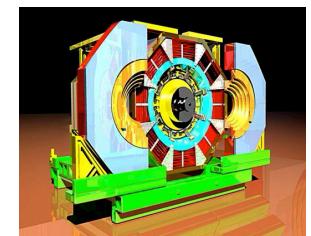


BES3 meeting
LNF, 14 May 2014

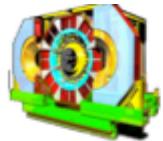
CGEM anode design



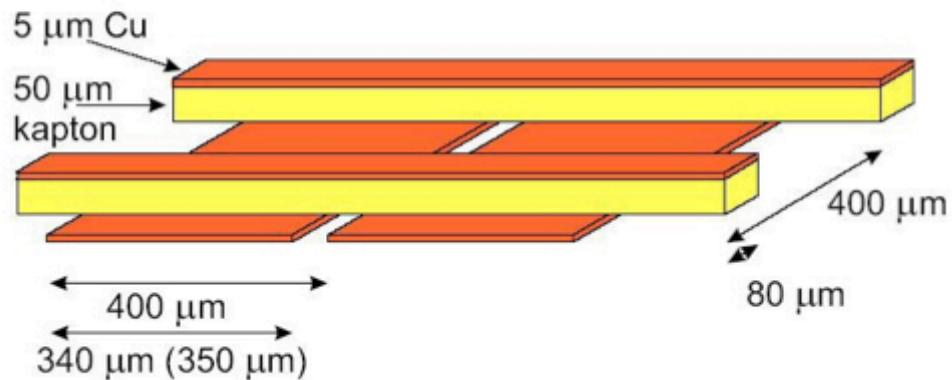
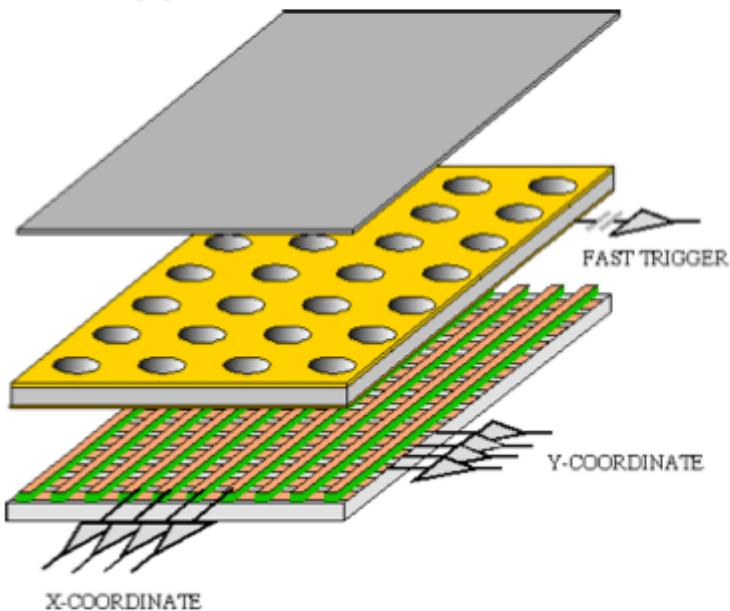
Gianluigi Cibinetto
on behalf of the Ferrara group



Compass like readout



COMPASS: readout electrodes



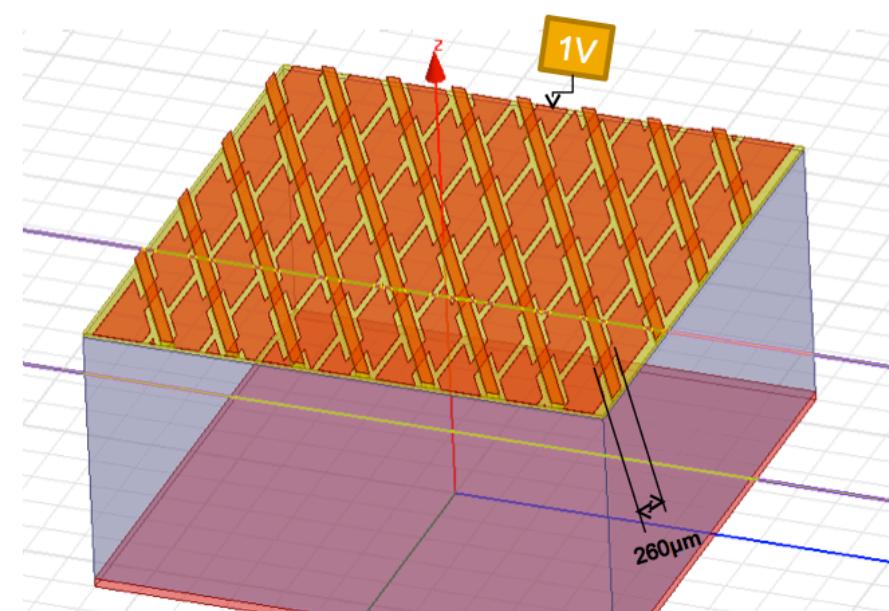
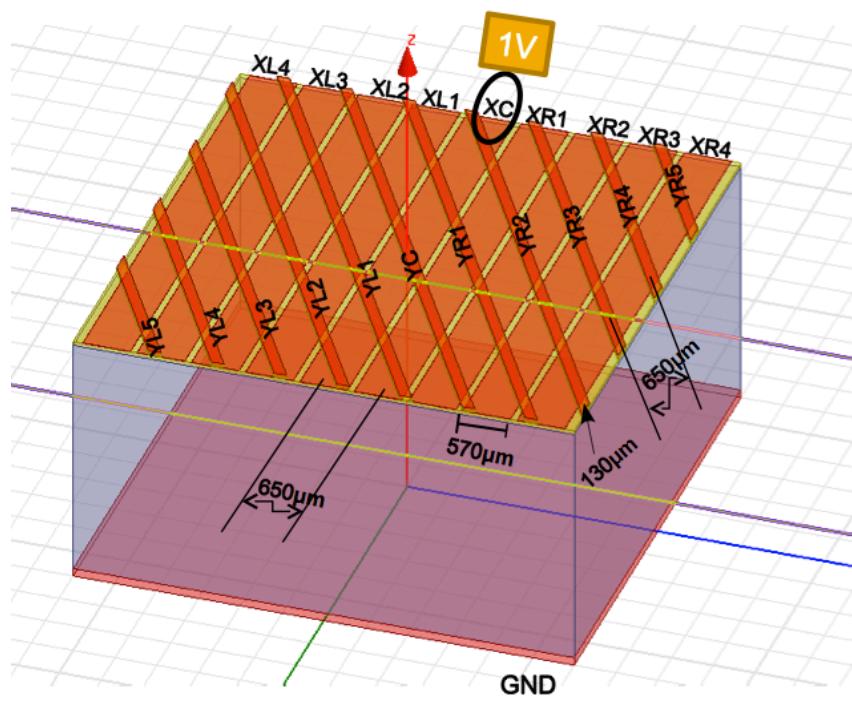
in our case

650/570/130 μm (pitch,X,V);
stereo angle 31.1 deg

- Due to diffusion the charge cloud collected on the readout board is bigger than the strip width ($\approx 3.5 \times$ pitch) and a weighting method is used for calculate the exact track position in two dimensions

Stereo angle and jagged strips

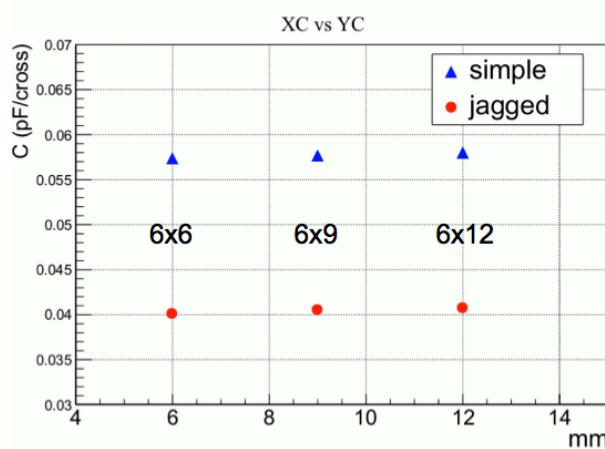
To reduce the capacitance of the strip crossing we are studying this jagged layout



