

**Geometry of the Geant4 simulation application  
for the 3rd Test Beam Experiment**

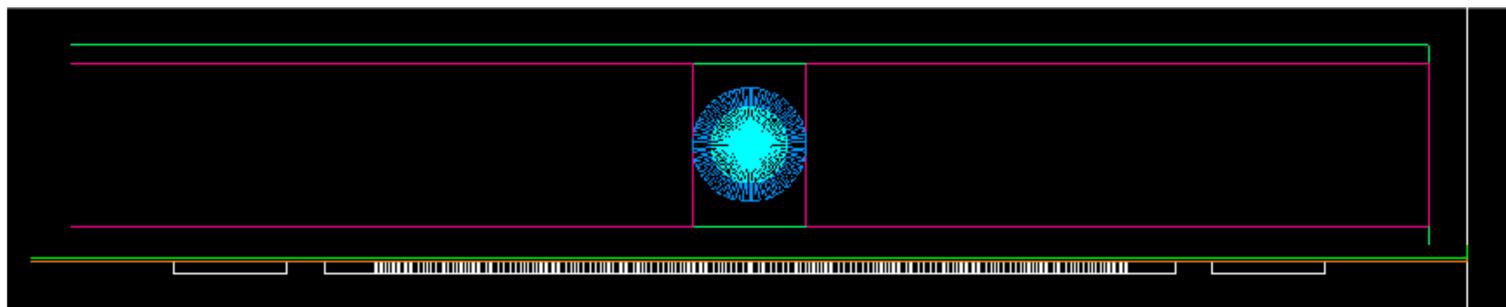
G. Nukazuka (RBRC) & C. W. Shih (NCU)

# Quick introduction to the geometry

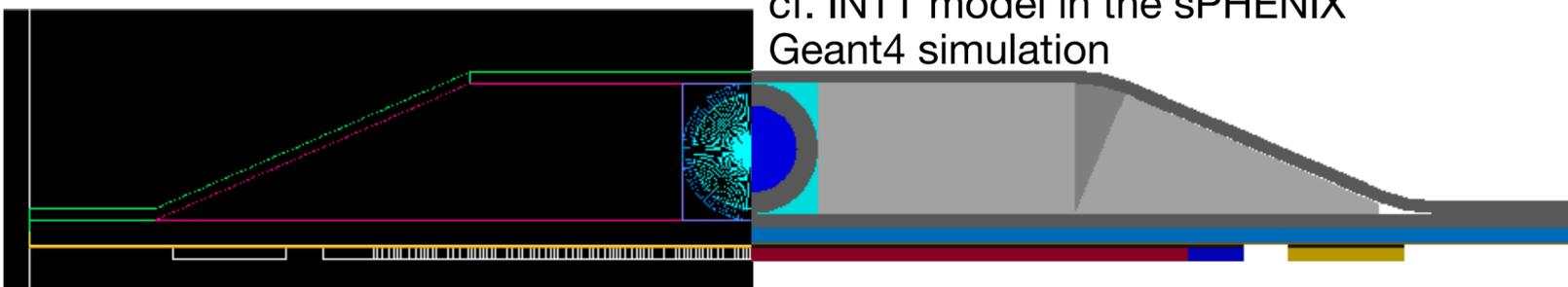
## Ladder

Ladder geometry was modified to be the same as that in the INTT model in the sPHENIX Geant4 simulation.

INTT MC for FNAL 2nd



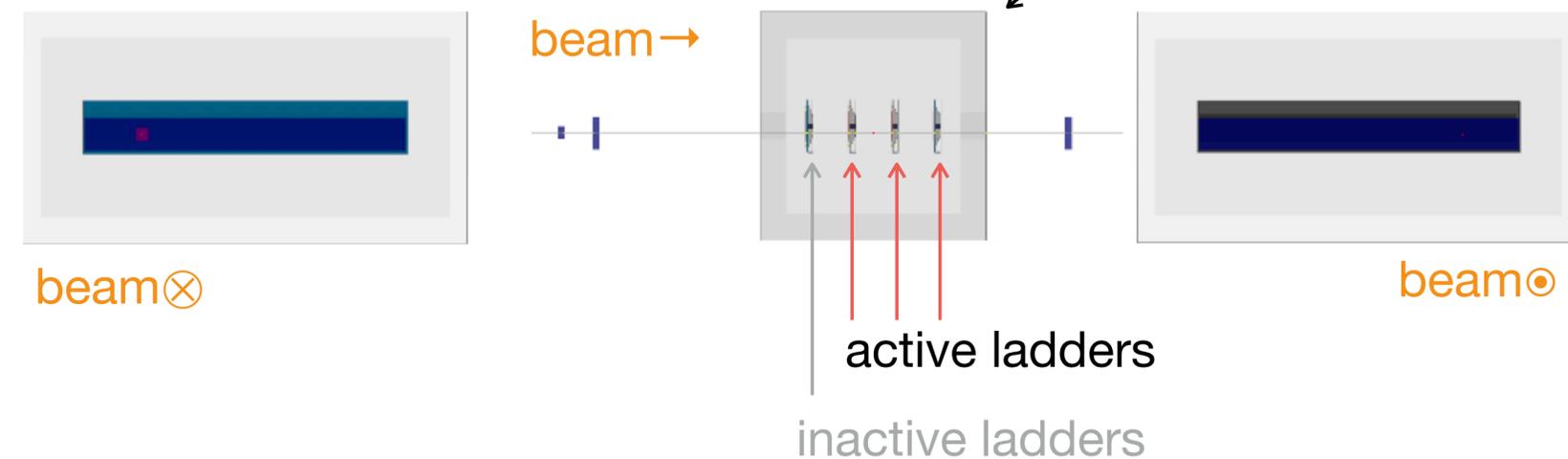
Now



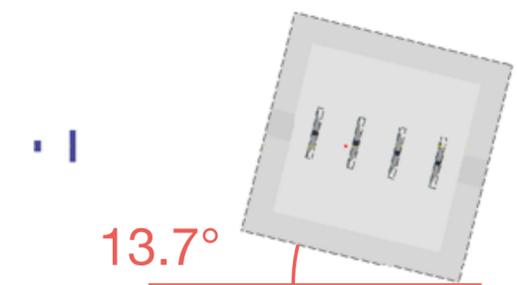
cf. INTT model in the sPHENIX Geant4 simulation

