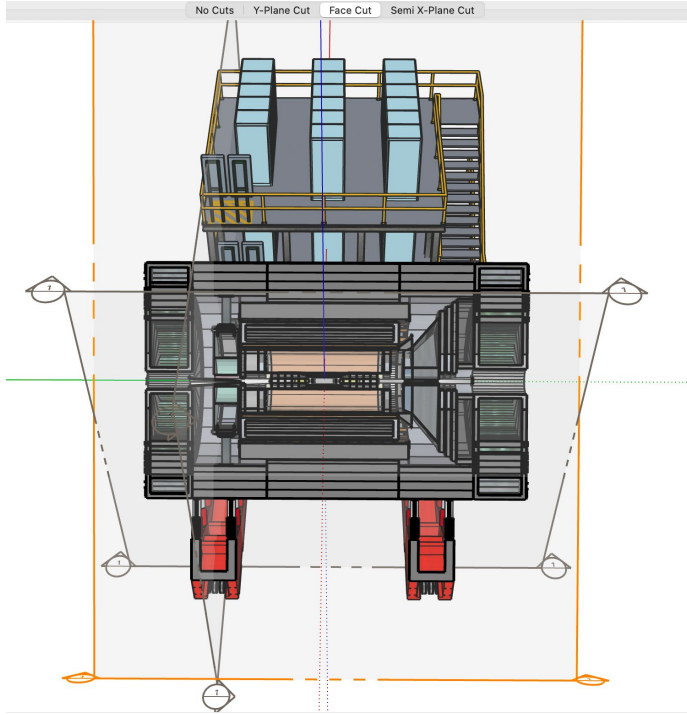
With Special Thanks To:

Charles Hyde, Pawel Nadel-Turonski, Tanja Horn, Brian Eng, Renuka Rajput-Ghoshal, Marcy Stutzman and Holly Szumila-Vance

**Summer Residential Governor's School for Engineering  
Mentorship Program at Jefferson National Lab**



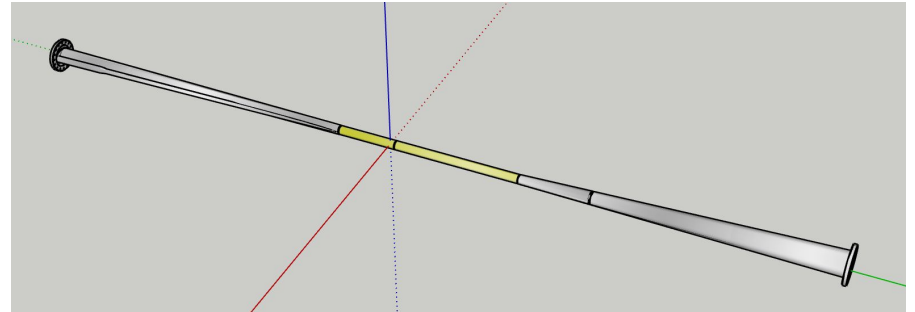
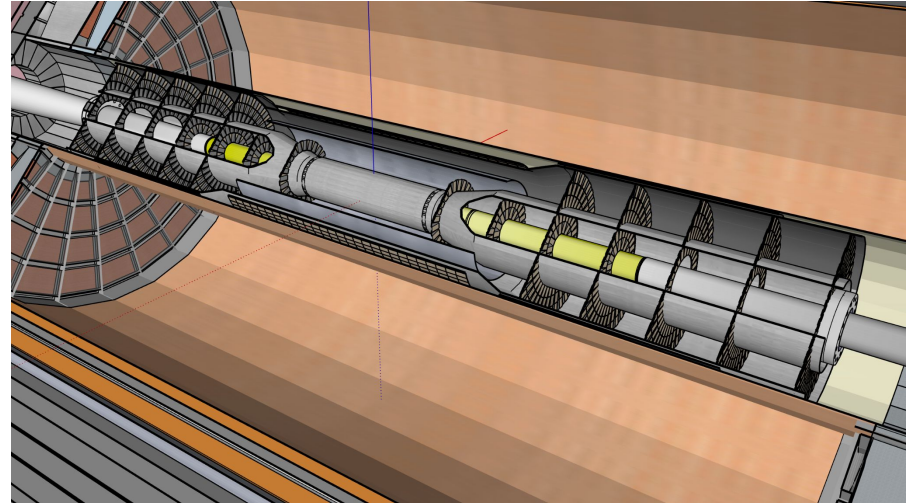
# Cross-Sections & Labeling Dimensions in SketchUp