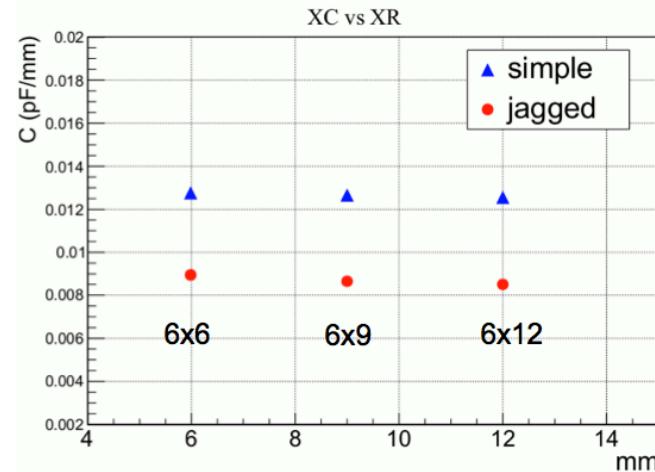
Risultati: CX vs CY

C Interstrip: CX vs. CX

Isabella



Area minore tra le strip X e Y per la configurazione jagged ==> capacità più piccola

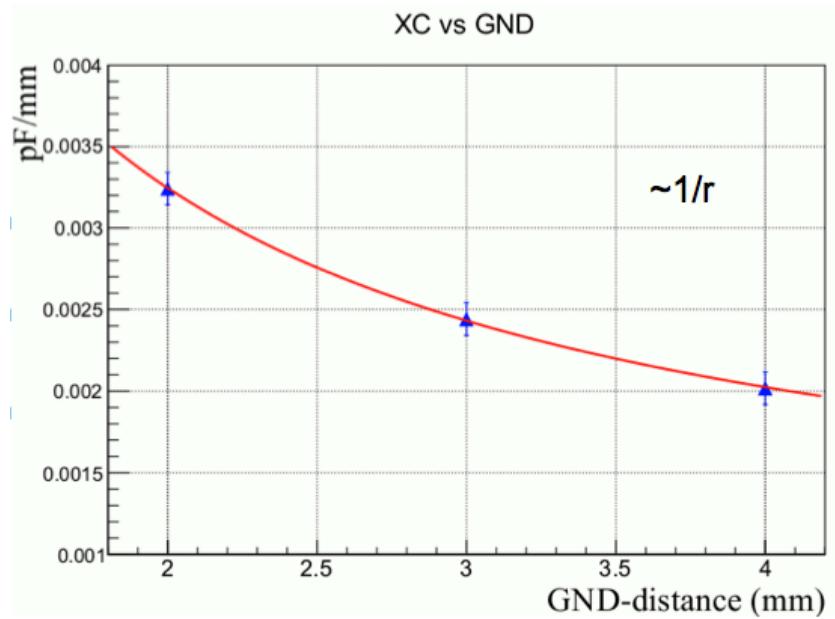


Maggiore distanza tra strip X adiacenti per la configurazione jagged ==> capacità più piccola



C ~ 30% più piccola per la configurazione jagged

C ~ 30% più piccola per la configurazione jagged



We are using combination of two different package
ANSYS and Garfield ++

ANSYS is a finite element program able to simulate the electric field
for a triple GEM

Garfield++ takes as input .lis files from ANSYS that area three-dimensional field maps

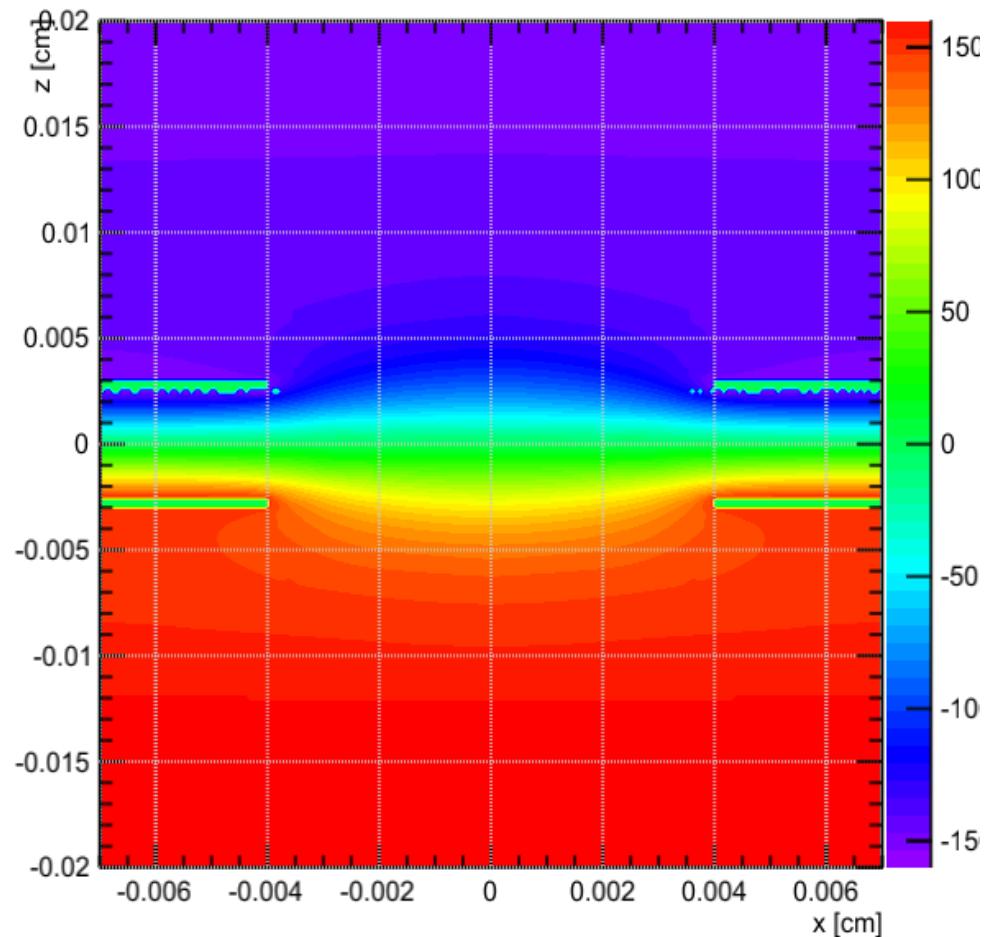
Garfield++ shares functionality with [Garfield](#). The main differences are the more up-to-date treatment of electron transport and the user interface, which is derived from [ROOT](#).



