

ND Concepts

Light and Pixel Integration (a work in progress)

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3/11/2021 (changing still daily)

3/18/2021

ND Charge and Light Collection concepts-

Field Cage uniformity-

For Module 0, the SiPMs on the light collection were pushed into the drift somewhat to permit use of some existing PC board designs and to allow for fairly large connectors. There are 5 PC boards per detector sub-module (which contains one PIXEL board and either one ArcLight or 3 LCM systems) To prevent the placing the SiPMs in an electric field, short “lips” pushed the resistive portion of the field cage to start at these devices.

John H. found that even this fairly small set of “lips” caused a distortion of the electric field.

To make the field more uniform, the resistive part of the field cage now starts at the PIXEL plane.

Pushing the electronics back created a large dead space behind the anode plane since the parts were already packed with a high density

My initial designs went from 5 PC boards to one, but that tied the PIXEL and light collection designs together

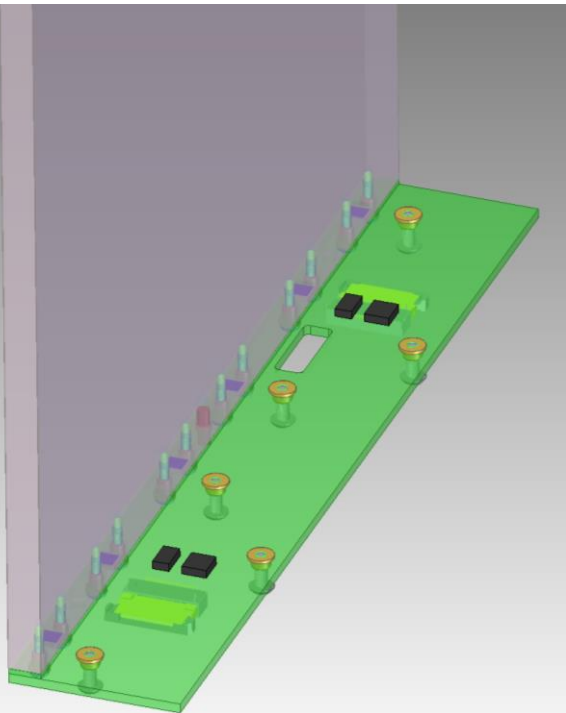
Since last time, I have re-drawn the system to keep technologies separate. The design shown in the following slides combines the 3 SiPM boards with the “E” interconnect board. The design is almost the same for the LCM and ArcLight systems (the hole pattern is slightly offset on the LCMs while it is centered on the ArcLight panels)

The proposed design mounts to the anode support panel and is compatible with a variety of detector configurations and assembly sequences

Single PC board combines SiPM boards and "E" boards

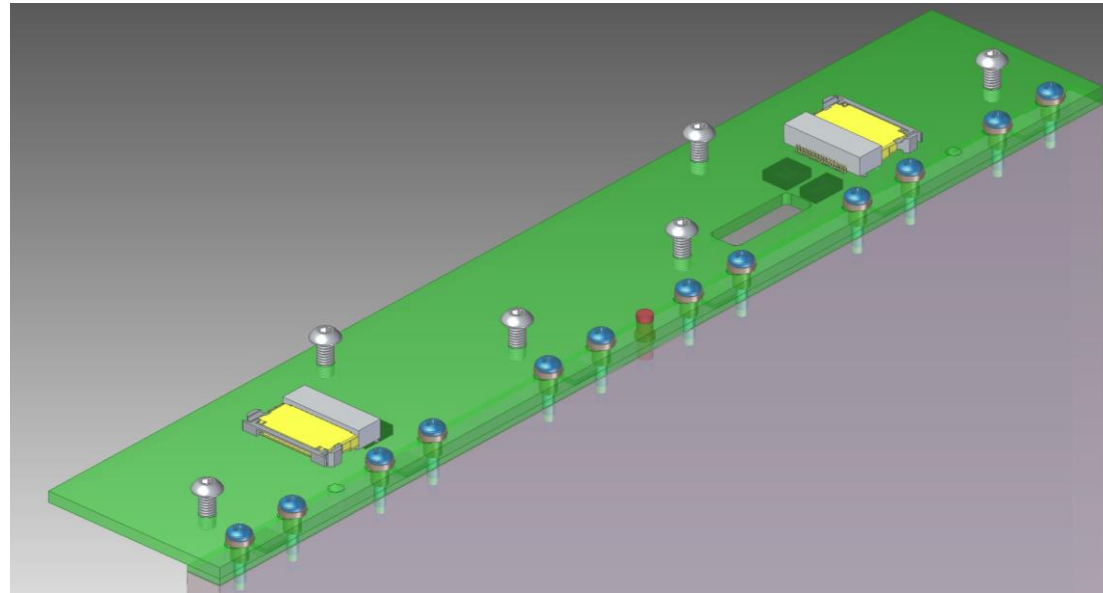
A slight variant of this works for the LCM as well (screws are slightly offset)
A hole is milled for the nut plate (the nut plate is not used in some configurations but the slot is still needed)

