DUNE Far Detector

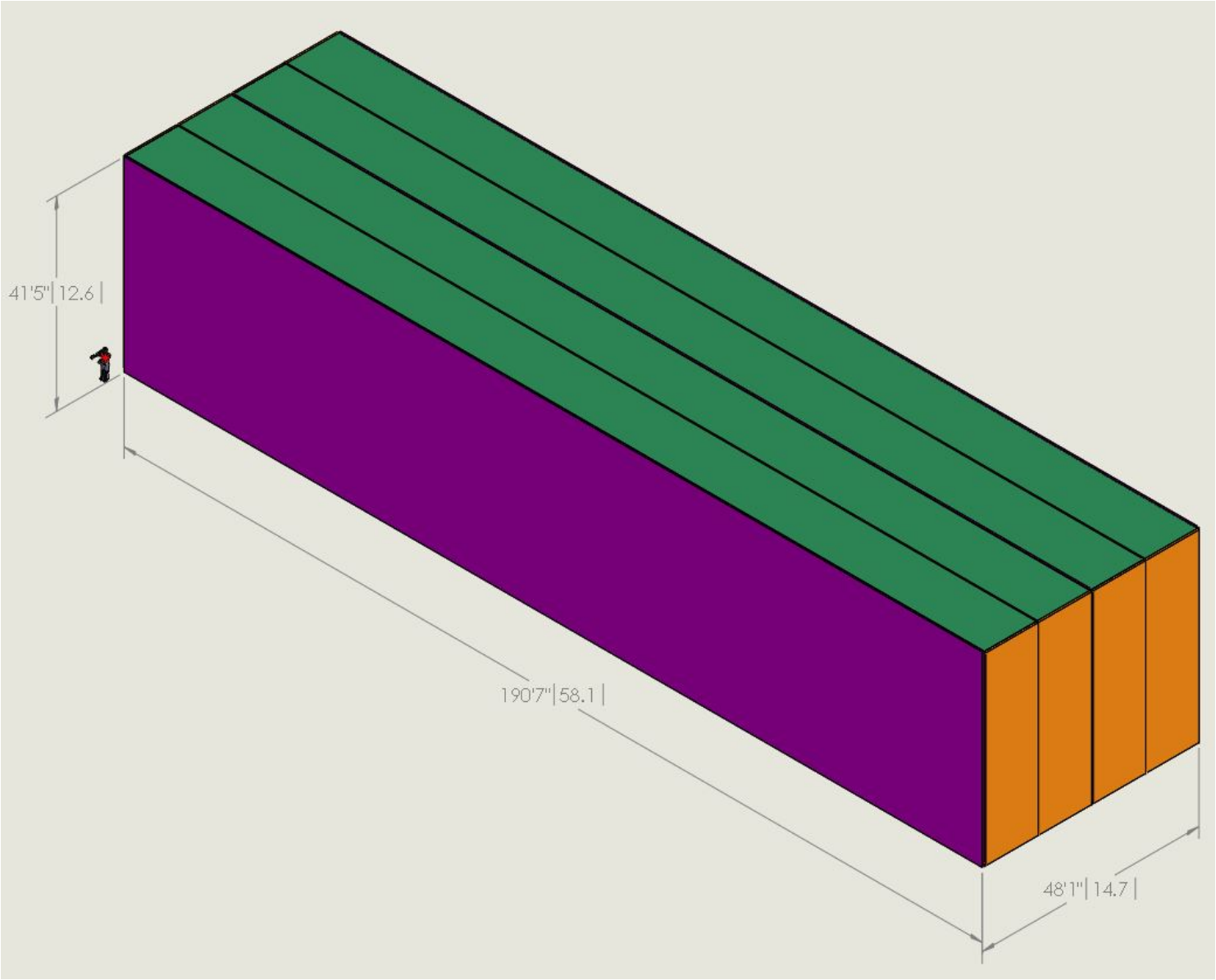
CAD Model Envelope Blocks

Overall size:

41.5 feet tall
[12.6m]