[https://github.com/erika-24/Detector\\_CrossSectionalDrawing\\_Measurements](https://github.com/erika-24/Detector_CrossSectionalDrawing_Measurements)

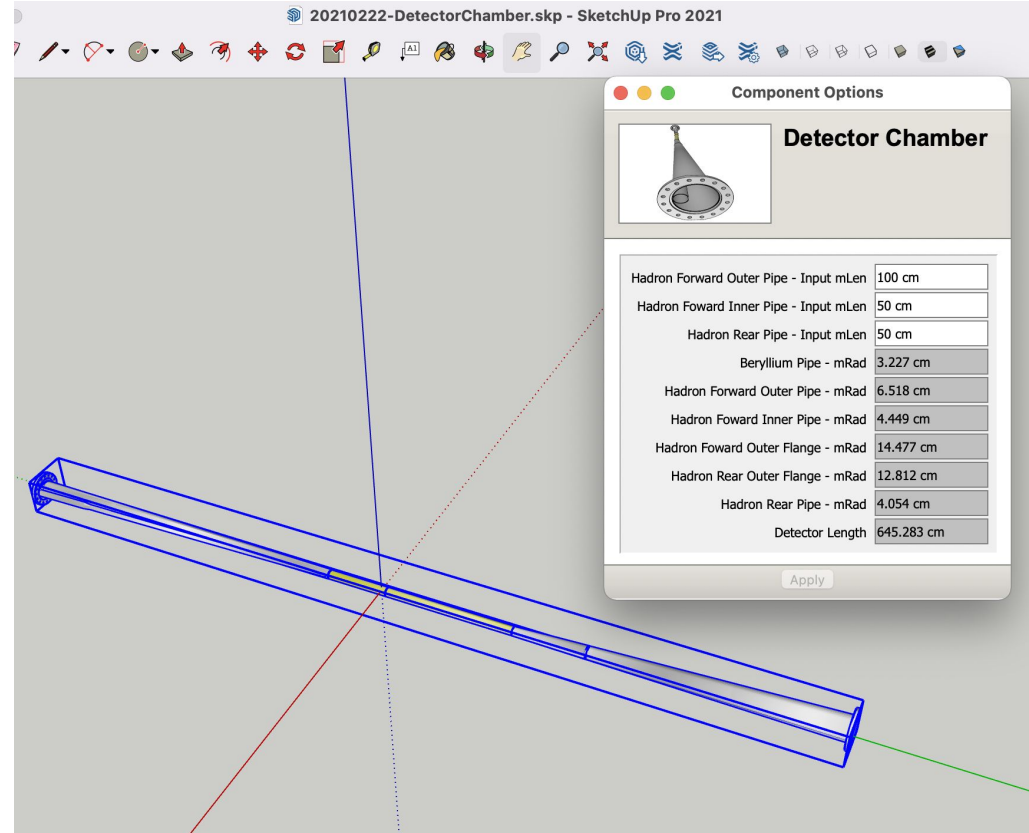
# Beam Pipe / Vacuum Chamber

- Requirements for the vertex layers (silicon disks) are driven by the beam pipe radius
- The beryllium section of the beam pipe is shown in yellow
- Beam pipe takes into account the expected electron-hadron-beam crossing angle