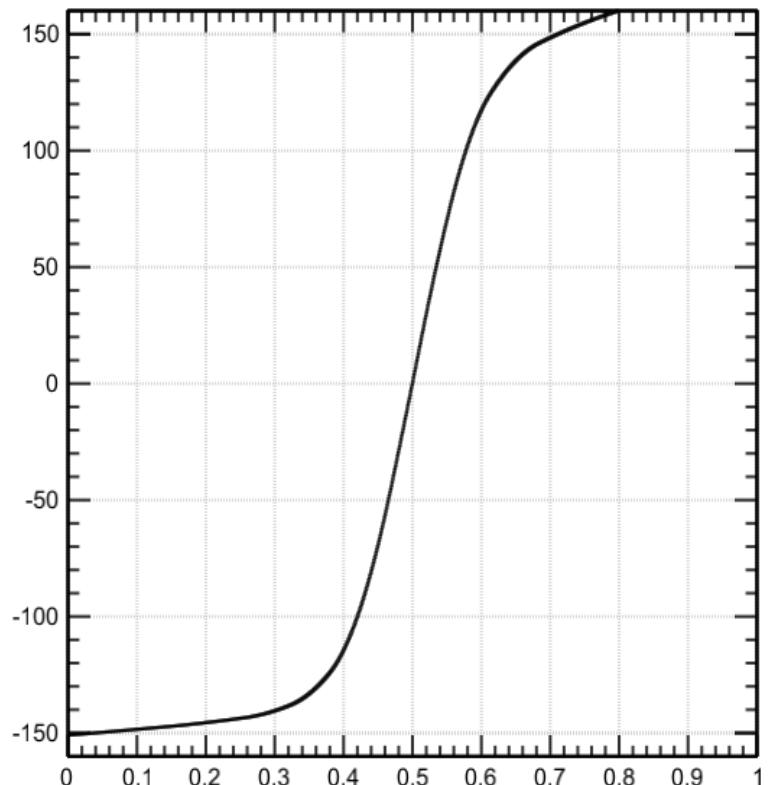
Status of the simulation (1) Valentina and Isabella

We are able to read the field from ANSYS from a single GEM

X vs Z of the GEM field



field profile of the GEM

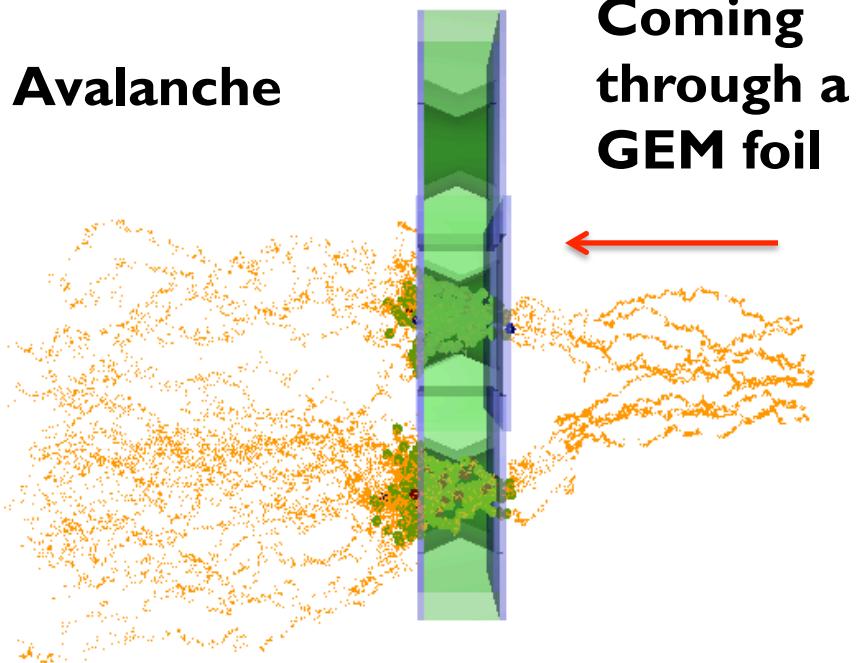


Status of the simulation (2) Valentina and Isabella

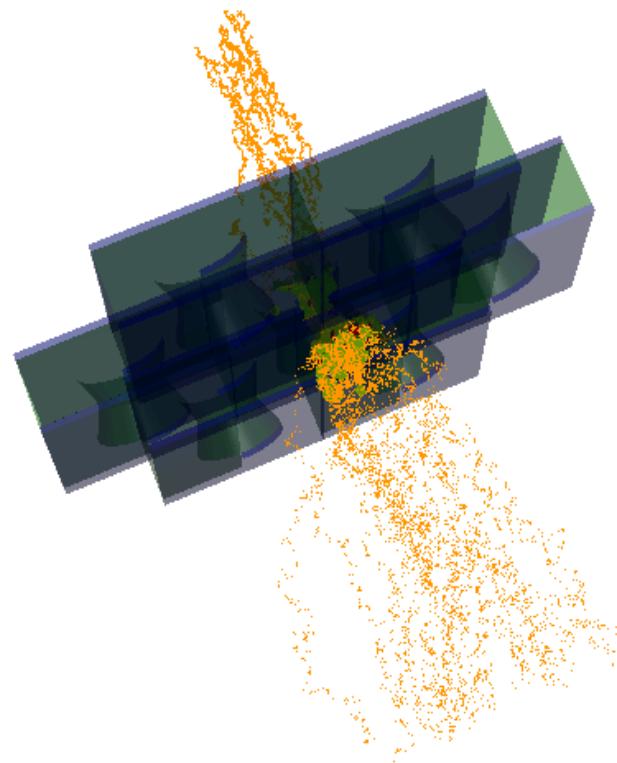
We are able to read the field for a single GEM and run the simulation

With the right gas mixture and the right GEM cell

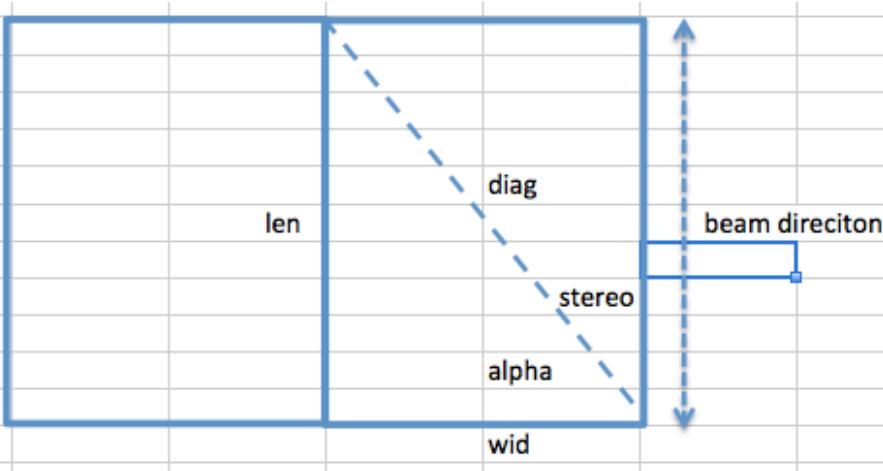
Avalanche



**Electrons
Coming
through a
GEM foil**



Number of strips



Total 3474 strips in layer 2.

Layer 2 will be made of two separate anode foils

Each foil has 1734 strips

- 640 X strips per foil
- 1096 V strips per foil

	Layer 2		
# of foils	2.00		
anode rad	132.50 mm		
len	690.00 mm		
wid	832.52 mm		
wid/sheet	416.26 mm		
diag	805.84 mm		
sin(alpha)	0.86		
alpha (rad)	1.03 rad		
alpha (deg)	58.90 deg		
stereo ang	31.10 deg		
pitch	0.65 mm		
p prime	0.76 mm		p/sin(alpha)
N ch phi	1281 wid/p		
N ch v	21932*wid/p'		
Tot Ch L2	3474		