## Setup

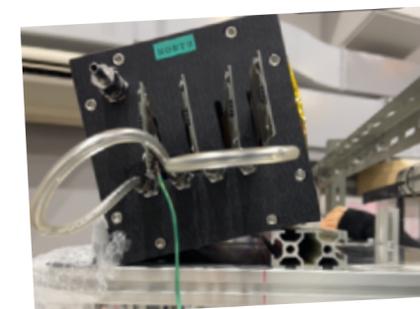
- The bark box
- The ladders inside the box
- The trigger and mini sci. on the beamline.



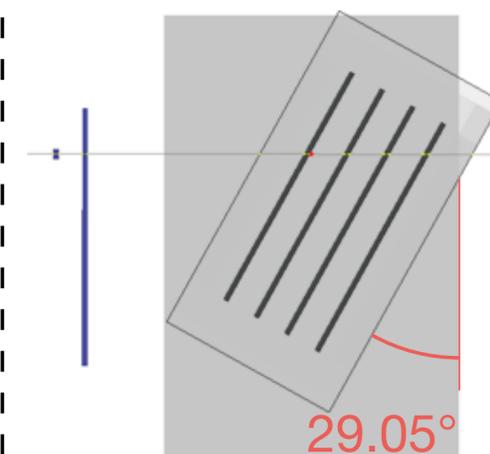
### Vertically rotated setup



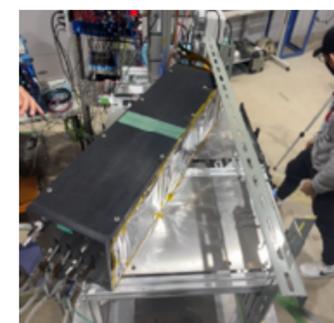
13.7°



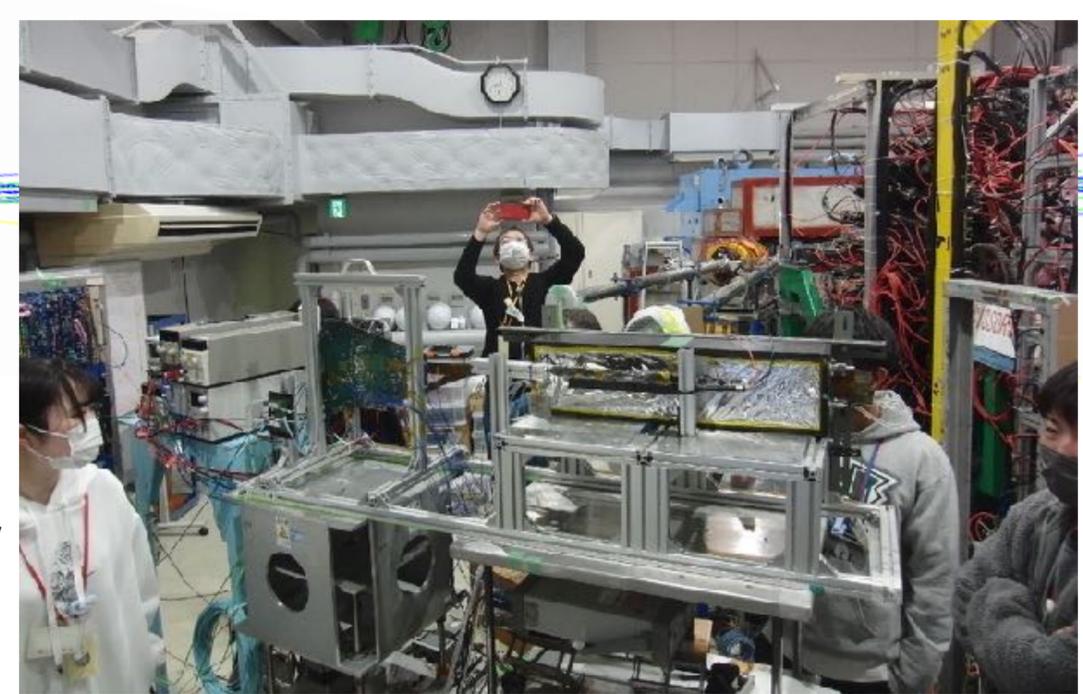
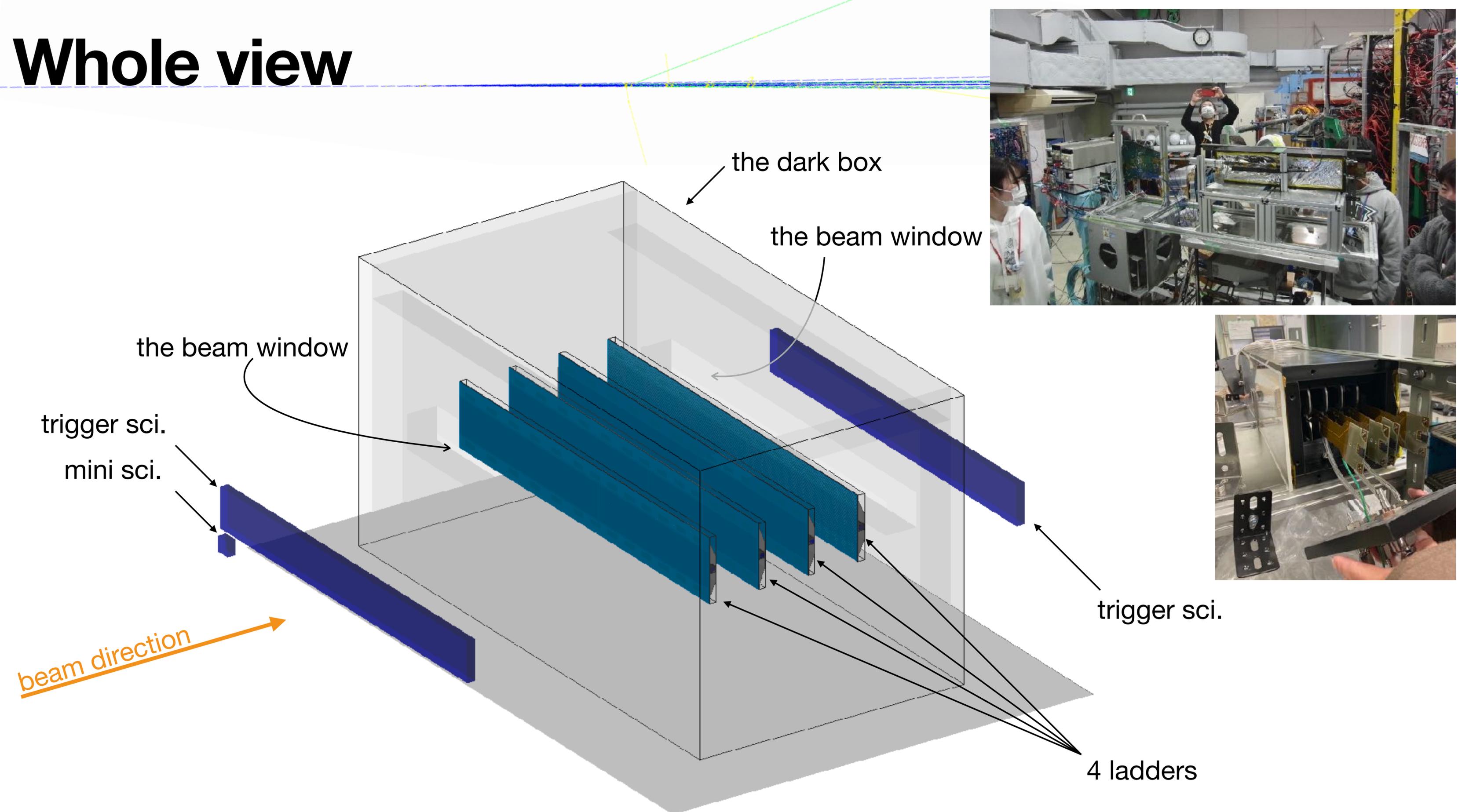
### Horizontally rotated setup



