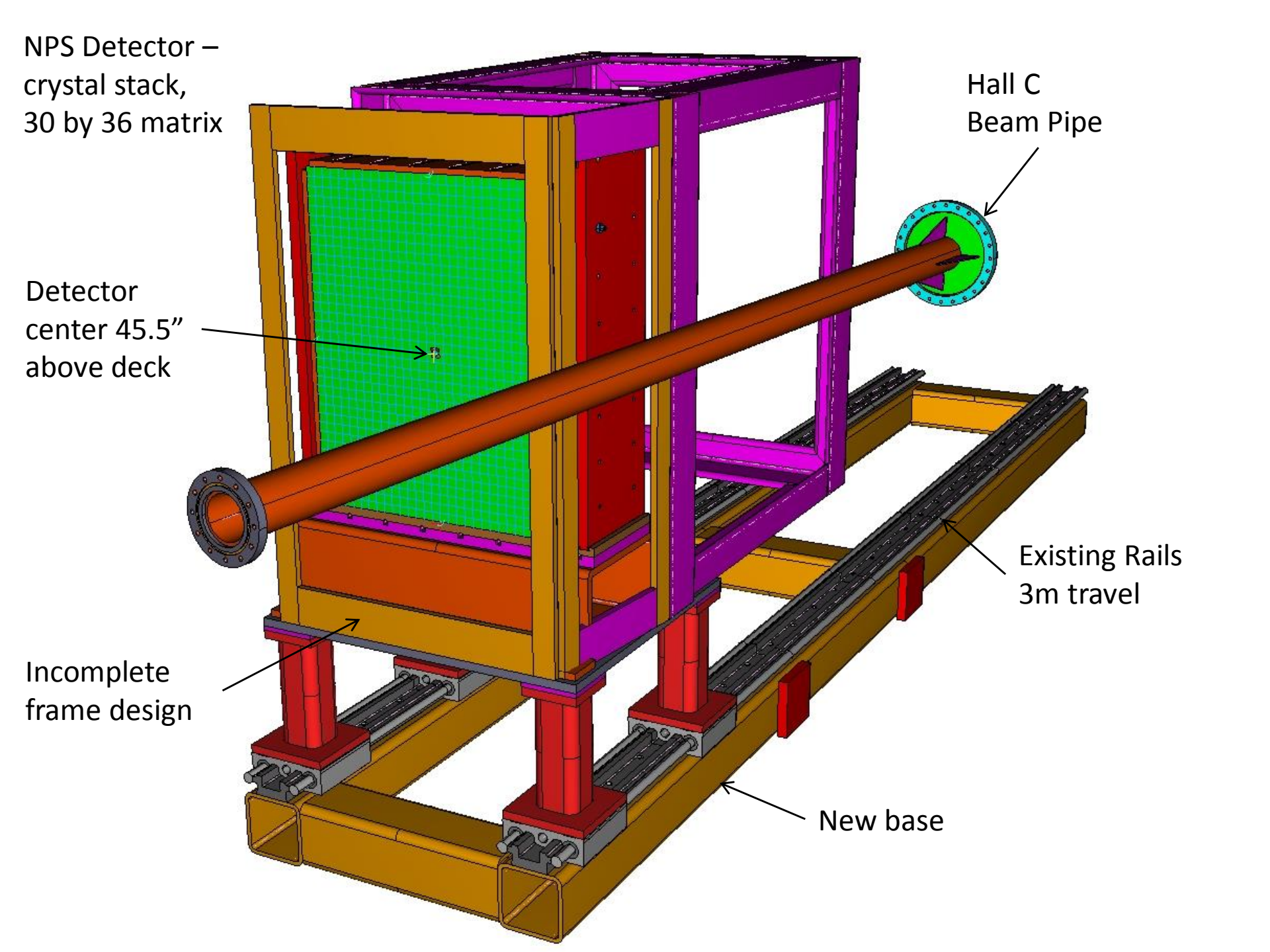
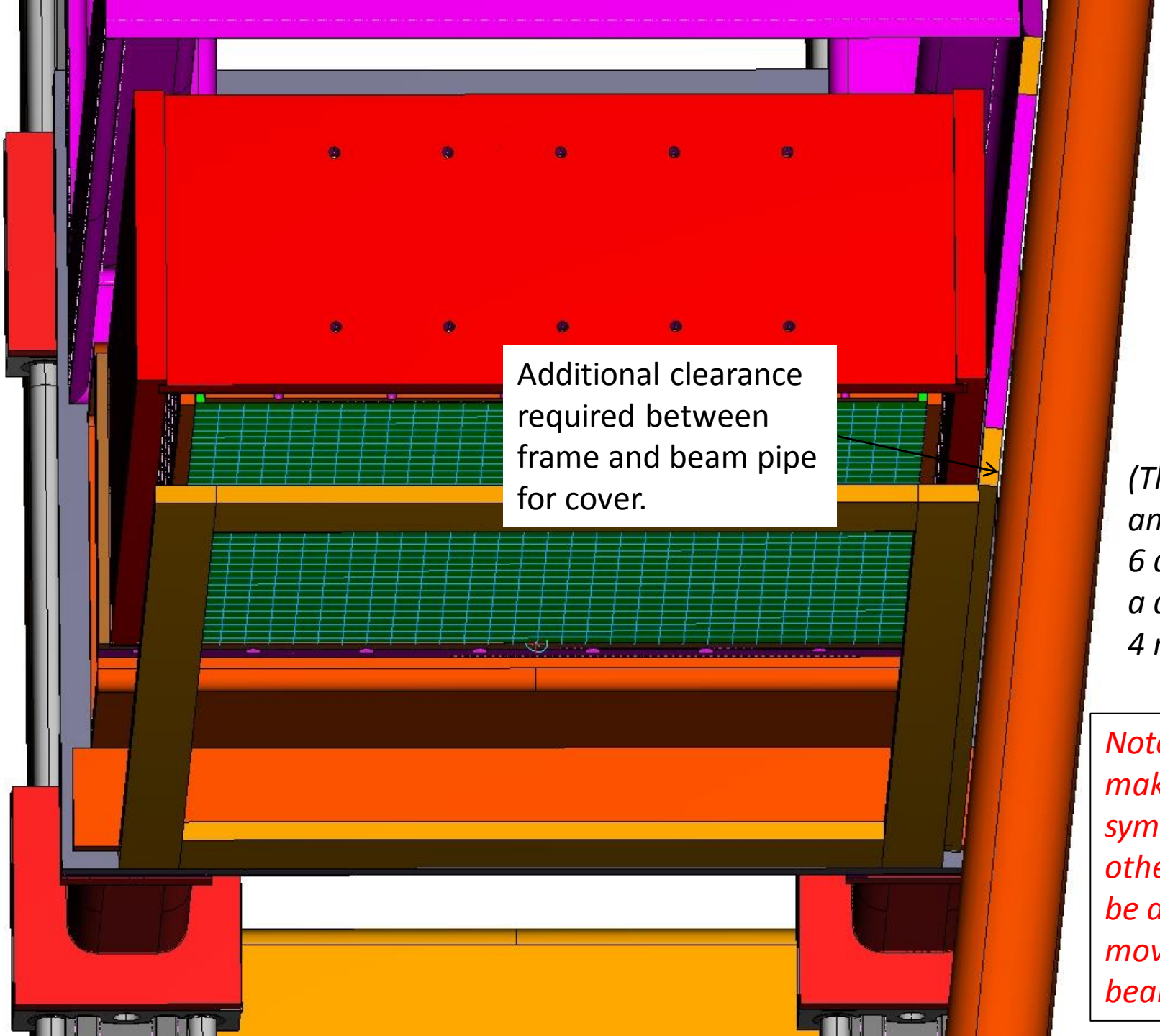
Considerations for HV and signal connector panel at back of NPS