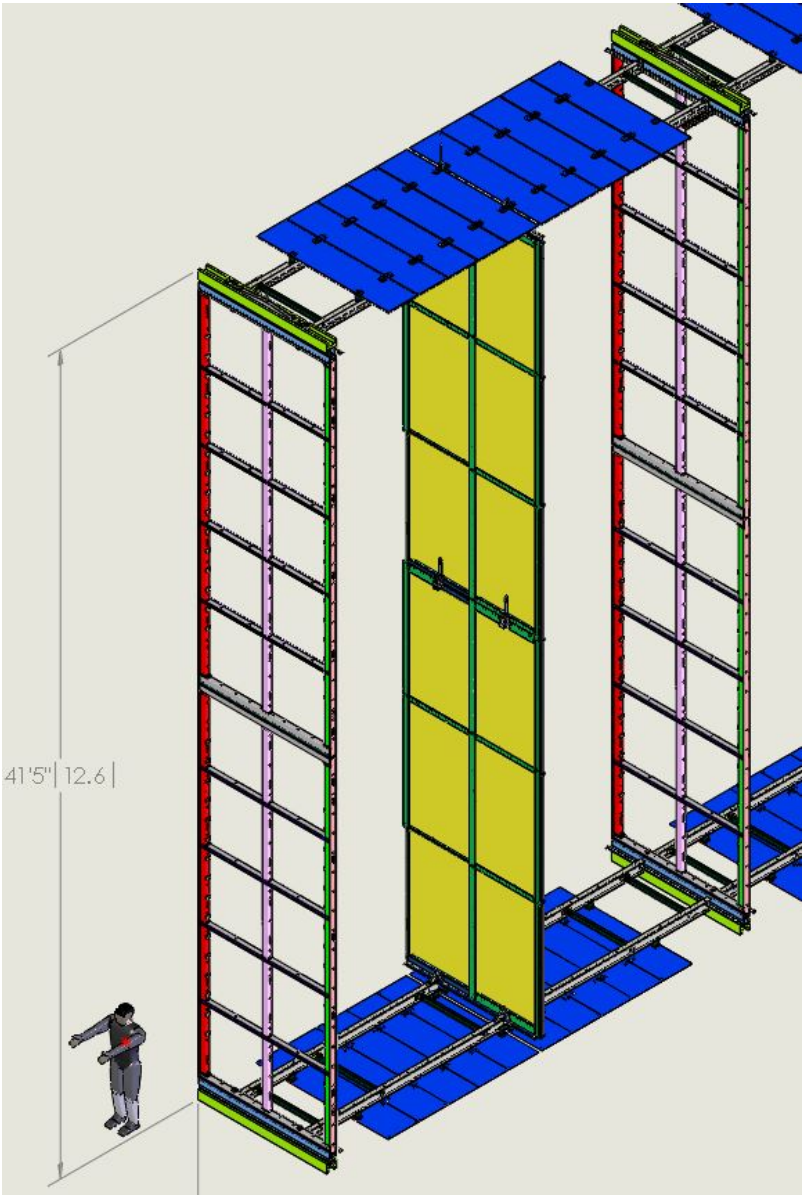
190’7” wide
[58.1m]

48’1” deep
[14.7m]