Anode design: main issues

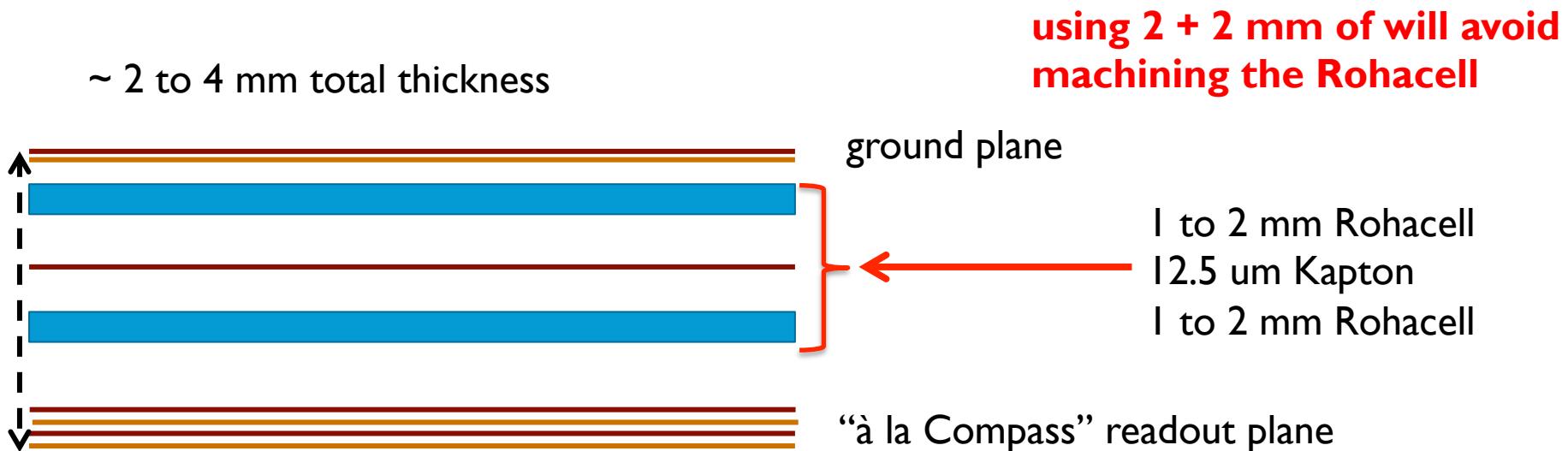
- I. About 2-4 mm will be the distance between the readout plane and the ground plane
 - need to assemble ourselves the readout and ground planes in a robust structure.
 - need to merge, at some point, the ground and the signals in a single connector.
2. Lack of space in z direction
 - but a lot of unused space between the active area and the edge of the chamber, for layer 1 and 2.

Proposed stratigraphy

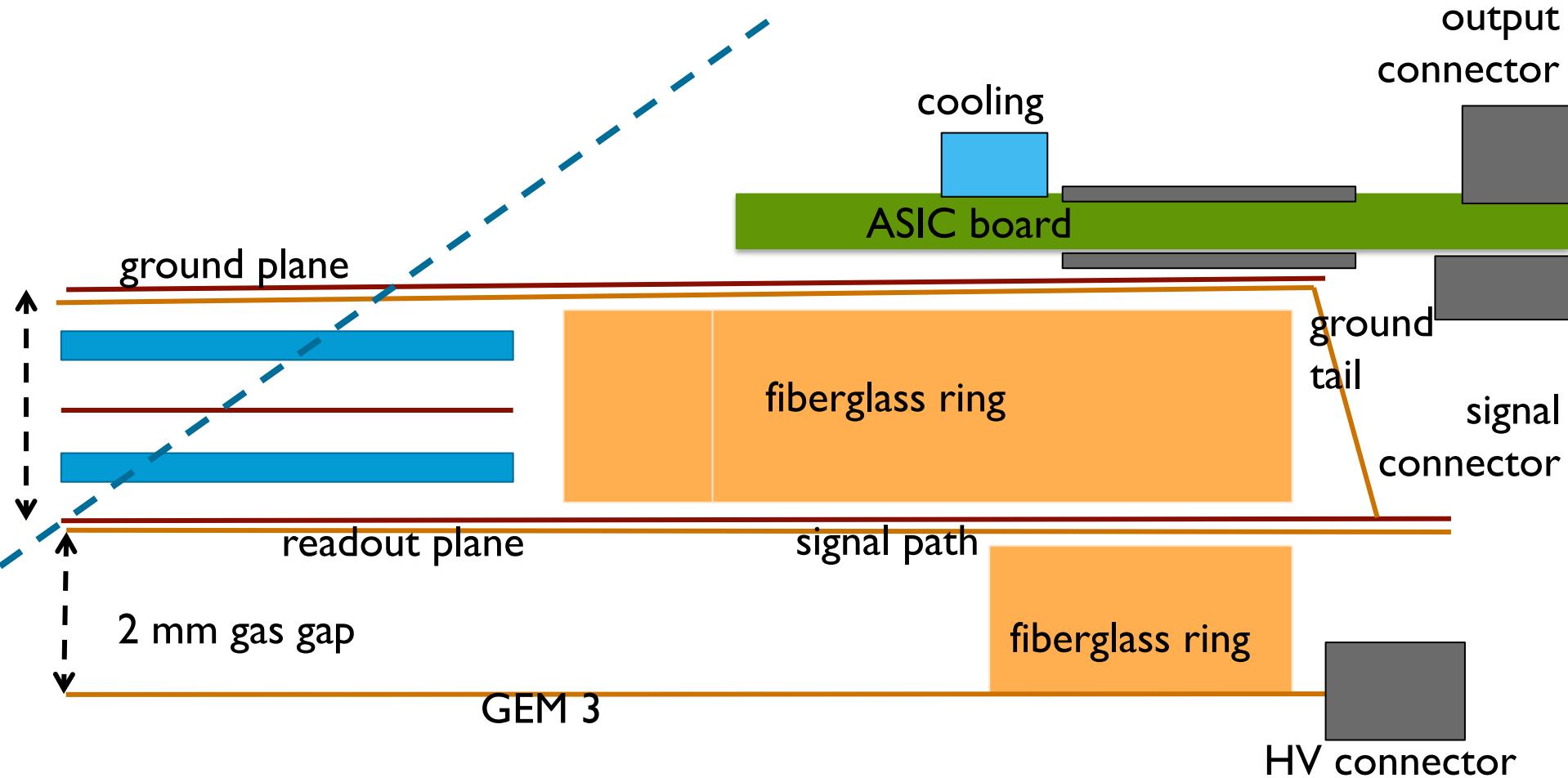
- This could be the layer configuration with a Compass-like readout plane at 3 mm from the ground.