29.05°



# Whole view



trigger sci.

4 ladders

# The ladder (side view)

FPHX chips (silicon)

silver epoxy glue

silicon sensor  
((in)active)

HDI (copper)

HDI (Kapton)

carbon stave (flat plate)

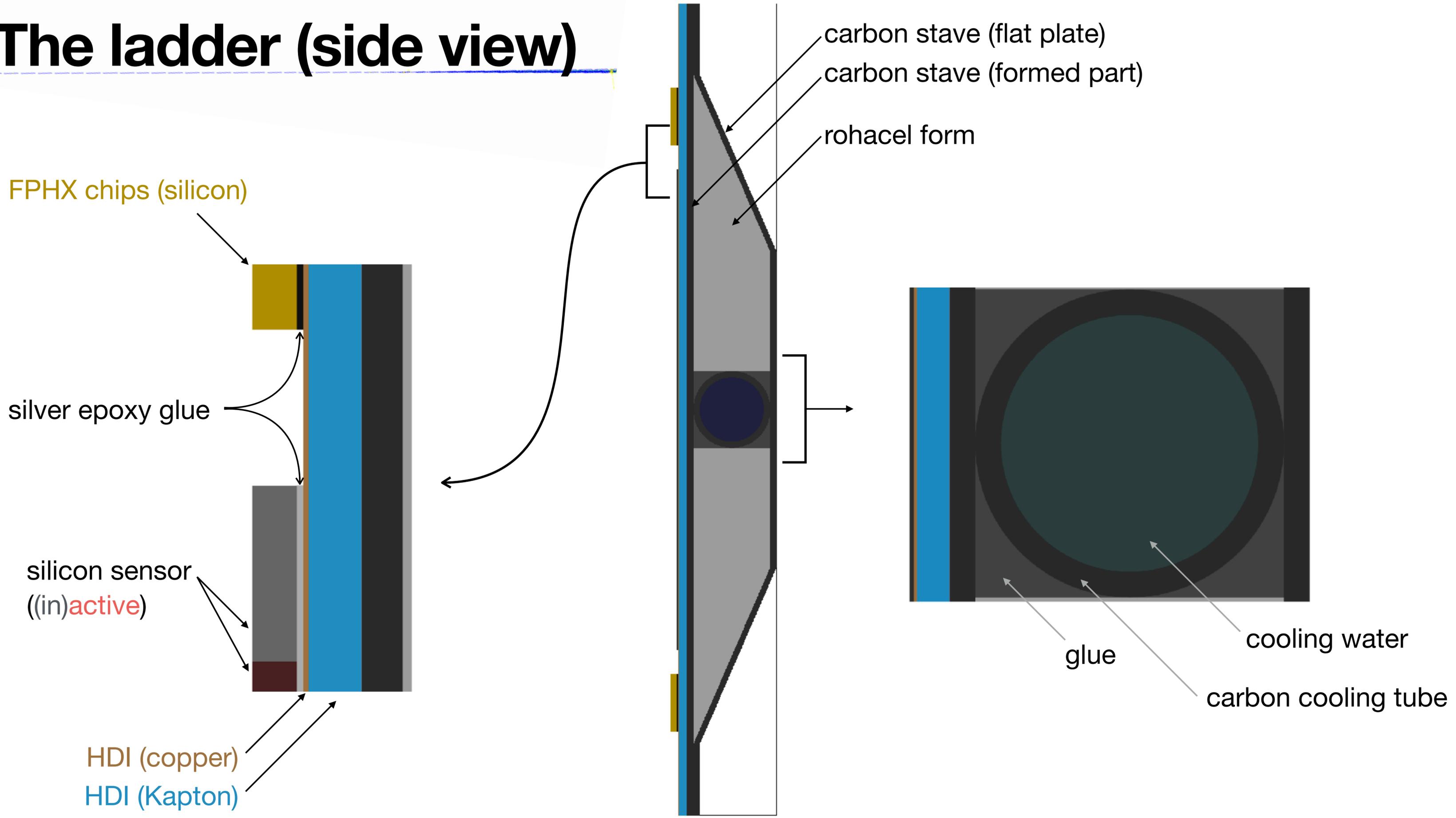
carbon stave (formed part)