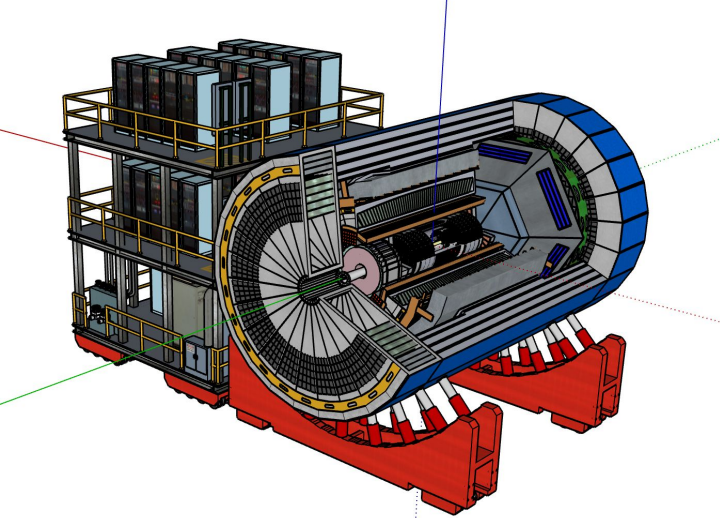


# Beam Pipe in SketchUp

- Dynamic components - parameterization
  - Beam pipe component takes mLen (Y distance) as an input and outputs mRad (outer radius)
- Purpose: determine the sizing of the outer silicon tracking layer discs



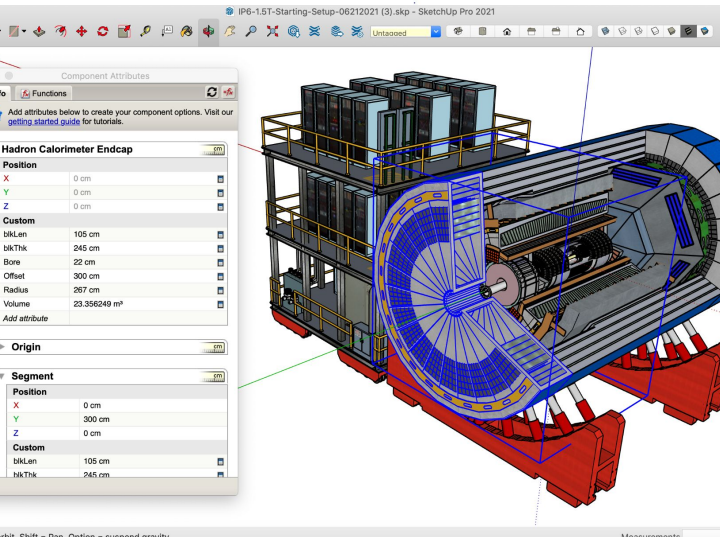




# ECCE in SketchUp

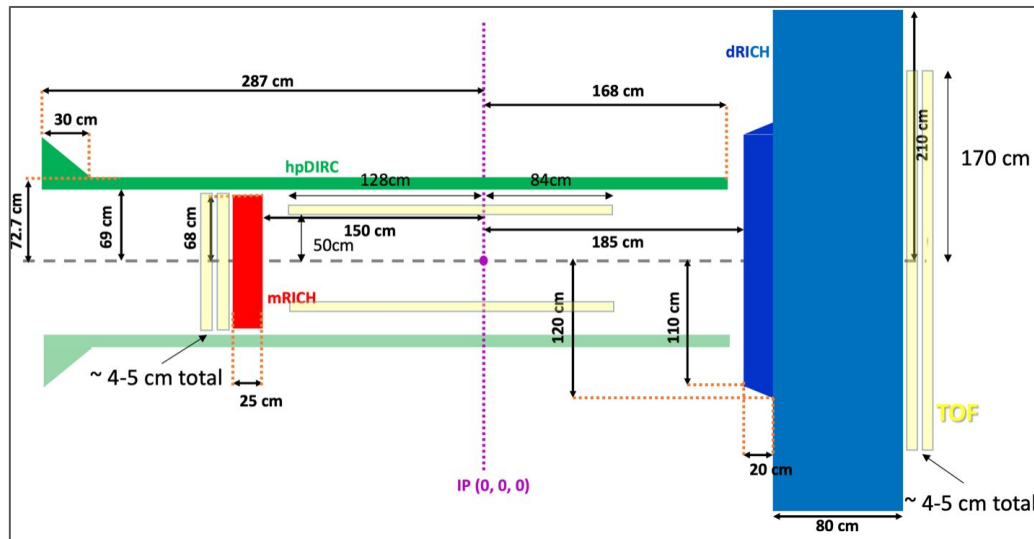
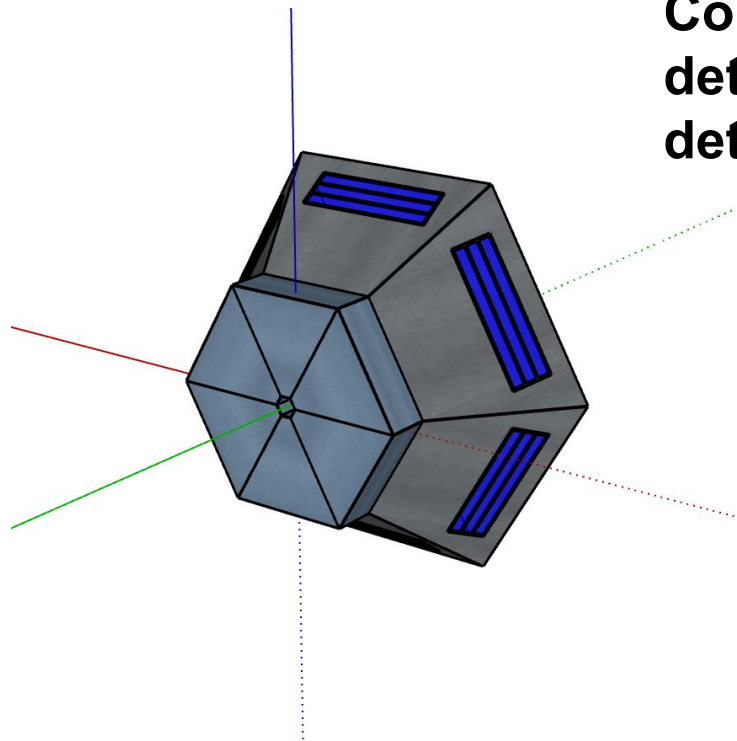
Students worked on updating and more accurate models of the ECCE detector parts: **Dual RICH, Barrel**