This is connected to the anode support plate



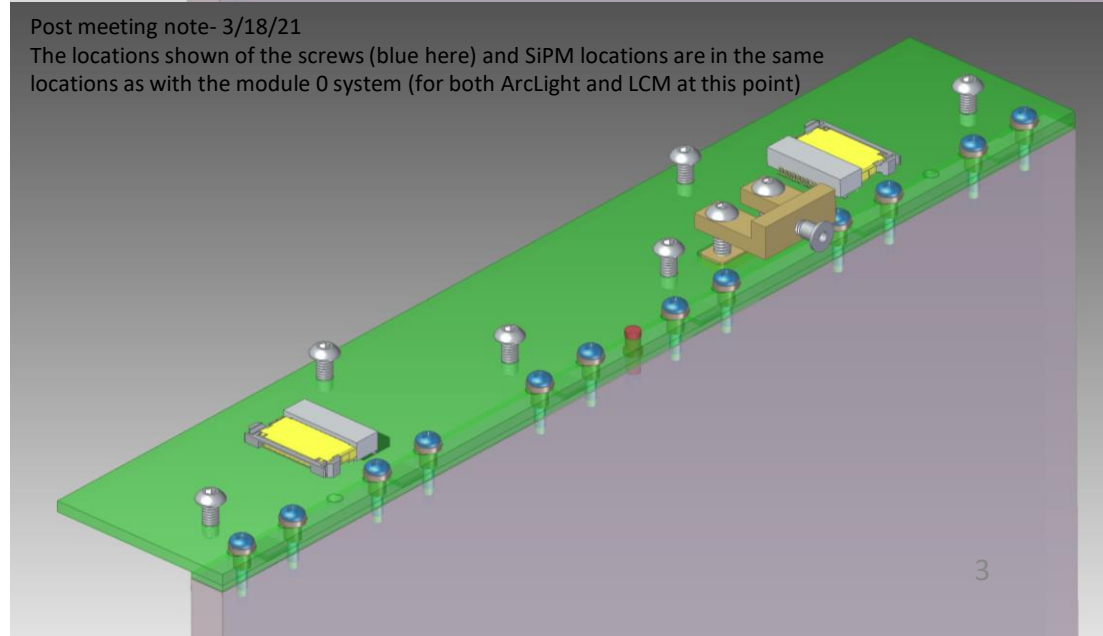
Post meeting note- 3/18/21

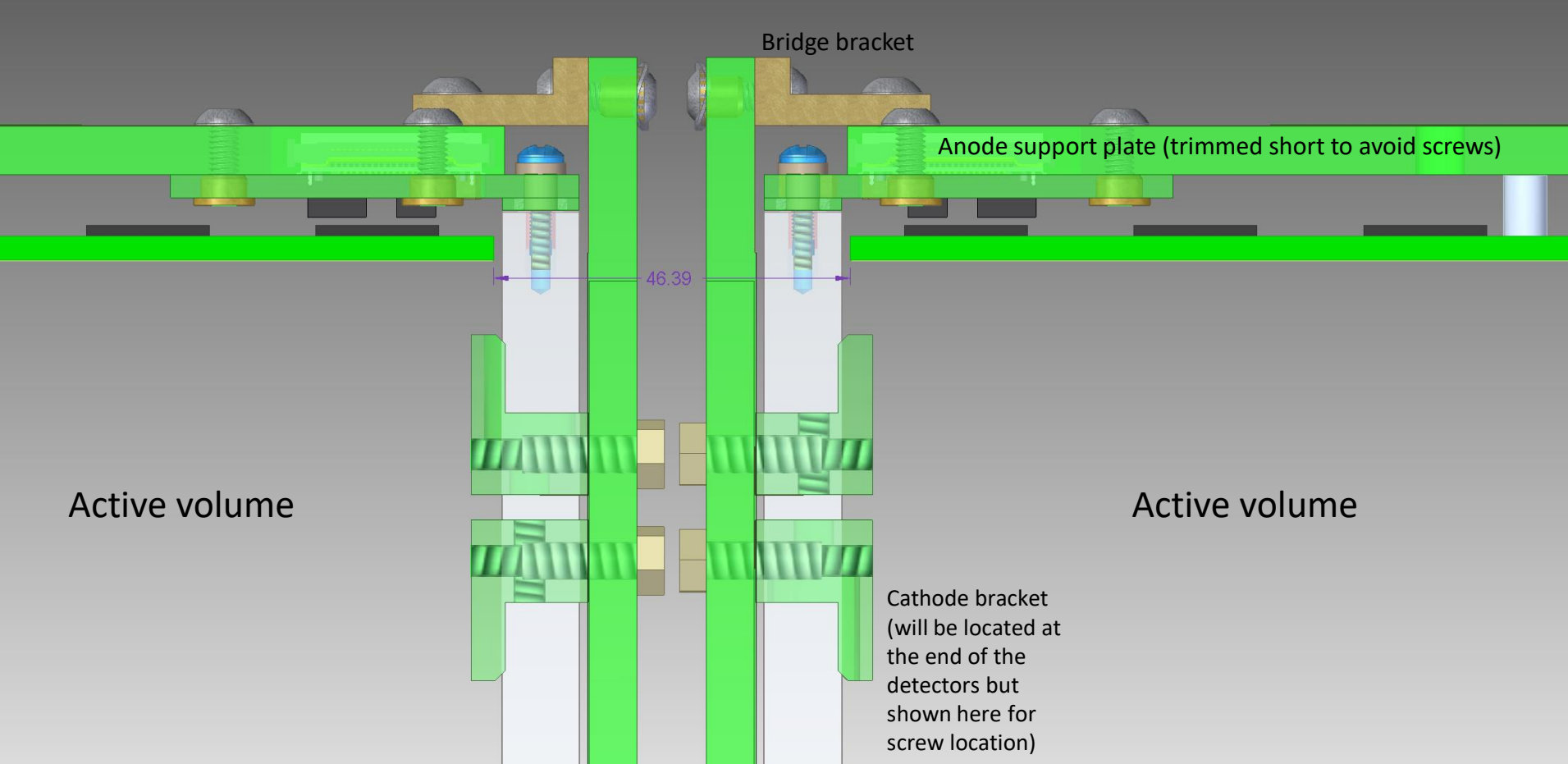
If there is a desire to put the electronics on the back, some locations on the edge will be the most compatible with assembly options (for a notched backplate). Shown here are two connectors but only one is used per side (so that area may be available) The location of any electronics should be in a fairly low stress area on the board to avoid solder failures. Fastener locations may be adjusted to create more room (if I could get the component sizes and some desired gaps or configurations, I could adjust the geometry to accept them)