rohacel form

glue

cooling water

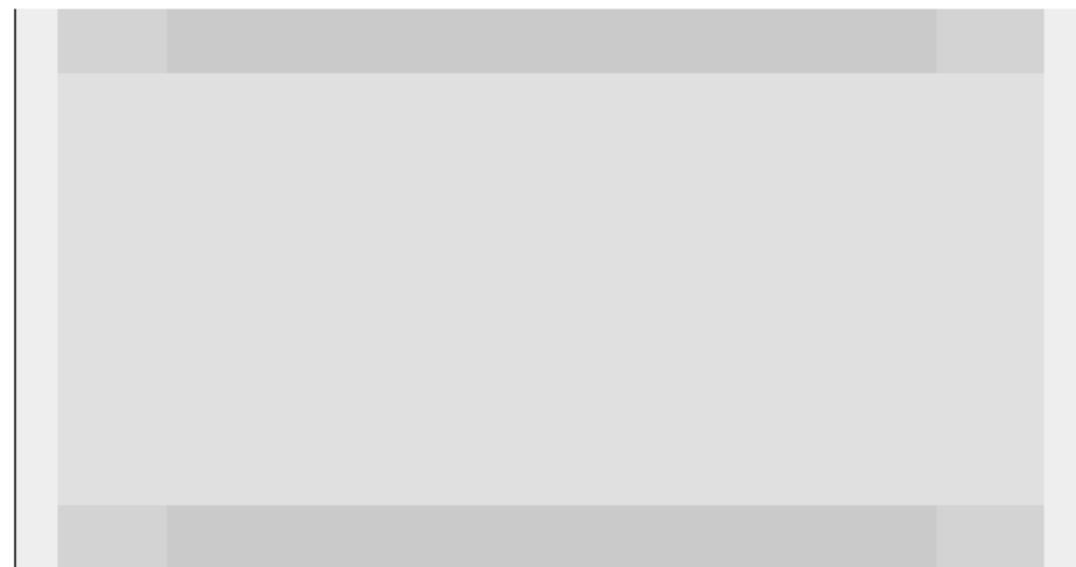
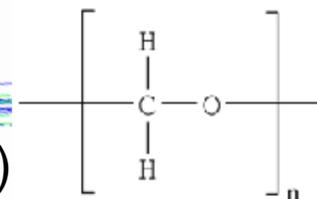
carbon cooling tube



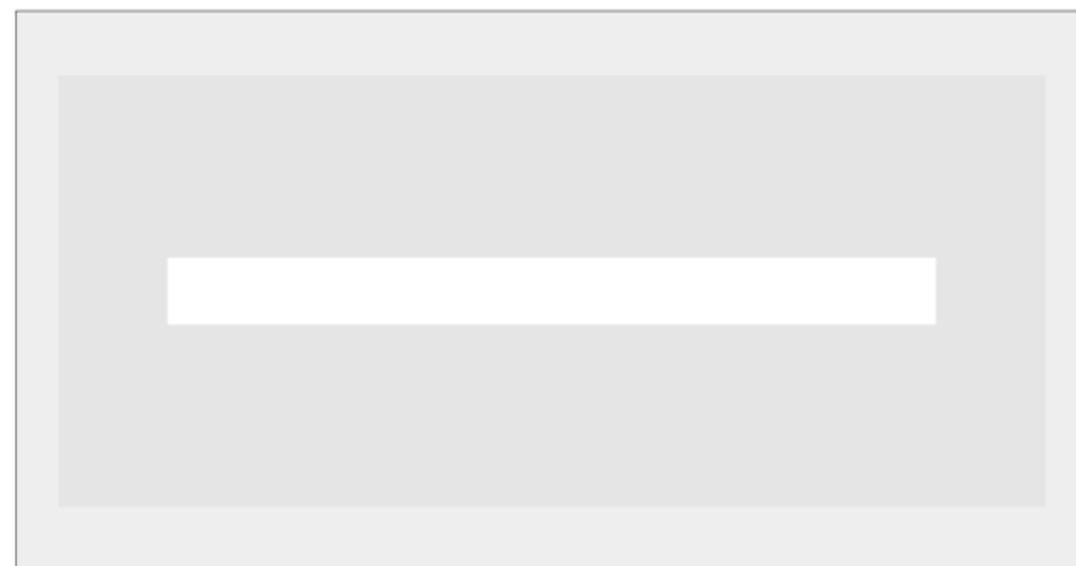


# The dark box

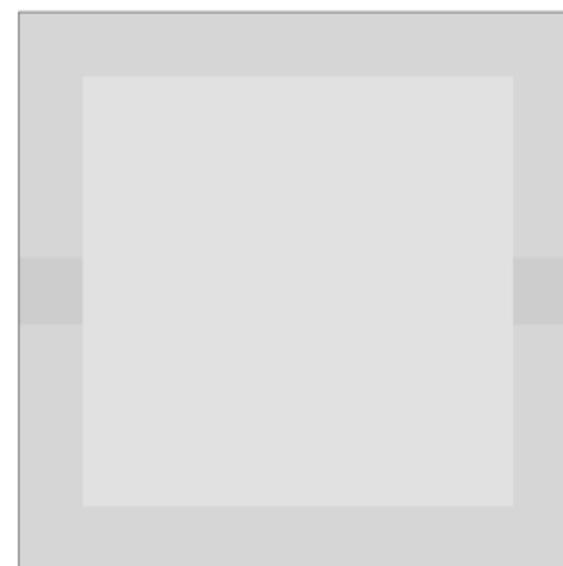
Material : Dupont [Delrin](#)® (polyacetal, 1.42 g/cm<sup>3</sup>)