**Electromagnetic Calorimeter**



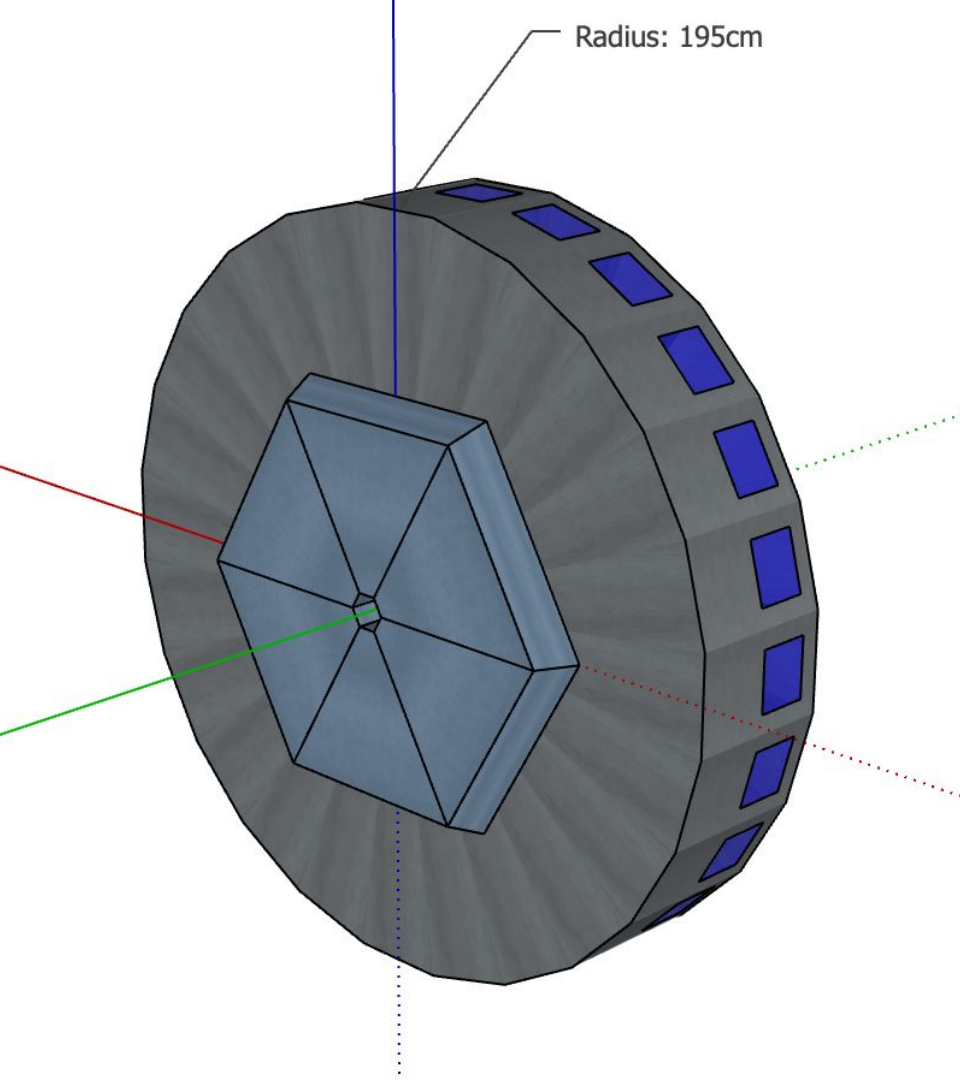
# The Dual RICH Remodel

**Consists of an aerogel component and detector component. Aerogel = radiator, detector = hadron identification<sup>[3]</sup>**



### Projected dimensions of possible dRICH



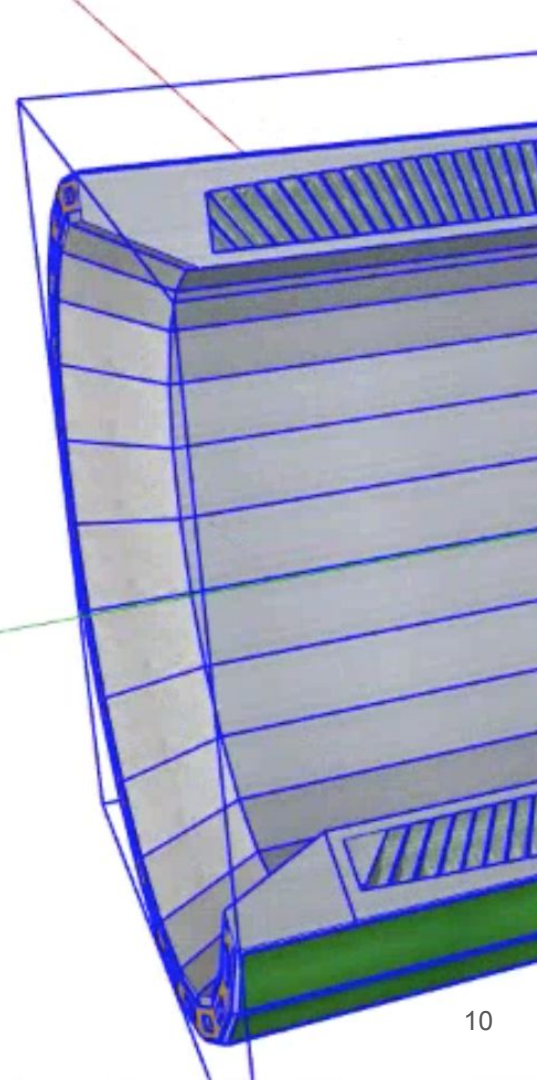
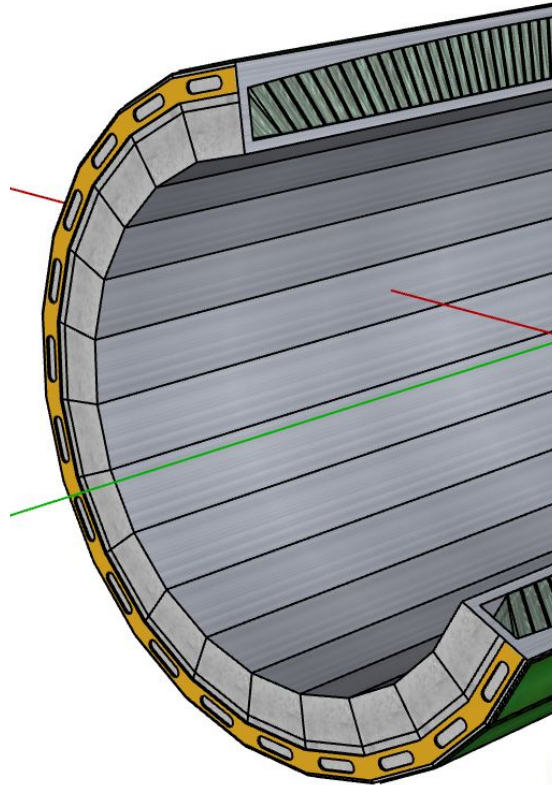