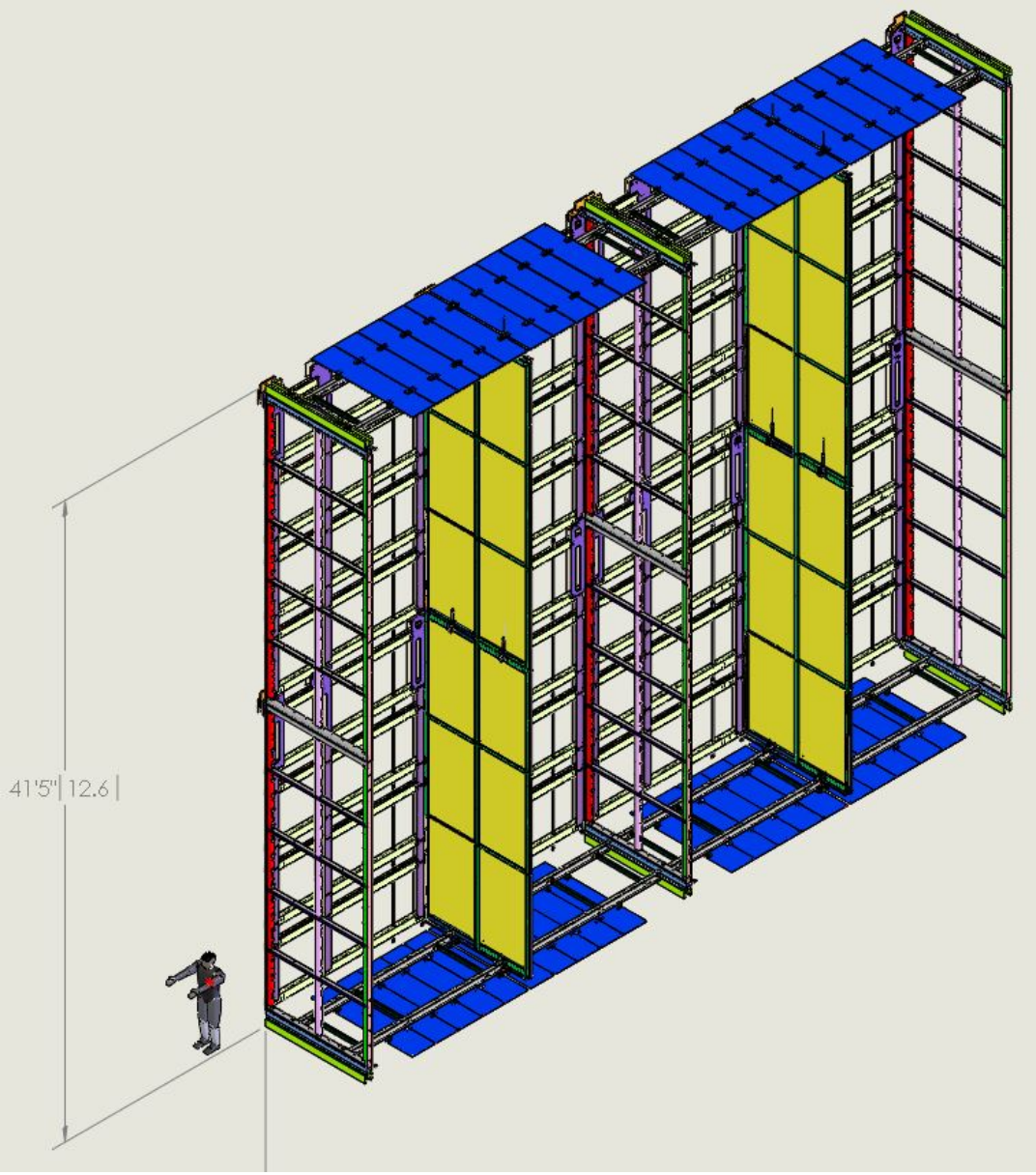
APA & CPA group

EndWall, APA, & CPA
grouped together
using current designs



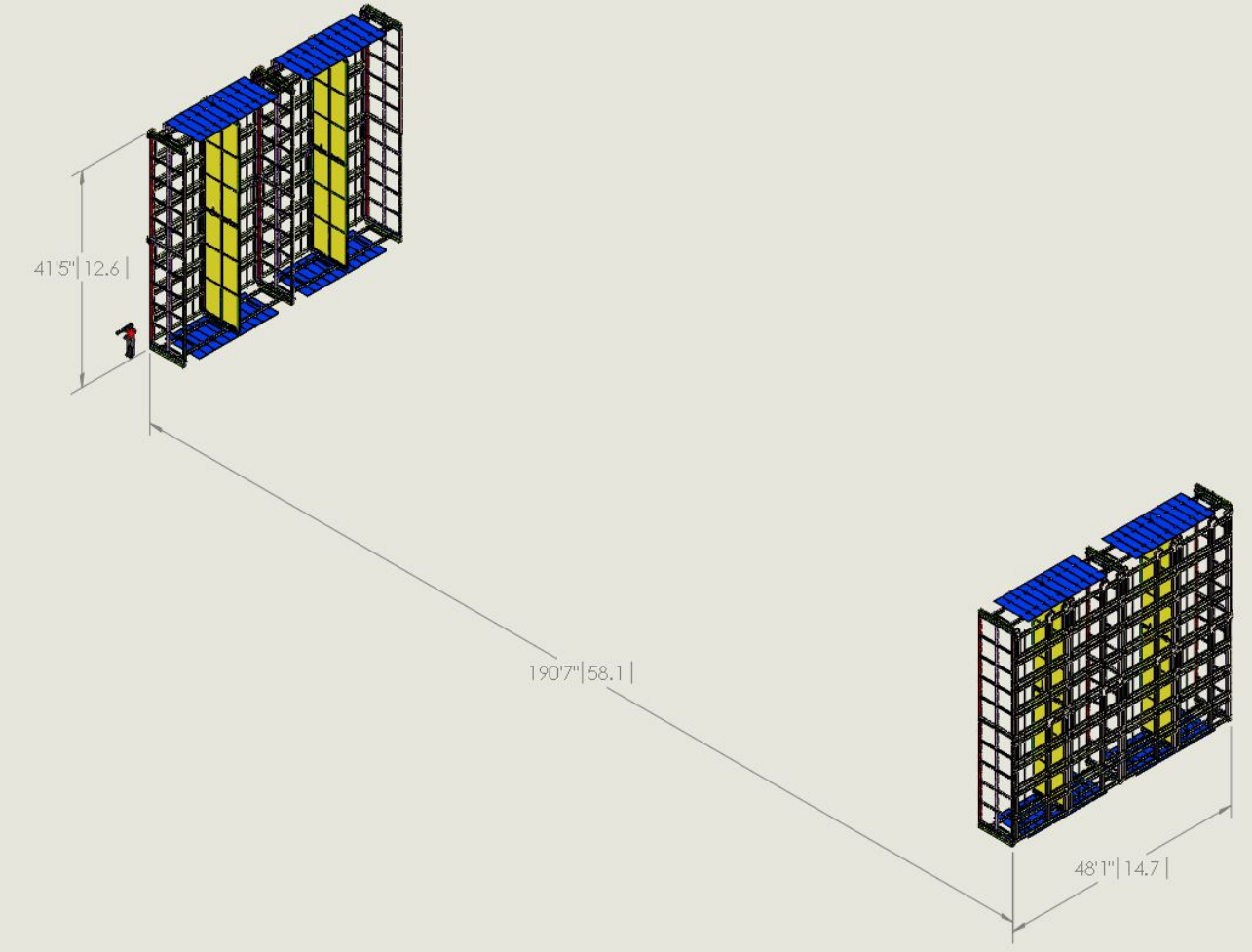