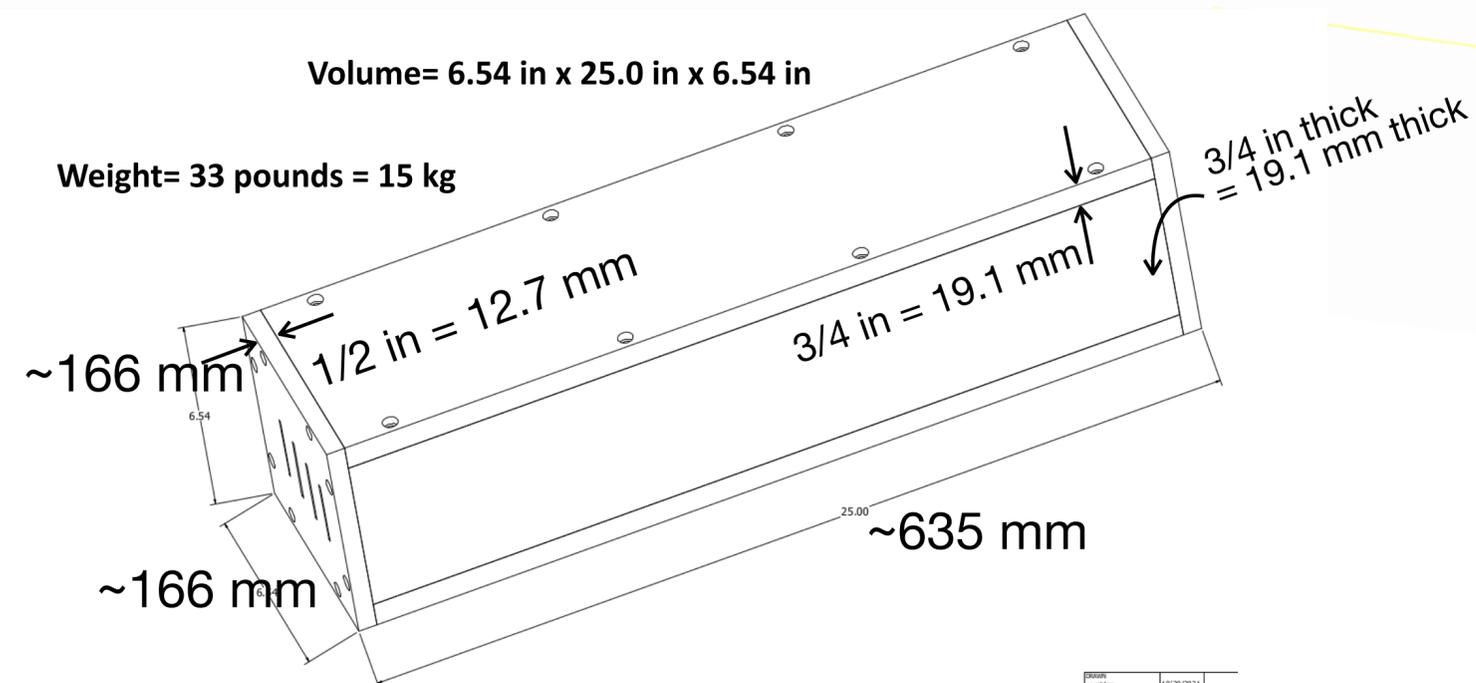
top



front

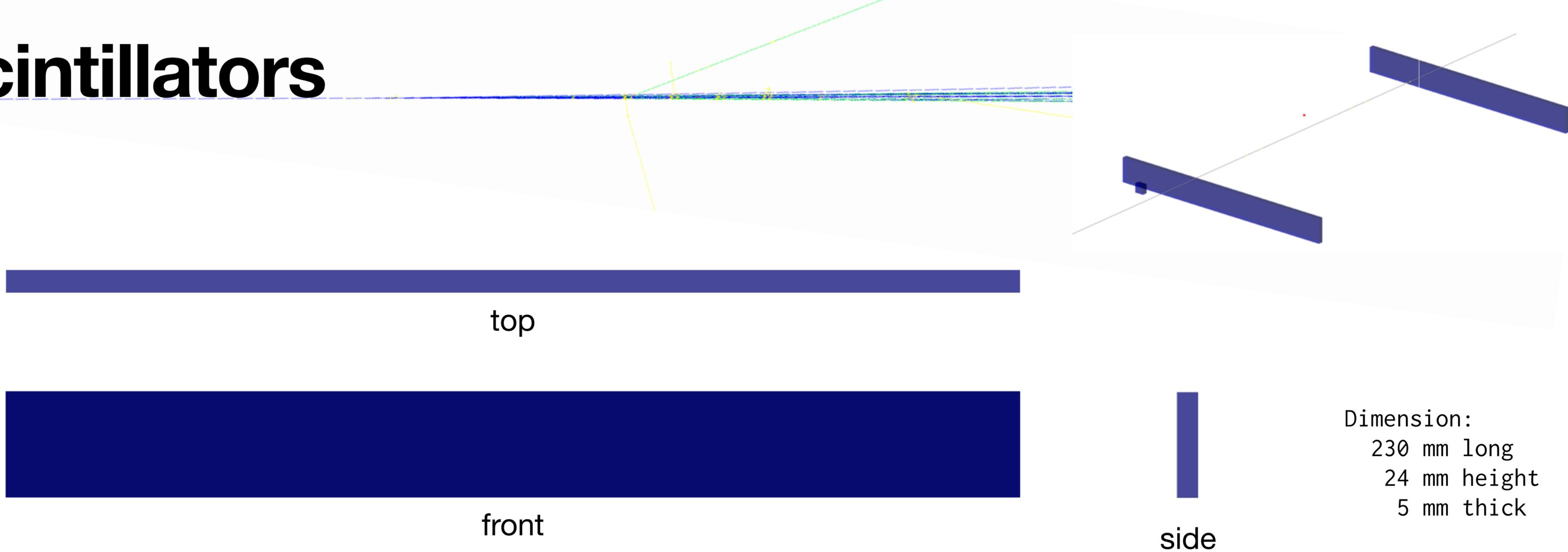


side

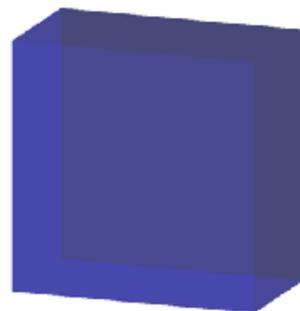


The dark box with the beam windows was already implemented to be the same as the design (except for transverse length). The material Delrin was also made. Aluminized Mylar for the window was not implemented.