Post meeting note- 3/18/21

The locations shown of the screws (blue here) and SiPM locations are in the same locations as with the module 0 system (for both ArcLight and LCM at this point)





This view shows two modules side by side with the light collection PC boards mounted to the anode support plates

Electrical components face each other

The brackets which hold the cathodes have been inserted to show the screw heights / gaps

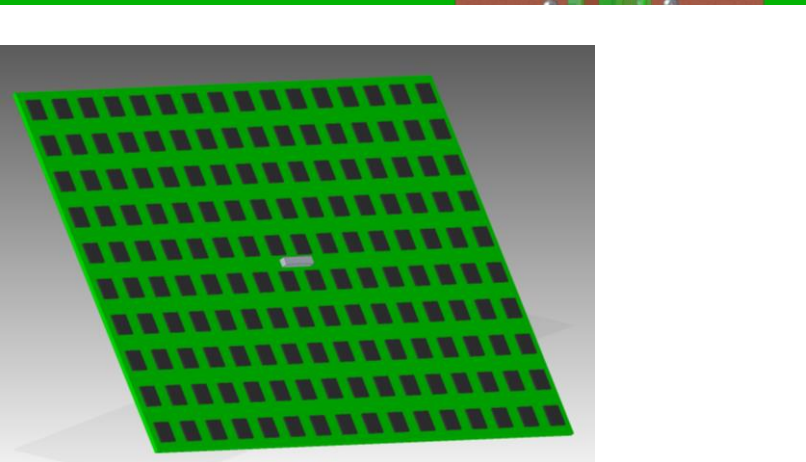


(bridge blocks can be made with screws on the outside or inside of the module depending on gap size)

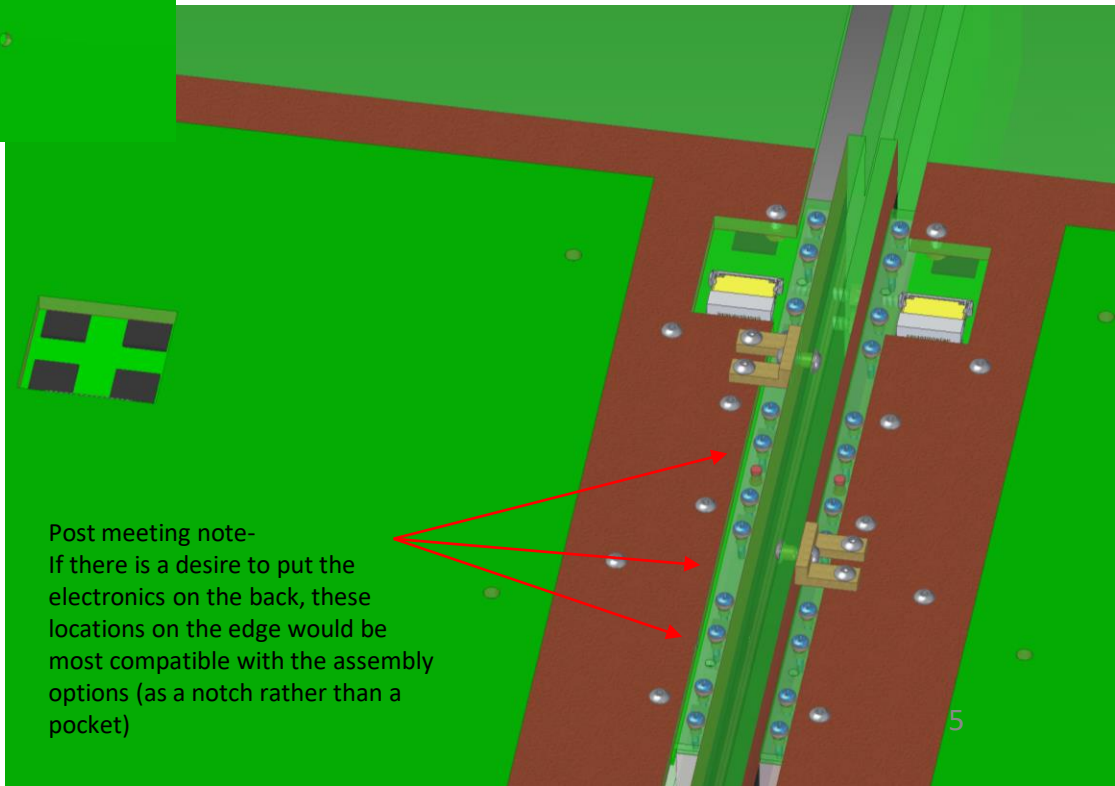
I need to trim the anode support plate back due to the screws for the light collection. I made "bridge" blocks to replace the brass anode blocks to cross the void.