End section

EndWall, APA, & CPA current design parts grouped together



Ends spaced apart

End Sections spaced apart



CAD Model agrees with Parameters Spreadsheet

The model dimensions helped confirm the spreadsheet created by Russell Rucinski

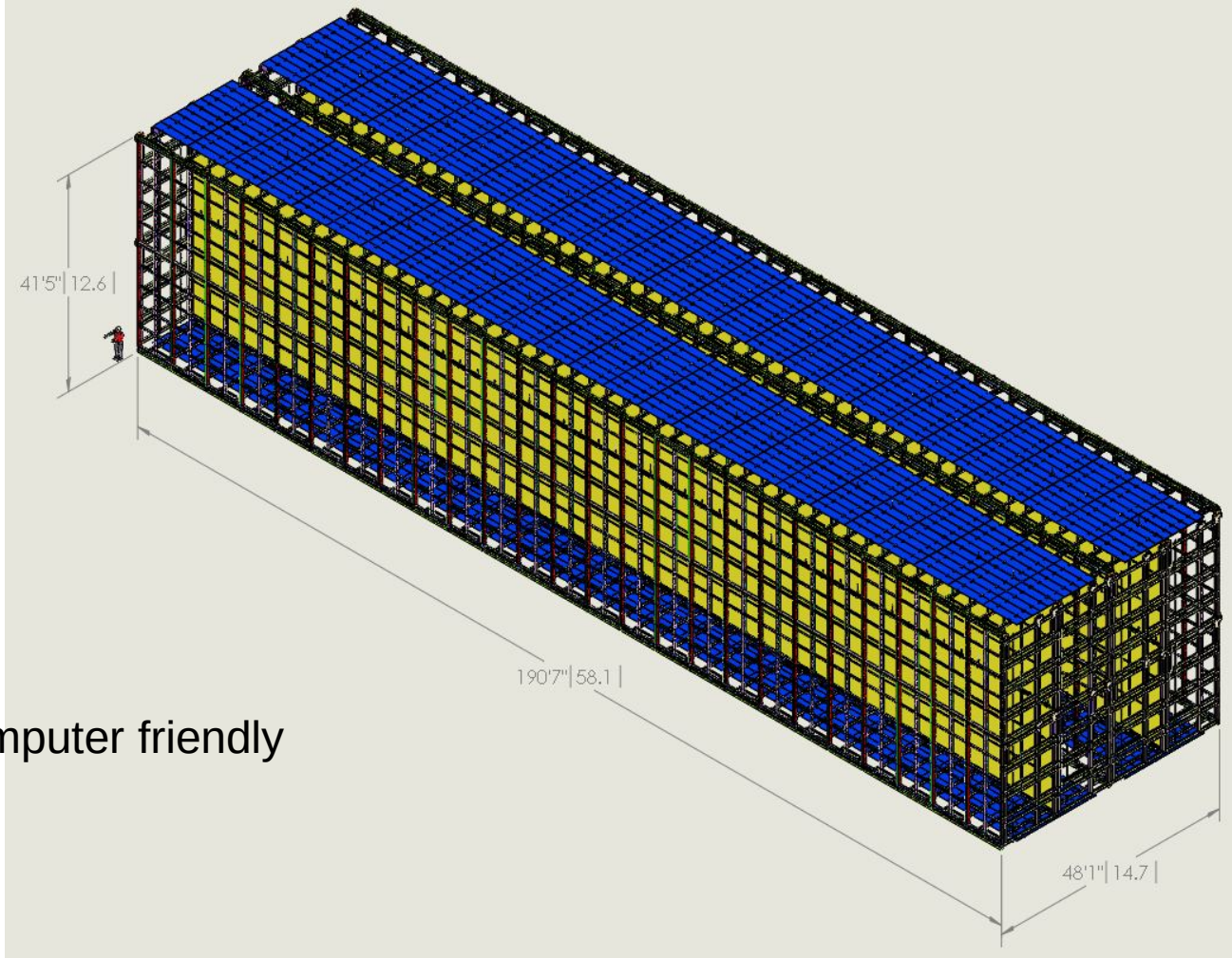
DUNE Far Detector 1 Parameters Spreadsheet