# Scintillators



Rectangular boxes made of Polyvinyl-toluene and anthracene (36:64) were placed upstream/downstream of the dark box.



A small box as a fingertip scintillator was installed upstream the trigger scintillator (upstream).

Dimension:  
9 mm long  
9 mm height  
5 mm thick

# Summary

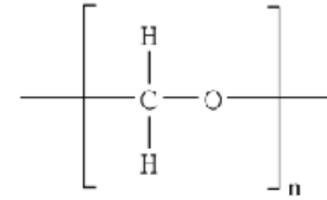
The geometry was implemented based on the INTT model for sPHENIX Geant4 simulation.

Most of the materials on the beamline were already implemented.

**backup**

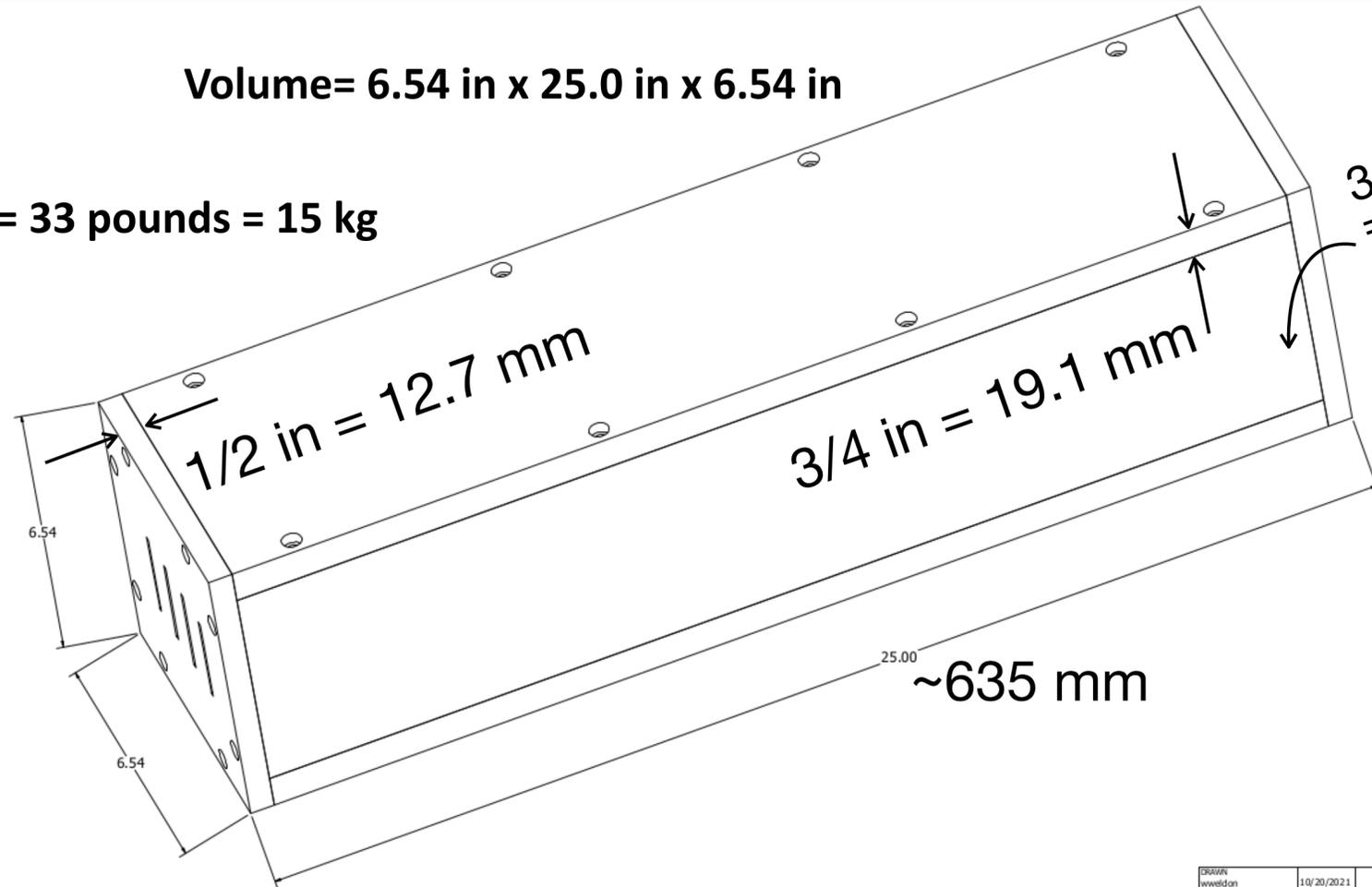
# Dark box (BNL)

Material : Dupont [Delrin](#)® (polyacetal, 1.42 g/cm<sup>3</sup>)