Radius: 195cm

- Cylindrical shape (24 segments)
- Smaller detector radius
- Updated detector placement
- Updated aerogel component

# The Electromagnetic Calorimeter Remodel

- Homogeneous-projective crystals
- Resize the inner barrel so that crystals are same length
- Curve barrel to ensure equal lengths



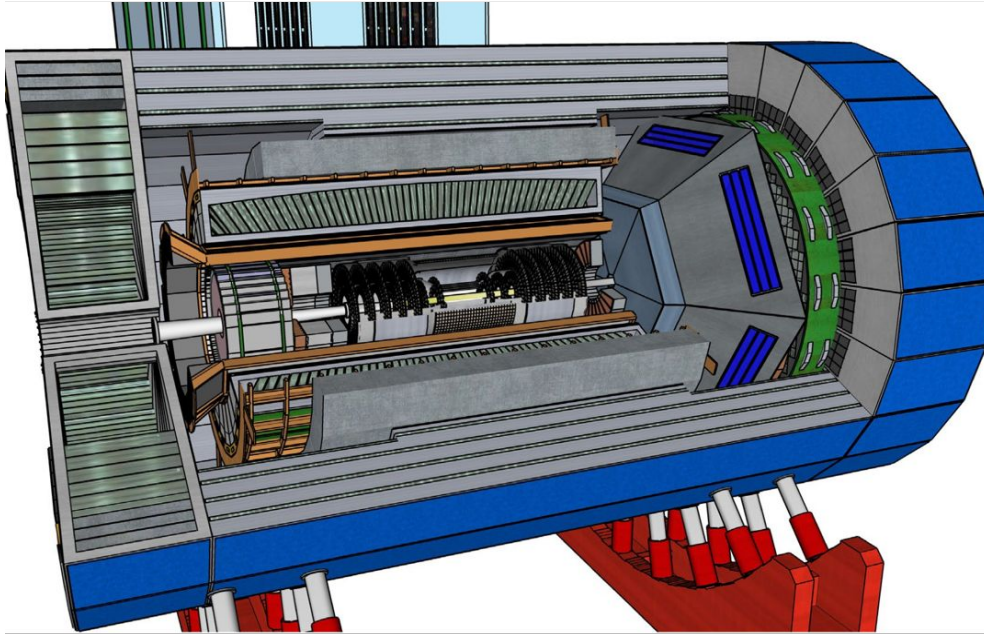
# Detector Team Progress

- Working towards next simulation campaign:
  - Wednesday 21 July 2021 @ 11:30-13:00 Detector Simulation Readiness Meeting:
    - Video: <https://userweb.jlab.org/~doug/ECCE/Videos/Detector-Simulation-Meeting-21July2021.mp4>
    - Indico Page: <https://indico.bnl.gov/event/12484/>
  - Wednesday 28 July 2021 @ 11:30-14:00 Detector Integration Meeting:
    - Indico Page: <https://indico.bnl.gov/event/12485/>
- Status: [https://docs.google.com/spreadsheets/d/e/2PACX-1vSHiMqzqiY5ZY8uvdvtVbMp\\_5Erv99AKvkBUBKO-5JLQAIYkuZ6SYQtN8KJ8e4cJyNhlfkGtRDUyYfk/pubhtml](https://docs.google.com/spreadsheets/d/e/2PACX-1vSHiMqzqiY5ZY8uvdvtVbMp_5Erv99AKvkBUBKO-5JLQAIYkuZ6SYQtN8KJ8e4cJyNhlfkGtRDUyYfk/pubhtml)
- DAQ and Electronics Team collecting information ( planning for Streaming Readout )
- Also continuing to collect cost, schedule, and risk information from the Detector Working Group co-conveners.