Anode Planes on Outside, One "10 kton" detector, **DUNE-docdb 158**

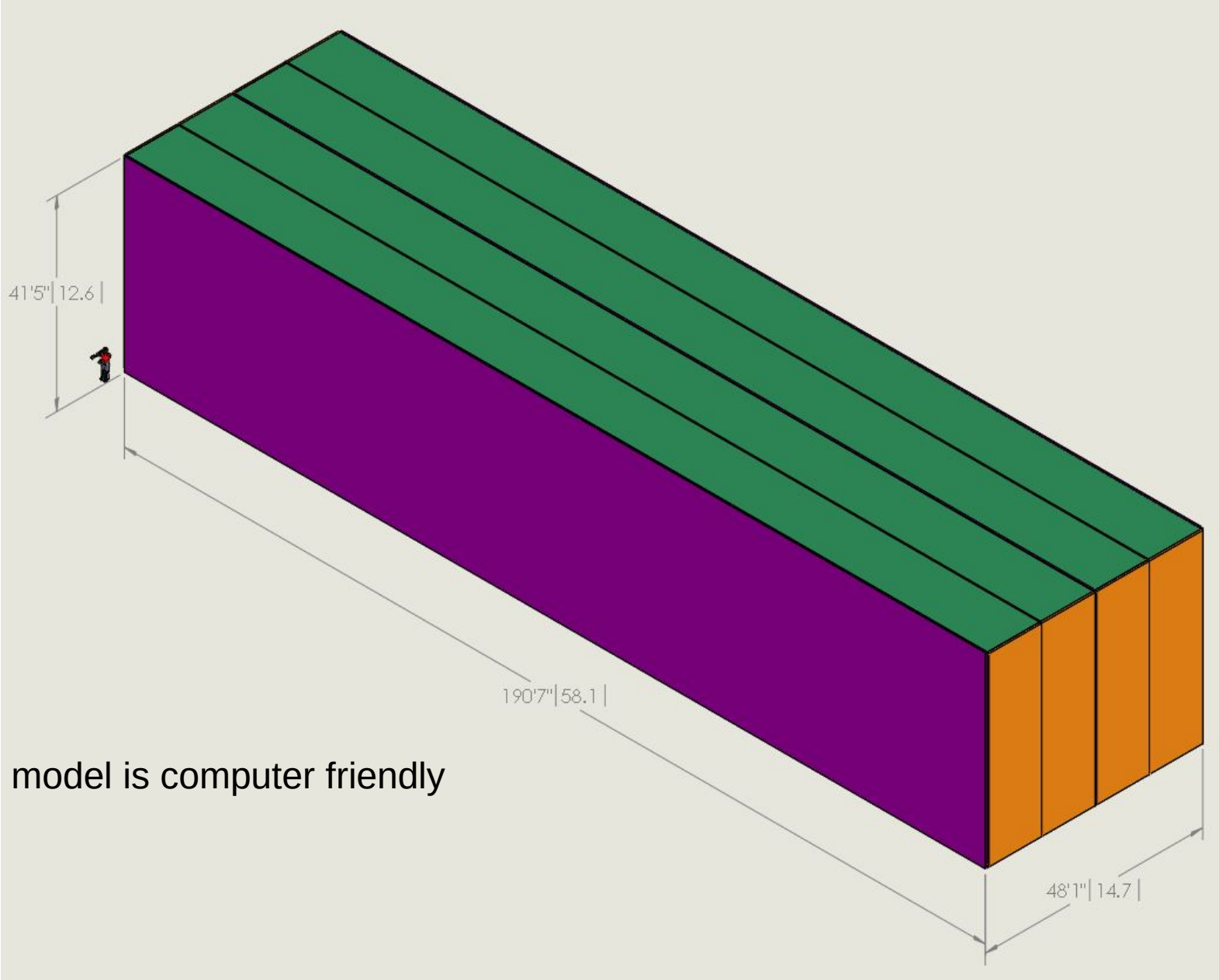
17-Nov-15

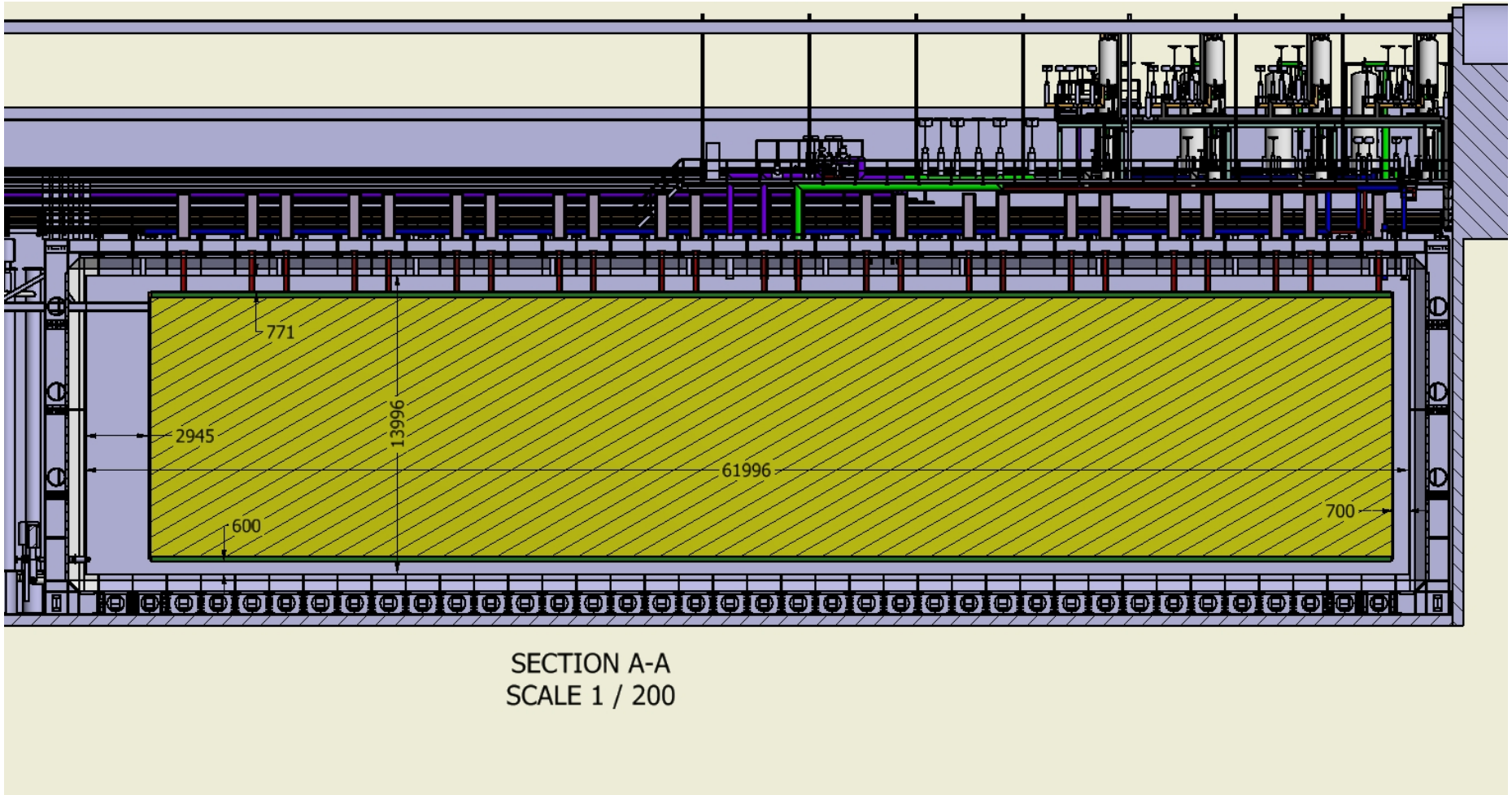
APA active height	5.920	m	Chosen for ease of transport and cryostat depth. This is the active height, not the total height
APA frame height	6.085	m	Side tube length
APA electronics mounting fin	0.216	m	
APA total height	6.315	m	Top of fin to outside of bottom cover
APA tube thickness	76.2	mm	3"x 4"x 3/16" tubing
APA thickness grid plane to grid plane	114.3	mm	grid plane to grid plane
APA thickness X plane to X plane	85.725	mm	X plane to X plane
APA weight	408	kg	Includes frame, printed circuit boards, readout boards,
U Wire length	7.29	m	
V Wire length	7.29	m	
Wire capacitance (in air)	15	pF/m	H. Jostlein measurement of prototype
U,V wire capacitance (in LAr)	164	pF	Apply dielectric constant for LAr
Cathode Plane Assembly (CPA)			
CPA thickness	6.7	cm	2" tubing
Cathode plane weight	50	kg	
number of CPA's per APA size	6		CPA panel size 2.3 m x ~3 m vertical. CPA's are half the size of an APA
CPA extension beyond APA	10.2	cm	CPA extends past APA by 4" at end of row and at top and bottom.
Detector Modules			
Num Vertical APA's	2		Chosen to balance construction, installation and cryostat design factors