Volume= 6.54 in x 25.0 in x 6.54 in

Weight= 33 pounds = 15 kg

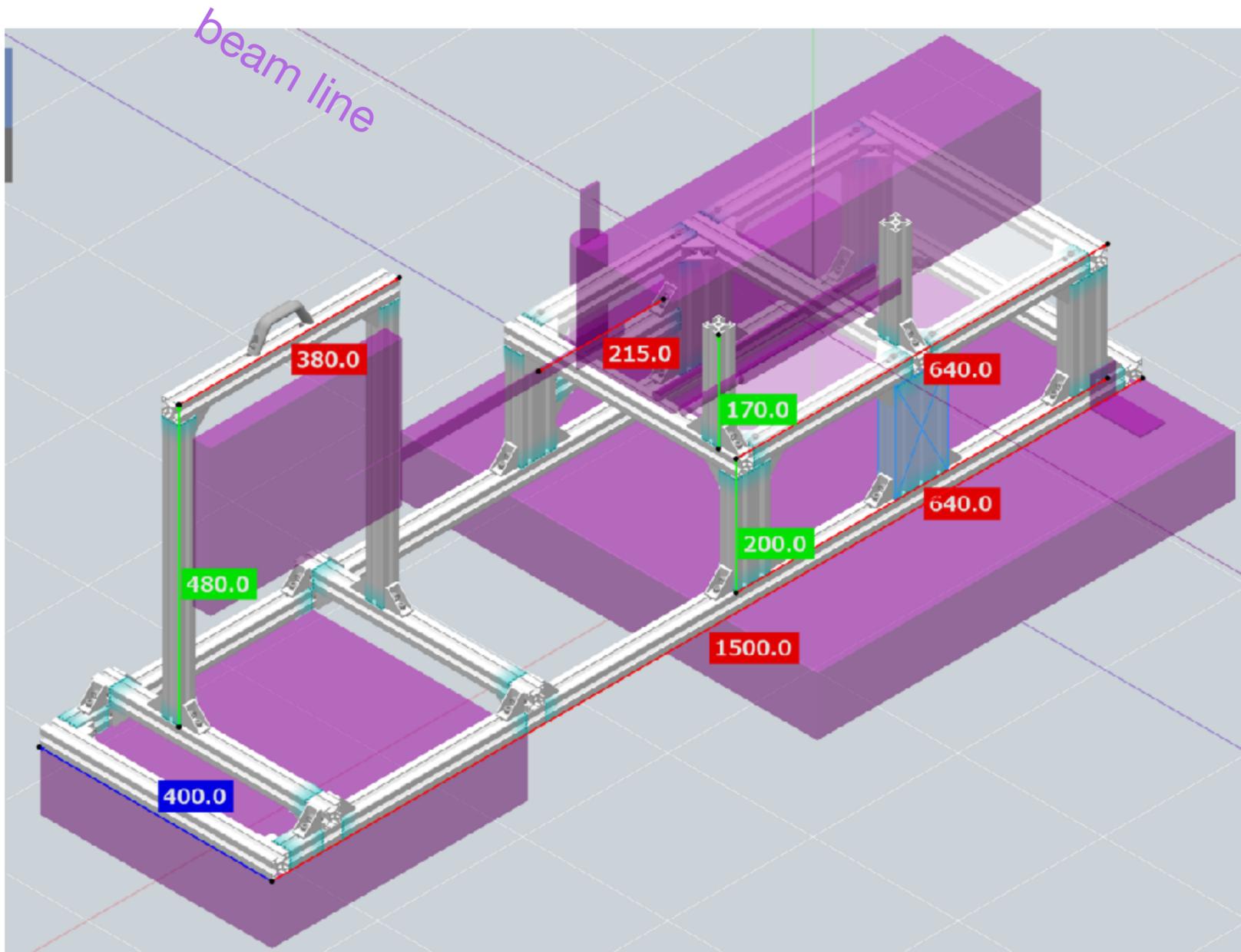


DRAWN  
lwstlclon 10/20/2021



The dark box was already produced.  
It should depart from BNL this week.

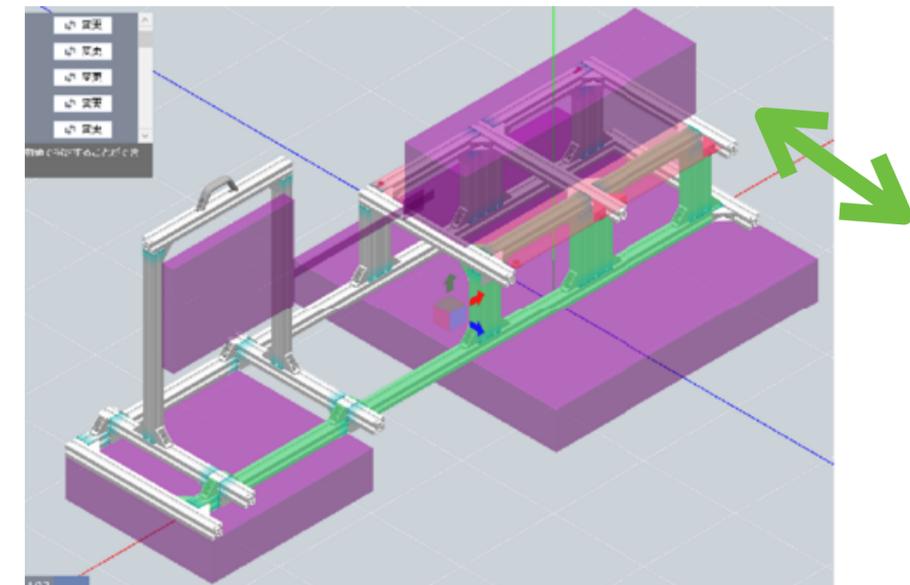
# The frame structure for the dark box and the ROC (Genki)