A notch is shown for light collection cables

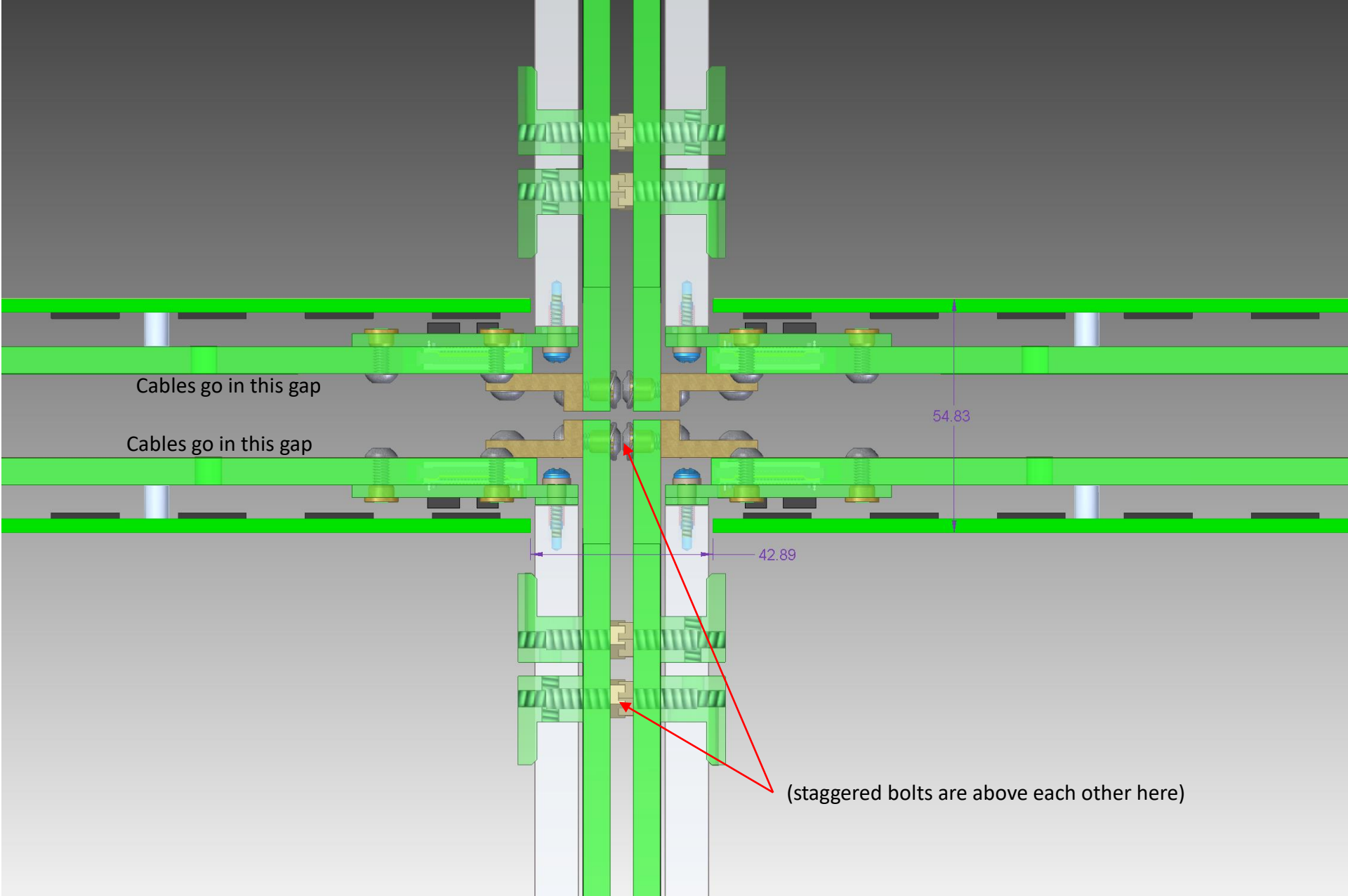
The Pixel boards all have the same orientation and the connector is located in the center of each board. (if there is any flow issue, a cover can be used)



The connector is in the center of the PIXEL board and boards are not flipped from side to side (so all connectors point in the same direction)