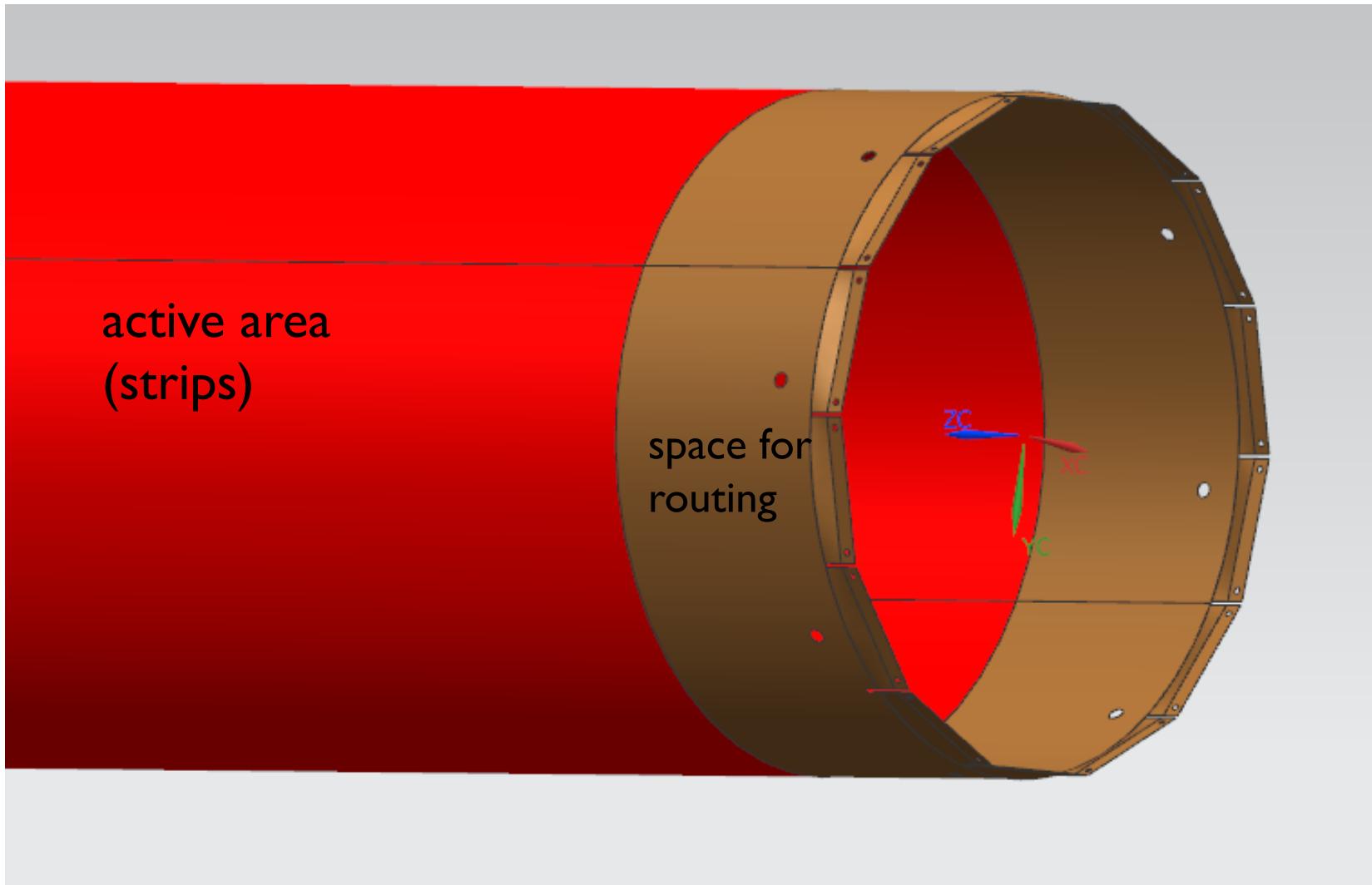
distance to be determined by planar prototype results and sim



Proposed layout

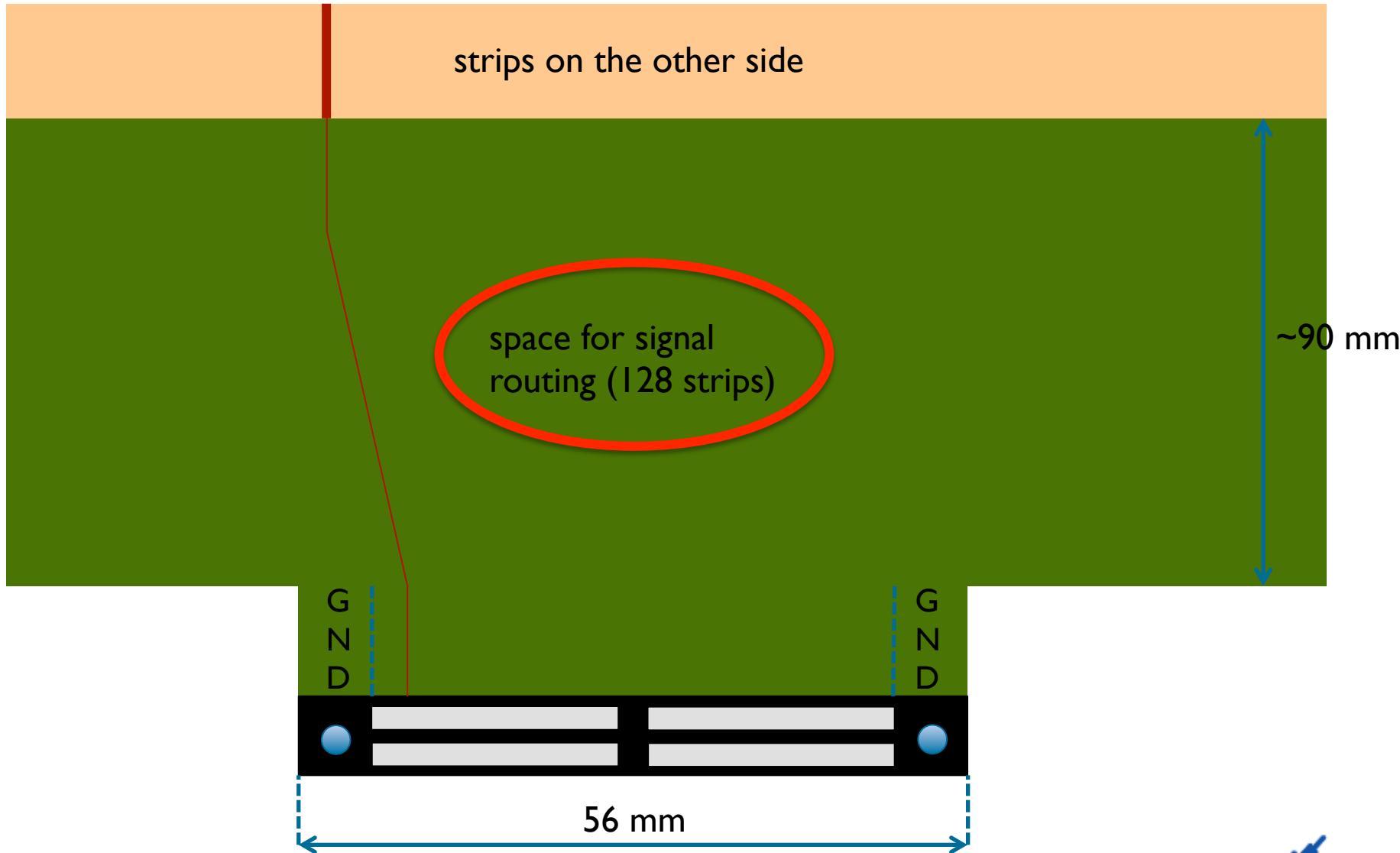


Anode circuit (two foils)