05/19/2017

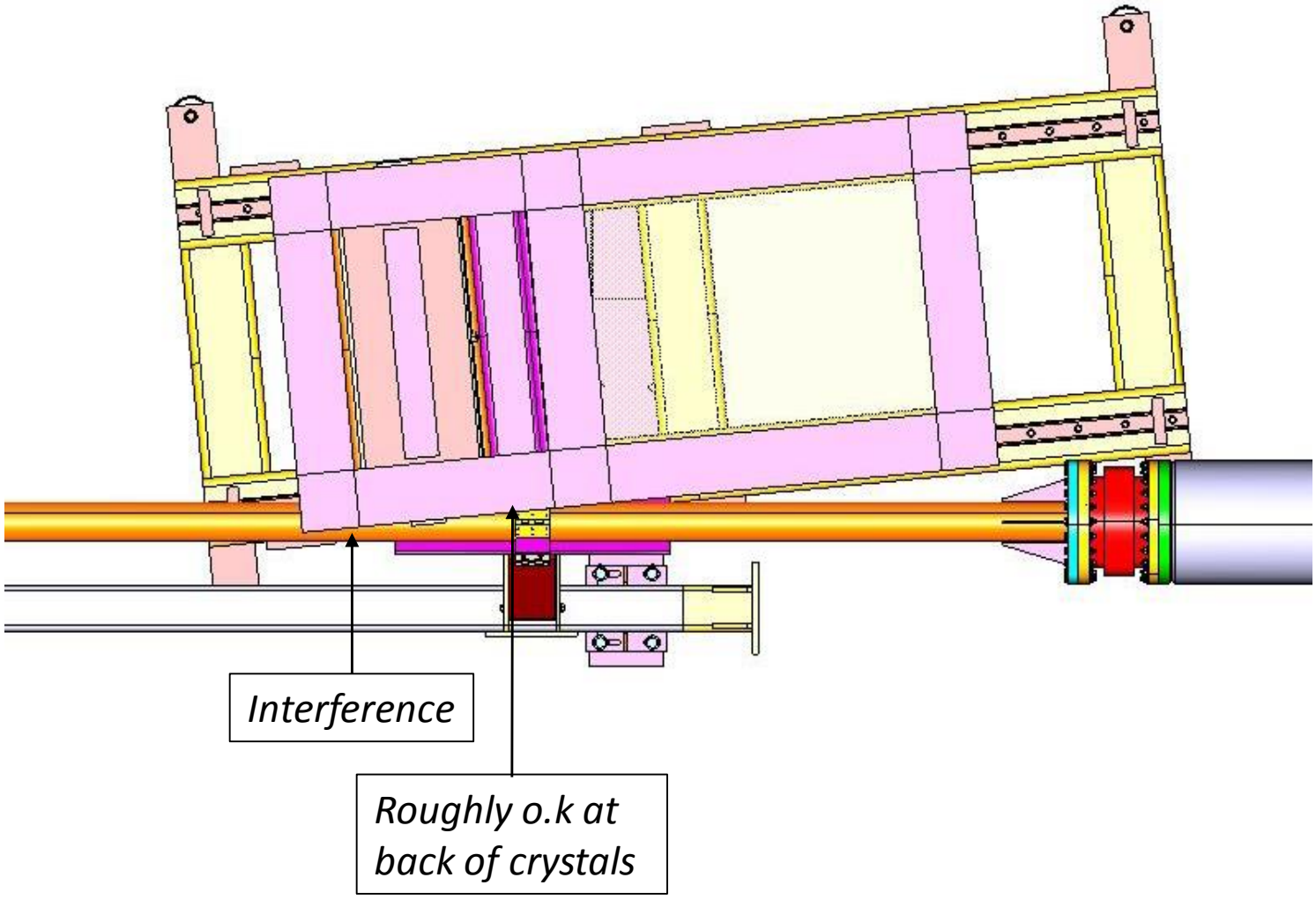

NPS Detector –
crystal stack,
30 by 36 matrix
Hall C
Beam Pipe
Detector
center 45.5”
above deck
Existing Rails
3m travel
Incomplete
frame design
New base