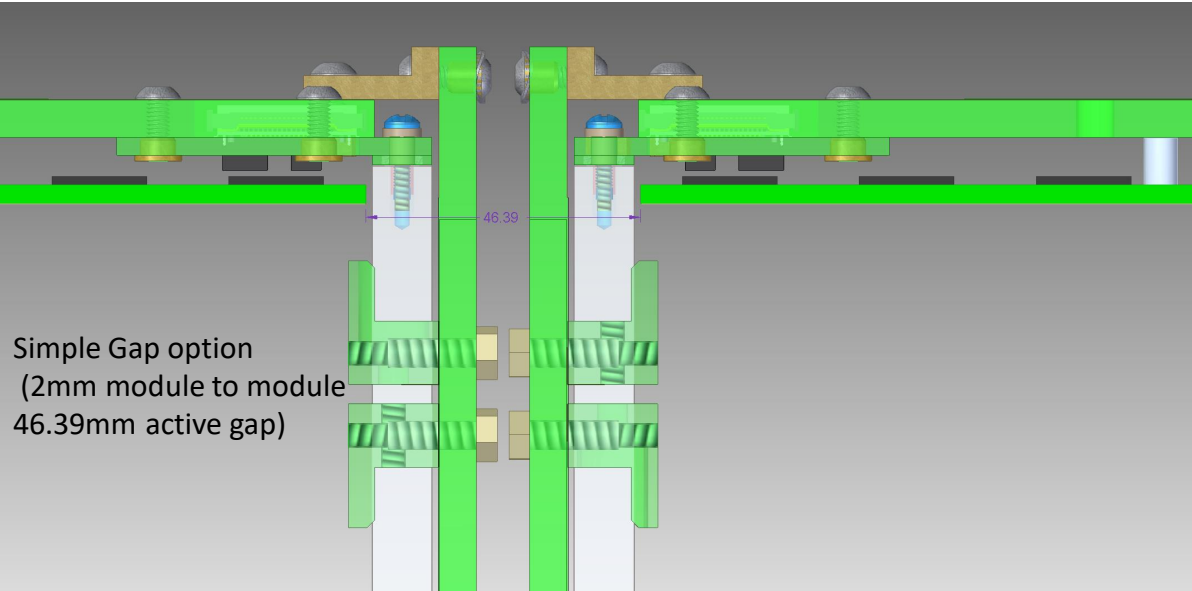


Post meeting note- If there is a desire to put the electronics on the back, these locations on the edge would be most compatible with the assembly options (as a notch rather than a pocket)



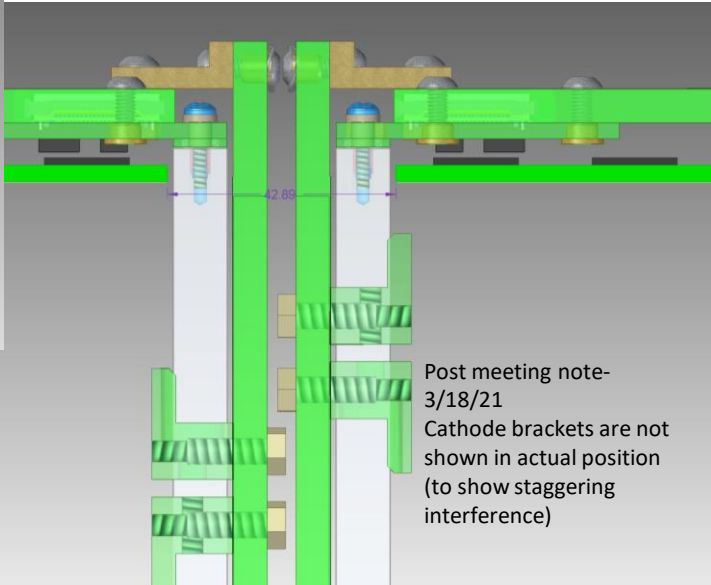
Intersection of four modules with staggered bolts (side to side) and 2mm gap (bank to bank –(tight))

The top view with the board simplification (components face each other). The light collection starts a little further back behind the Pixel board.



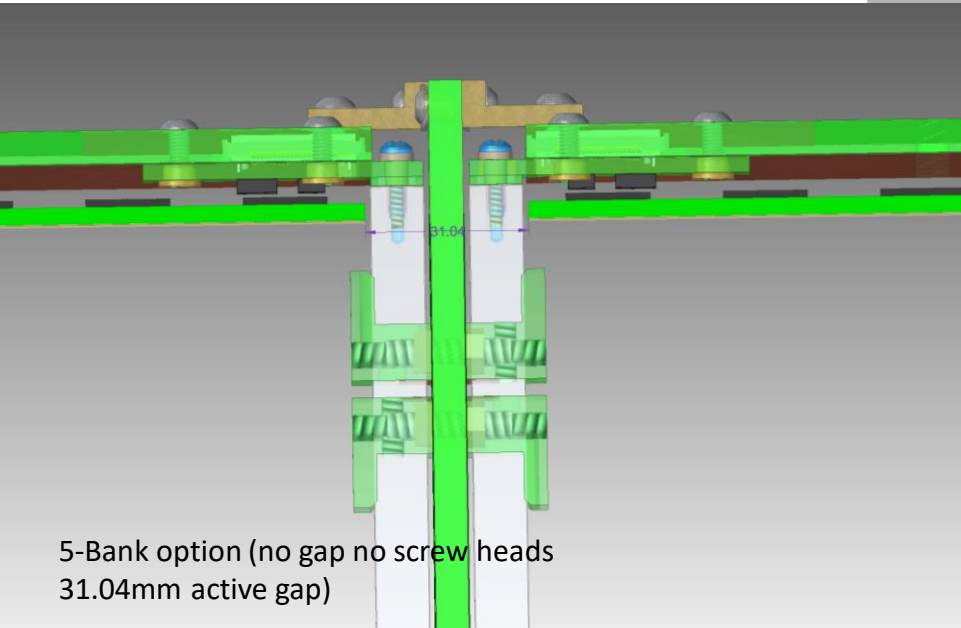
Simple Gap option
(2mm module to module
46.39mm active gap)