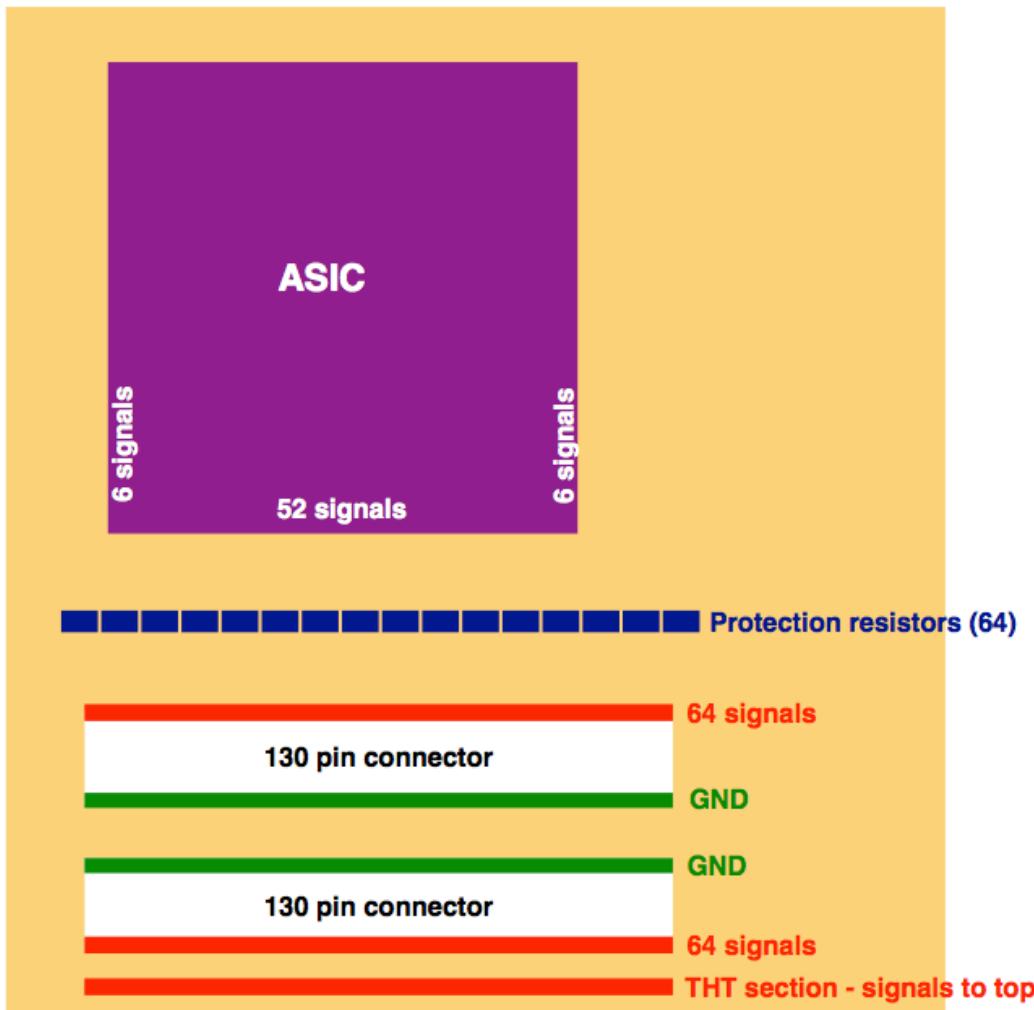


The signal connectors

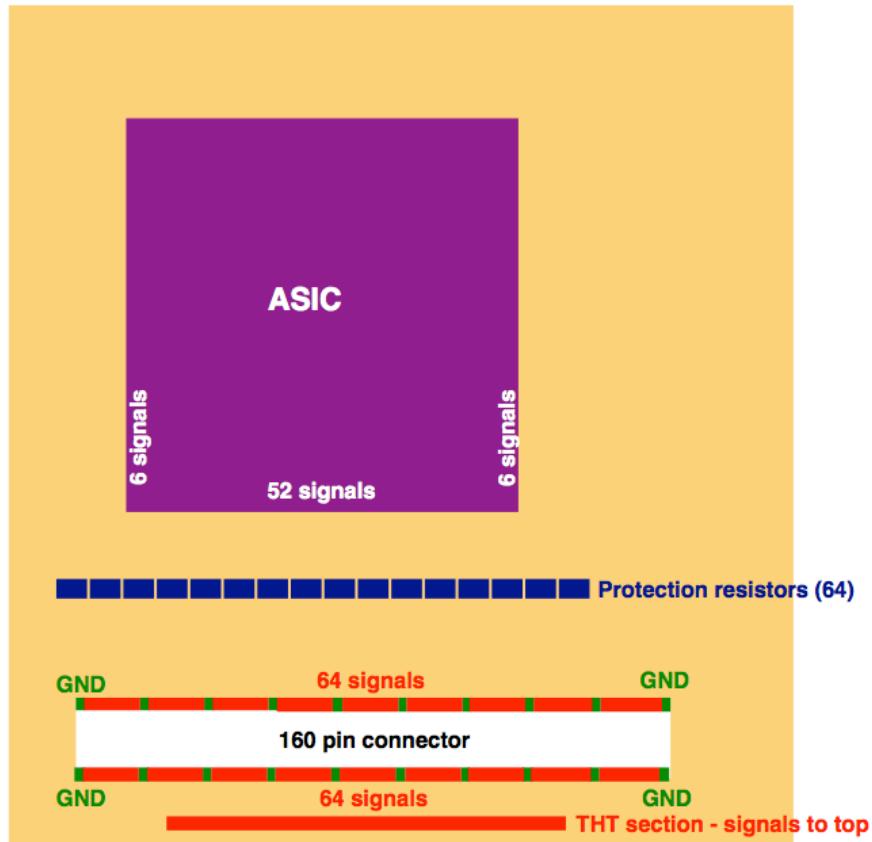
Wire routing



Option #1



Option #2

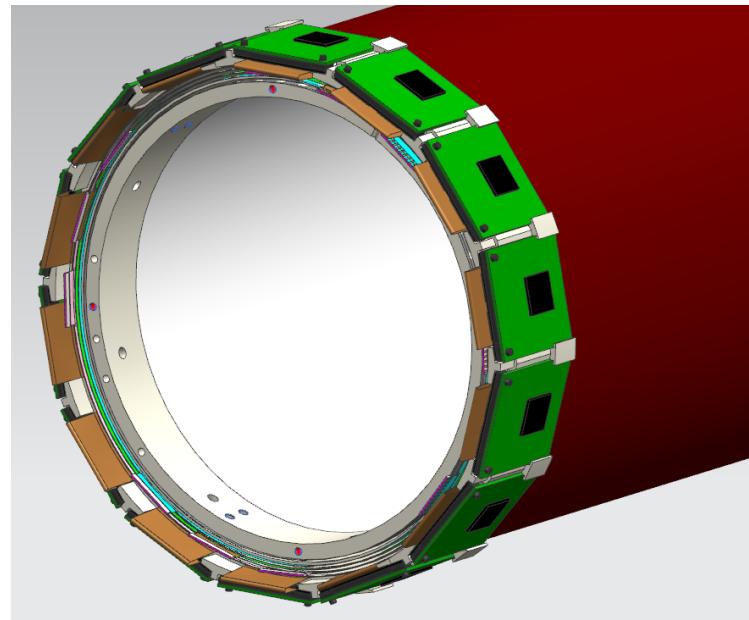
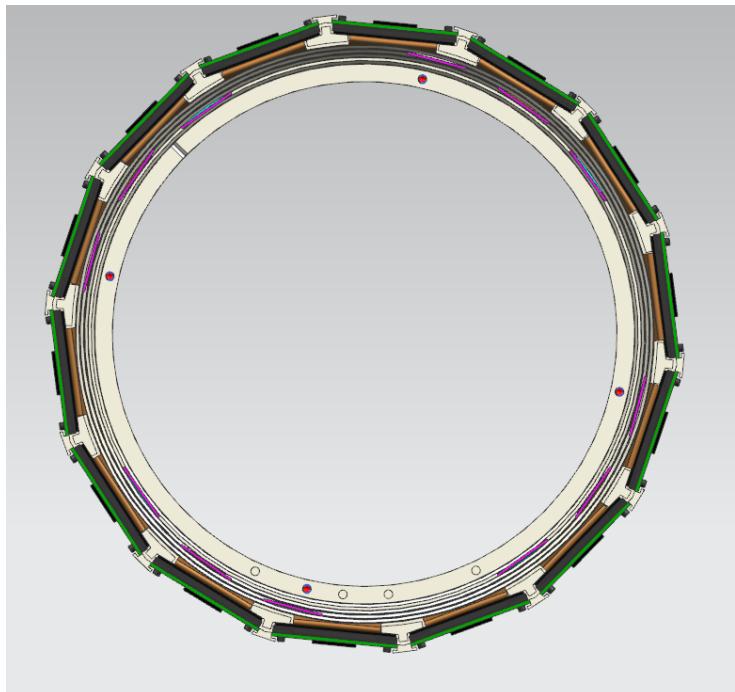