# ECCE Cost & Schedule

WBS Code	WBS Name	WBS Managers	Planning Status
<b>ECE06.10</b>	<b>EIC Detector</b>	<b>Ken Read/Doug Higinbotham</b>	
ECE06.10.03	Tracking	Xuan Li/Nilanga Liyanage	Kickoff Meeting Held, Planning Underway, Weekly Status Meetings Scheduled
ECE06.10.04	PID	Greg Kalicy/Xiaochun He	Kickoff Meeting Held, Planning Underway, Weekly Status Meetings Scheduled
ECE06.10.05	Electromagnetic Calorimetry	Friederike Bock/Yongsun Kim/Tanja Horn	Kickoff Meeting Held, Planning Underway, Bi-Weekly Status Meetings Scheduled
ECE06.10.06	Hadronic Calorimetry	Friederike Bock/Yongsun Kim	Kickoff Meeting Held, Planning Underway, Bi-Weekly Status Meetings Scheduled
ECE06.10.07	Magnets	Paul Brindza/Renuka Rajput-Ghoshal	Kickoff Meeting Held, Planning Underway, <b>Need to schedule routine meetings.</b>
ECE06.10.08	Electronics	Chris Cuevas/Martin Purschke	Kickoff Meeting Held, Planning Underway, Weekly Status Meetings Scheduled
ECE06.10.09	DAQ / Computing	Chris Cuevas/Martin Purschke	Kickoff Meeting Held, Planning Underway, Weekly Status Meetings Scheduled

- Many recent separate cost & schedule meetings held with DWG co-conveners. Parallel weekly and bi-weekly meetings underway.
- Cost, schedule, and risk questionnaires/ templates completed and returned to our team for study. Data entered into Primavera P6 and Risk Log.
- Today was the self-imposed deadline for this first round.
- Next iteration due August 13.



### ELECTRON ENDCAP

**Tracking:** Large area  $\mu$ RWELL

**Electron Detection:**

- Inner: PbWO<sub>4</sub> crystals (reuse some)
- Outer: SciGlass (backup PbGl)

**h-PID:** mRICH & AC-LGAD

**HCAL:** Fe/Sc (STAR re-use)

### CENTRAL BARREL

**Tracking:** MAPS Si for vertexing and endcaps  
(design to be optimized)

**Electron PID:** SciGlass (alt: PbGl or W(Pb)/Sc shashlik)  
(plus instrumented frame)

**h-PID:** hpDIRC & AC-LGAD

**HCAL:** Fe/Sc (sPHENIX re-use)

### HADRON ENDCAP

**Tracking:** Large area  $\mu$ RWELL

**PID:** dual-RICH & AC-LGAD

**Calorimetry:** standard Pb/ScFi shashlik (PHENIX re-use)  
longitudinally separated HCAL  
(other options under study)

Very important to consider the ECCE detector holistically as we do final optimizations.



# ECCE Talks At EICUG Meeting



ECCE Proposal Overview (Or Hen) Tuesday @ 14:00 - 14:30 EDT

ECCE Calorimetry (Friederike Bock) Wednesday @ 10:30 - 10:45 EDT

ECCE Tracking (Xuan Li) Wednesday @ 11:30 - 11:45 EDT

ECCE Particle Identification (Xiaochun He) Wednesday @ 12:30 - 12:45 EDT

ECCE Far Forward/Far Backward (Igor Korover) Wednesday @ 14:15 - 14:30 EDT

ECCE Computing & Electronic (Cameron Dean) Wednesday @ 15:15 - 15:30 EDT

ECCE Software (Joe Osborn) Thursday @ 11:50 - 12:05 EDT

And Cristiano Fanelli will be presenting a general AI talk that highlights a number of detector ECCE examples Thursday @ 11:10 - 11:30 EDT



# Time To Start Writing-Up Detector Information

Document Detector Team Decisions and Findings with Short Reports

Keep in mind the high level goal is addressing the call for collaboration detector proposals ( <https://www.bnl.gov/eic/CFC.php> ):

- detector based on the reference detector described by the EIC User Group in the Yellow Report and included in the EIC Conceptual Design Report
- must satisfy the requirements of the EIC mission need statement based on the EIC White Paper and the National Academies of Science report.

Proposal is Due on December 1st