Various gaps shown for screws

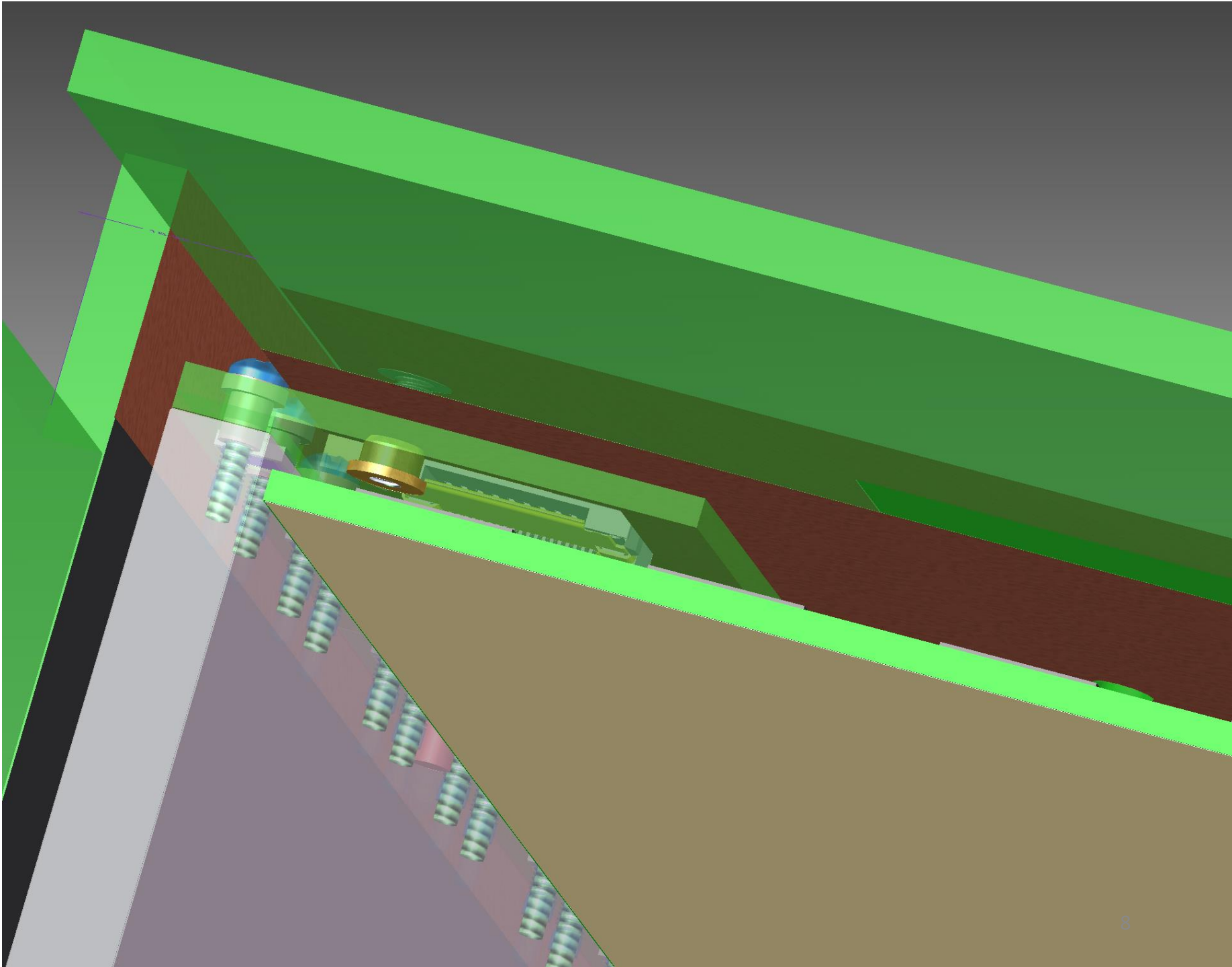


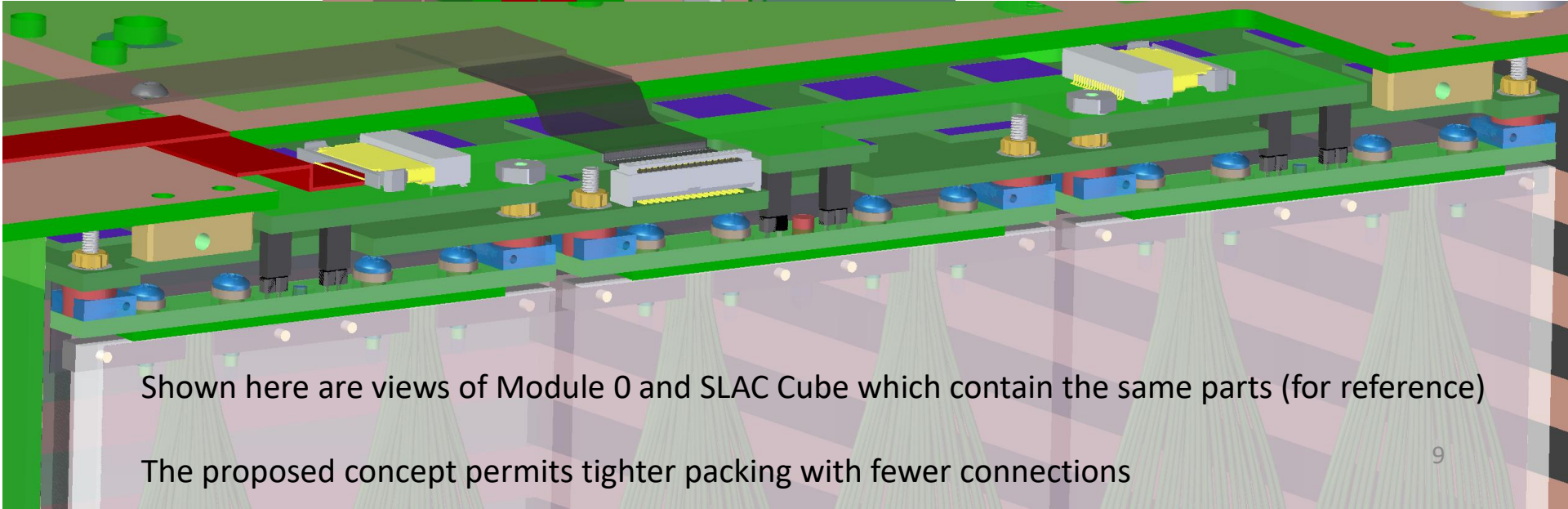
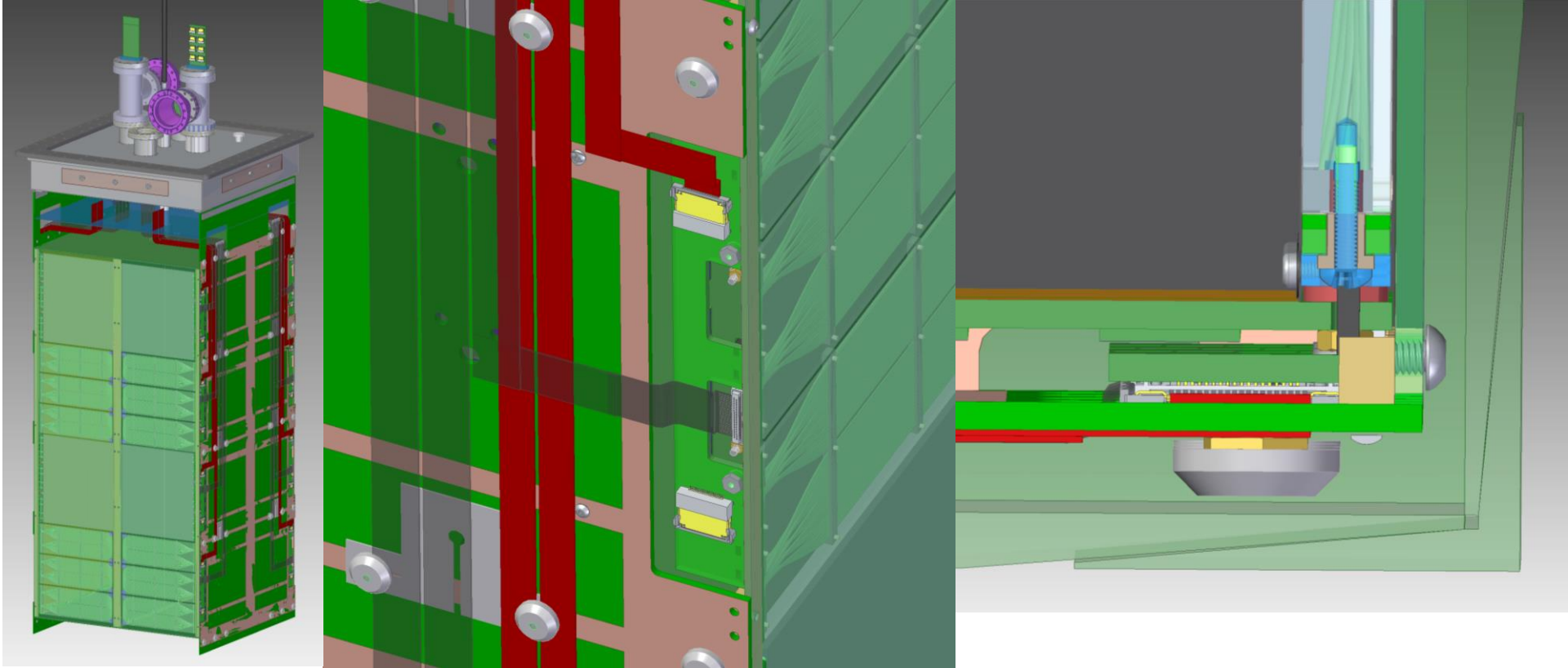
Post meeting note-
3/18/21
Cathode brackets are not
shown in actual position
(to show staggering
interference)

Stagger screw option
(2mm clear with 42.89mm active gap)



5-Bank option (no gap no screw heads
31.04mm active gap)





Shown here are views of Module 0 and SLAC Cube which contain the same parts (for reference)

The proposed concept permits tighter packing with fewer connections

Support Material

Some inserts types which may be used in fiberglass-



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Headed to ensure level insertion.
Available in plain steel, zinc plated steel and in stainless steel grades 1.4104 and 1.4305.