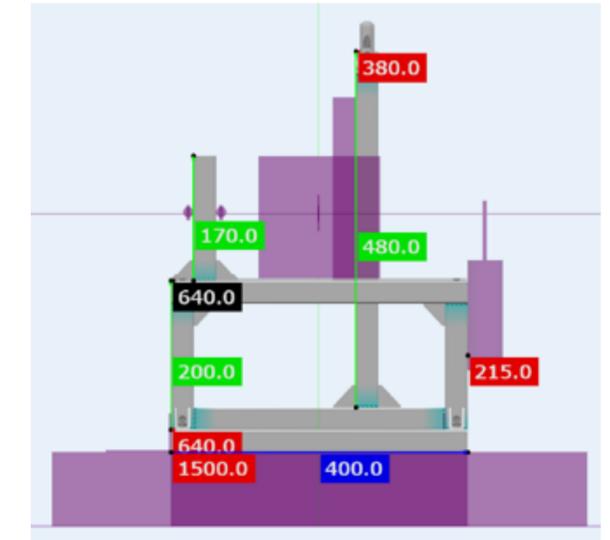
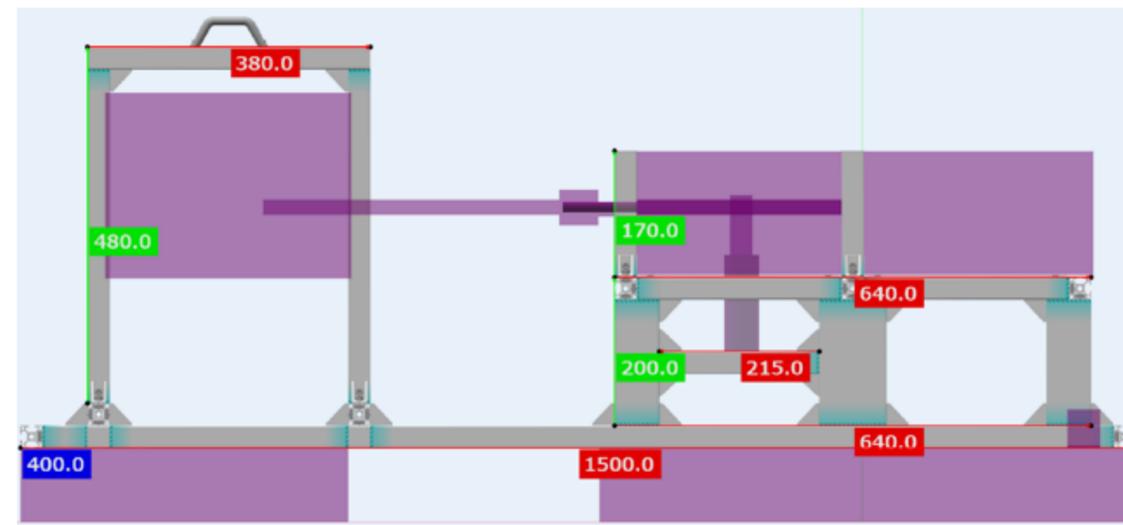
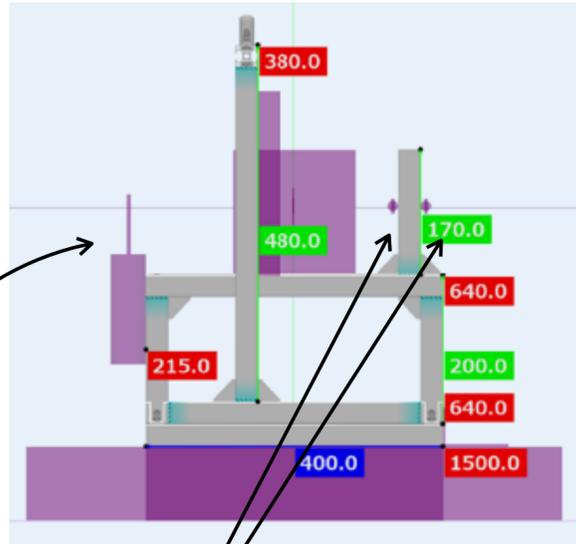
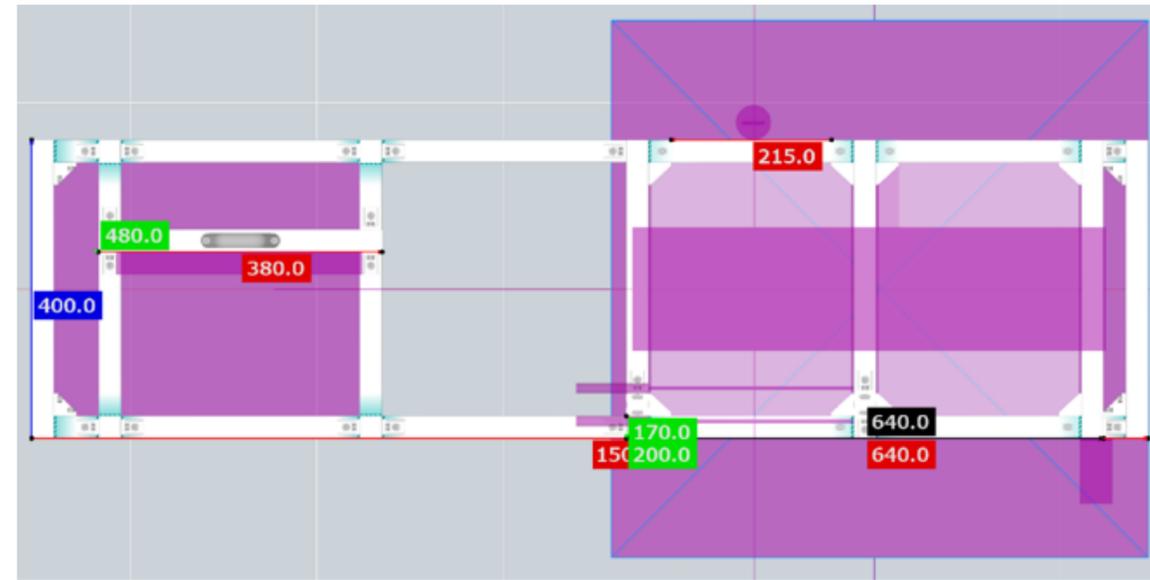
The basic design was established as already shown last week.

Some minor updates were made:

- thicker frames to stand the weight of the dark box
- additional frames for PMT fixations
- width flexibility to fit the stage below this structure



# The frame structure for the dark box and the ROC (Genki)



trigger scintillators