Arrangement of Anode & Cathode planes	A C A C A		Anode Planes on outside, closest to wall
Number of APA rows	3		Chosen to result in a moderate span
number of CPA rows	2		
Number of Longitudinal APA's in a row	25		Chosen to achieve minimum fiducial mass requirement
Total number of APAs per detector	150		
Total number of cathode planes per detector	600		CPA panel size 2.3 m x ~3 m vertical. CPA's are half the size of an APA
Centerline Distance between APA & CPA rows	3.637	m	Set to be something less than 3.7 m
Drift distance	3.594	m	Distance from APA X plane to center of cathode plane
Detector Active Width	14.377	m	
Detector APA row Length	58.083	m	Outside of APA to Outside of APA
Detector CPA row length	58.292	m	Outside of CPA to Outside of CPA
Detector Active Height	11.873	m	Active height, Not total height of APA
Detector CPA Height	12.076	m	Outside of CPA to Outside of CPA
OVERALL APA Height	???		No spec
Detector Vertical APA gap	3.2575	cm	2*(4 x 3.175mm FR4)+cover) + 4mm of clearance. Space between APA frames vertically
Detector Longitudinal APA gap	8	mm	For inter-APA connection. Distance between G-10 covers.

Entire detector



Actual model is not computer friendly



Simplified model is computer friendly

FD Detector within the Cryostat