Option #3

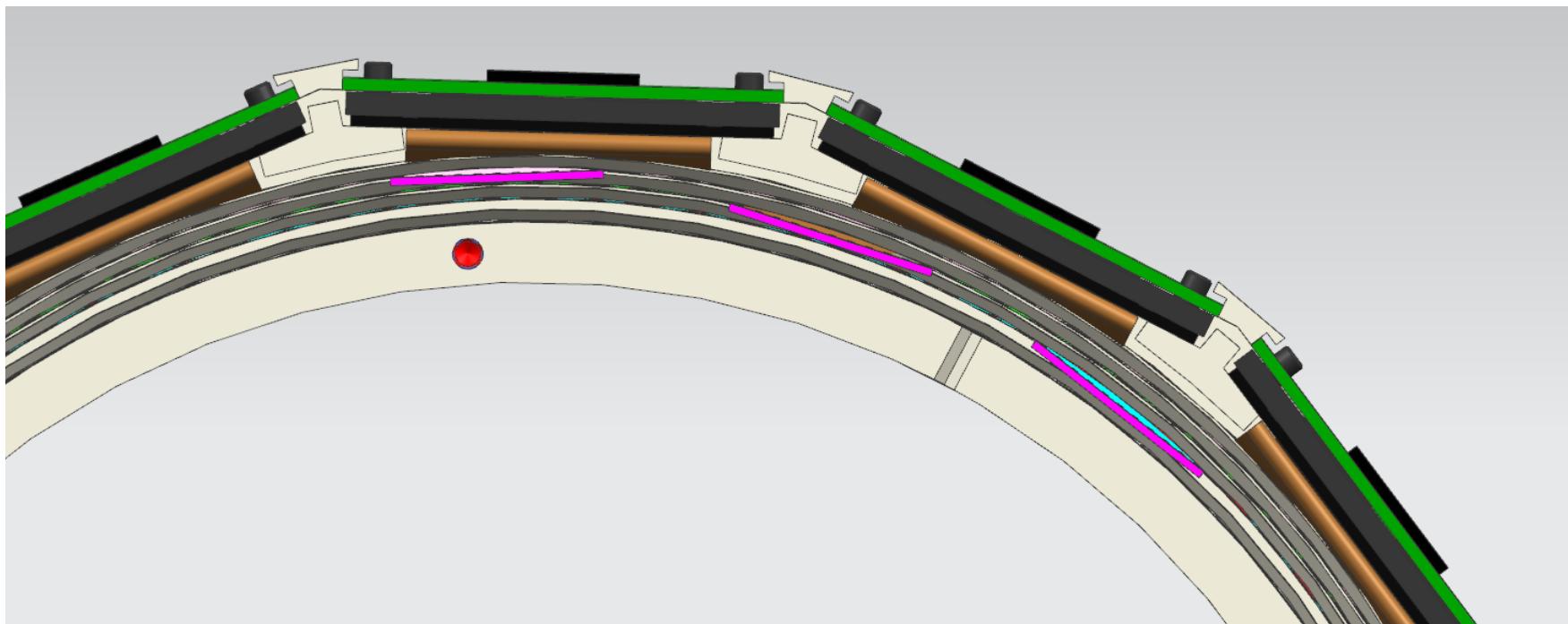
- use the Kloe-2 connector and increase the strip pitch of ~6%.

The signal tail routing to FEC

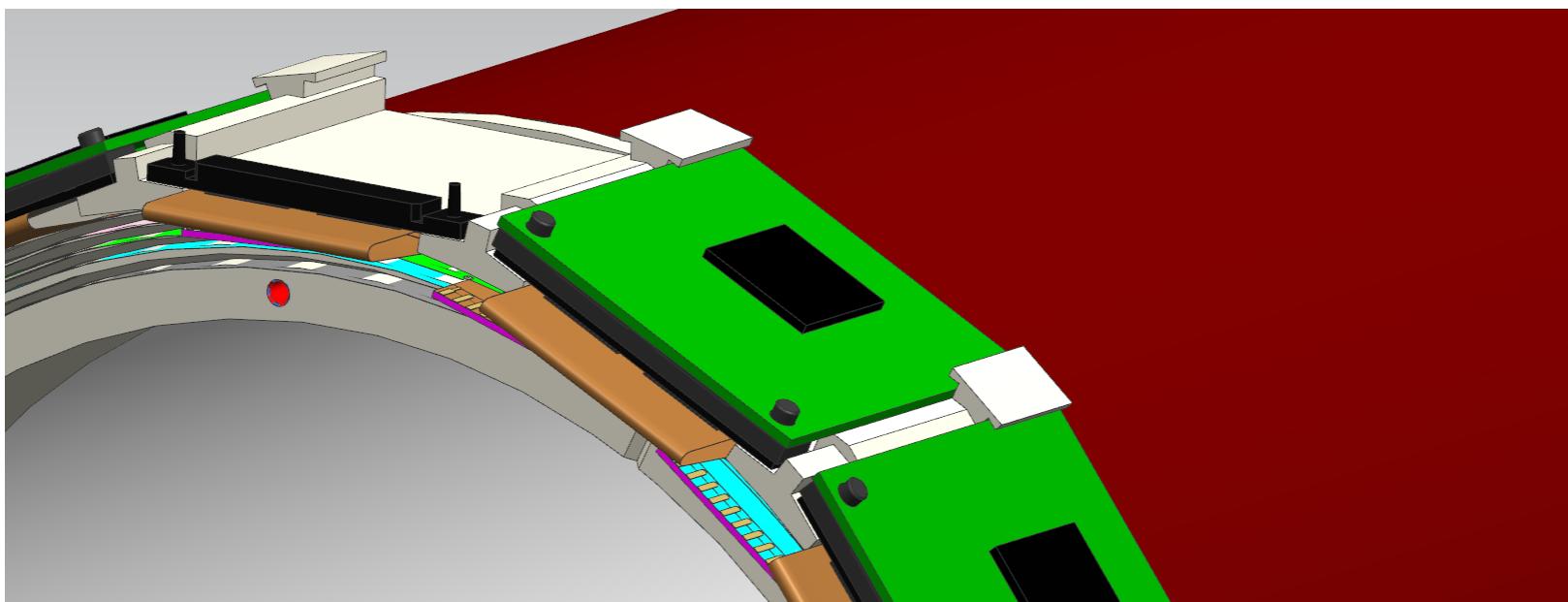
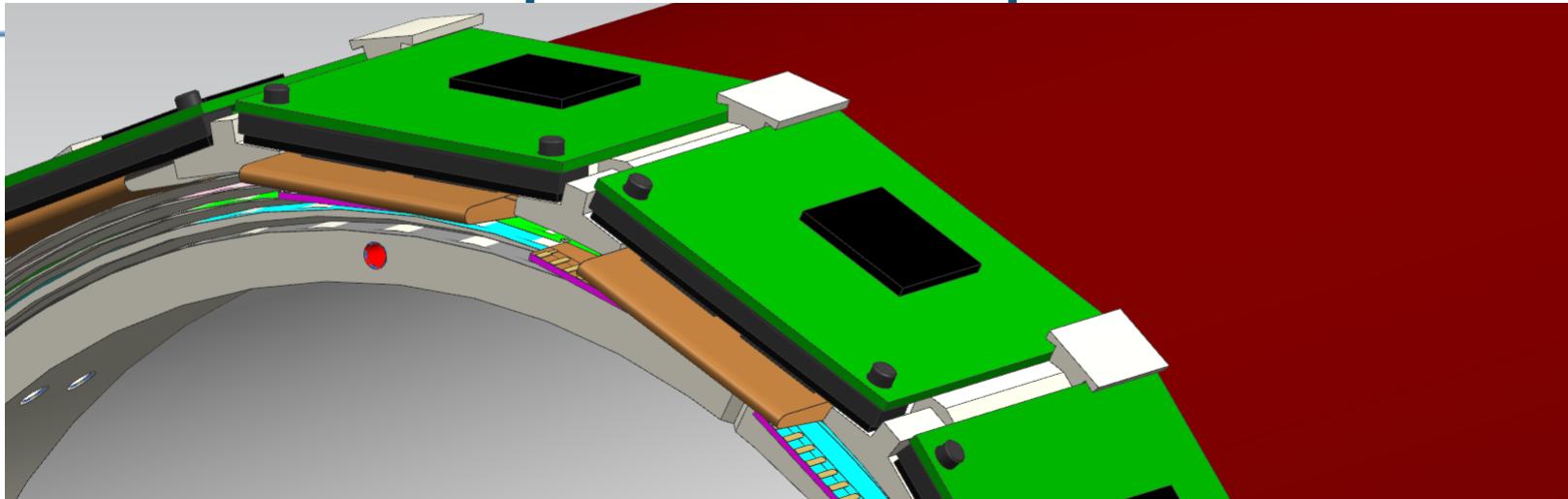
Option #1: loop