See also...
Headed Knock-in Zinc Alloy Inserts
Knock-in Brass Inserts
Tee Nut Inserts

Specifications Buy Online

Steel Knock-in

Thread Size	Available Lengths(L)	ØH	ØD
M3	8.0	8.0	5.5
M4	5.5 / 8.0*	8.0	5.5
M5	6.6 / 10.0*	10.0	6.5
M6	7.7 / 12.0*	12.0	8.5
M8	12.0*	15.0	10.5
M10	12.0**	18.0	12.5
M10	12.0	18.5	12.5

*Available in stainless steel grades 1.4104 and 1.4305.
**Only available in stainless steel grade 1.4305.
All dimensions in mm.
Pilot hole dimensions for reference purposes only.

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Knock-in threaded insert with external knurl and groove design to provide excellent resistance to torsion and pull out.
Headed to ensure level insertion.
For applications in wood and composite materials.

See also...
Brass Flathead Bolts
Knock-in Steel Inserts
Headed Knock-in Zinc Alloy Inserts

Specifications Buy Online

Brass Knock-in

Thread Size	Available Lengths(L)	ØH	ØD
M3	8.0	8.0	5.5
M4	8.0	8.0	5.5
M5	10.0	10.0	6.5
M6	7.7 / 12.0	12.0	8.5
M8	12.0	15.0	10.5
M10	12.0	18.5	12.5

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Unique knurl and groove design gives excellent resistance to torsion and pull-out.
Reduced length insert designed for use in thin section and sheet materials.
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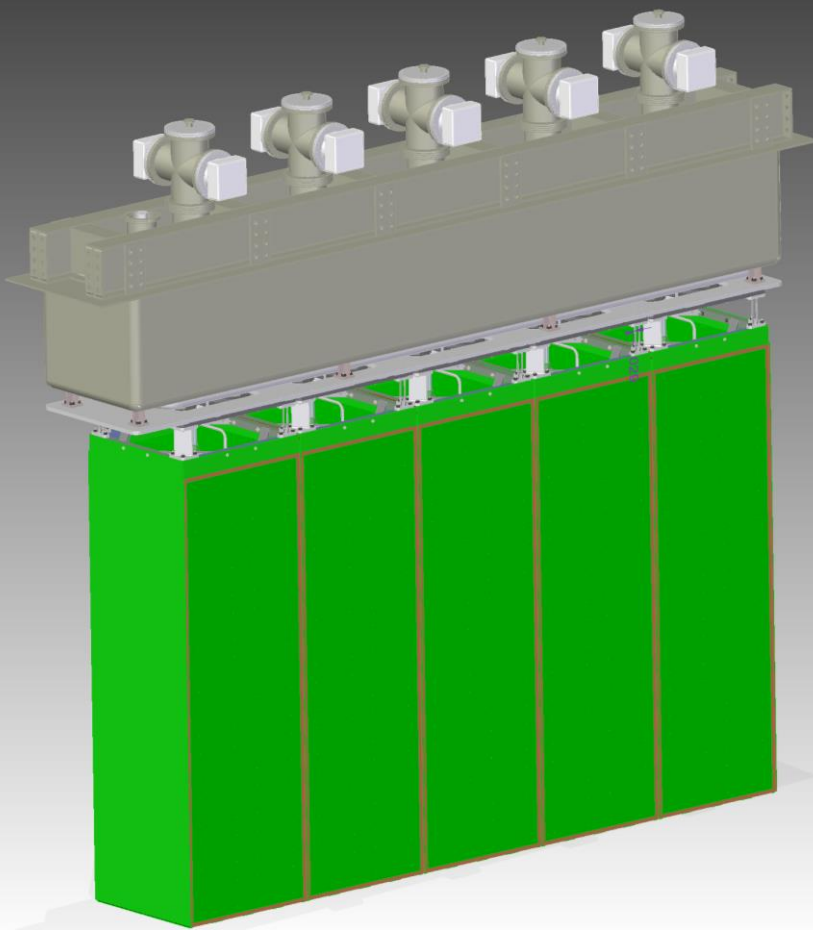
See also...
Brass Flathead Bolts
Knock-in Steel Inserts
Headed Knock-in Zinc Alloy Inserts

Specifications Buy Online

Multi Micro

Thread Size	Length (L)	ØH	T	Pilot Hole
M2	1.35	4.9	0.55	3.3
M2.5	1.85	5.6	0.55	4.15
M3	1.85	6.1	0.85	4.66
M4	3.0	7.9	1.0	6.13
M5	3.0	7.9	1.4	7.7
M6	3.0	12.7	1.7	9.55
M8	4.55	14.3	1.7	11.55
M10	4.55	16.0	1.5	13.05

All dimensions in mm.
Pilot hole dimensions are for reference purposes only.



(old views of various ND modules)