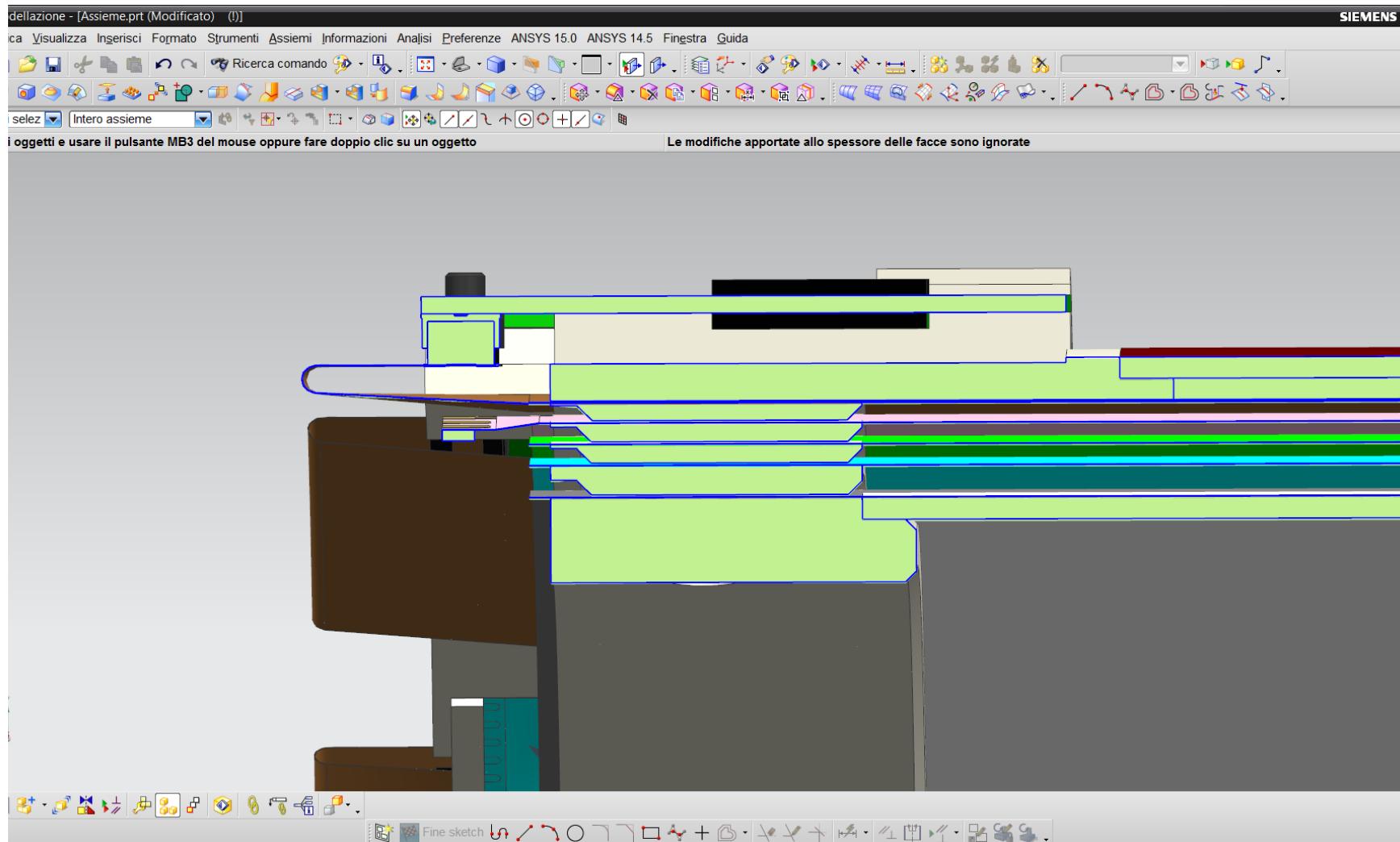
Option #1: loop



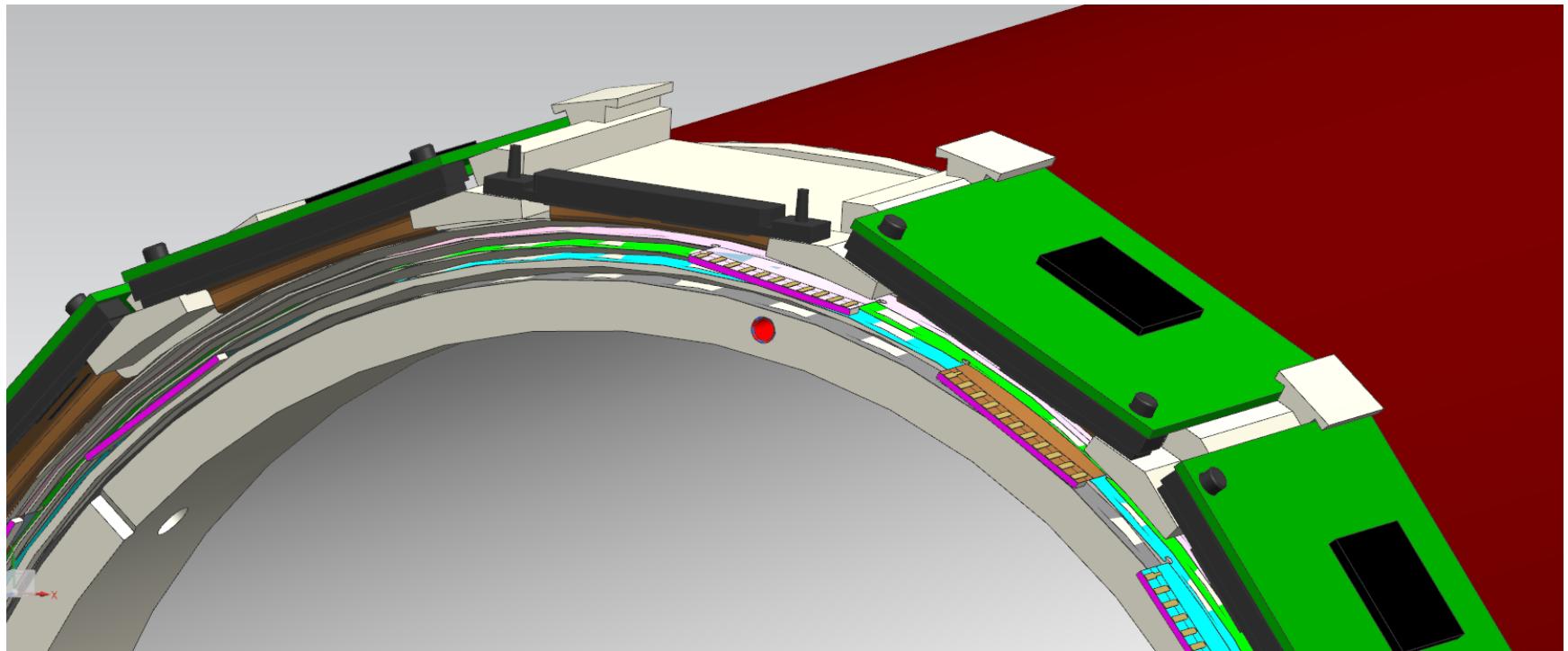
Option #1: loop



Option #1: loop



Option #2: S type



Option #2: S type