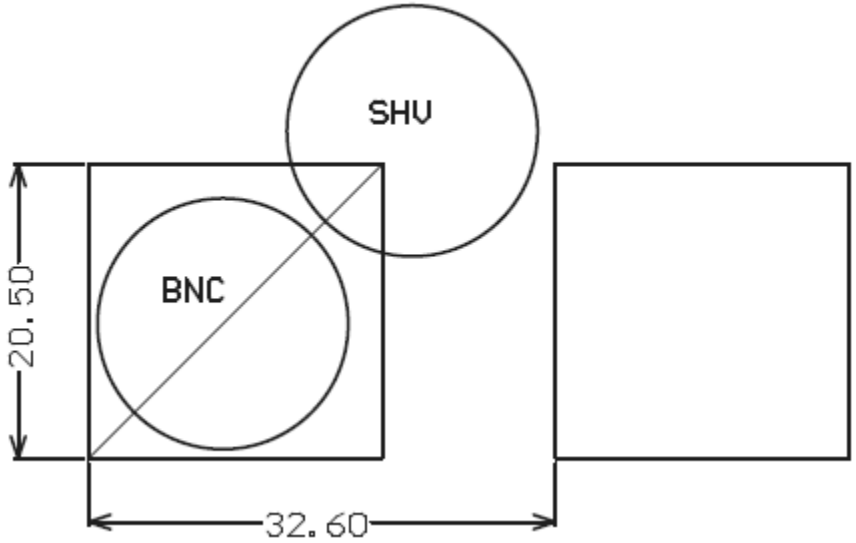
(This was for an angle of 6 degrees at a distance of 4 meters)

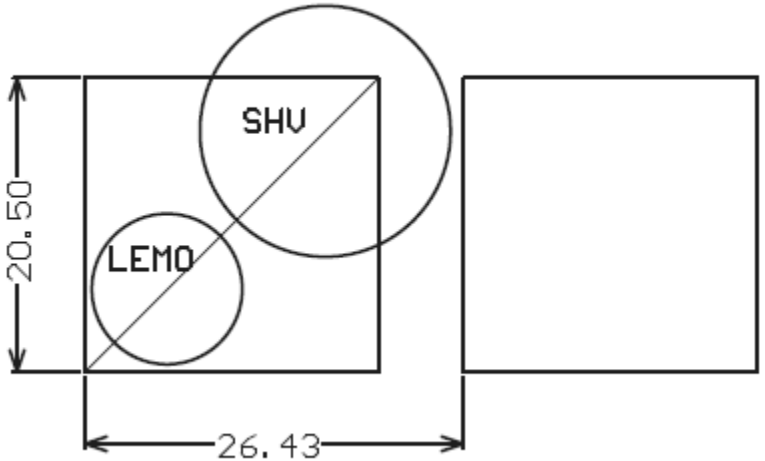
Note: should make frame symmetric on other side, to be able to move NPS to beam-right

Position 6 degrees, 4 meter distance from pivot to front crystals



Minimum connector space requirement:
(SHV + BNC) = 3.26 by 3.26 cm^2, or 1285 by 1285 mil
(SHV + LEMO) = 2.64 by 2.64 cm^2, or 1040 by 1040 mil



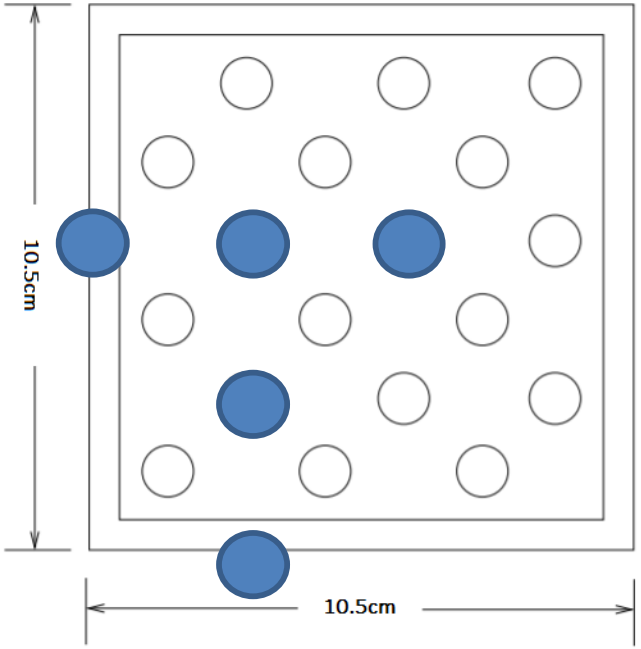


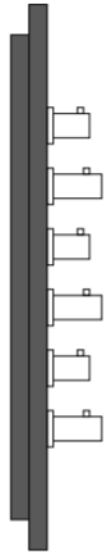
Can squeeze a bit more, following the prototype

Prototype: 3 by 3 channels, 6.15 by 6.15 cm^2

connector space 9.0 by 9.0 cm^2, or 3540 mil by 3540 mil

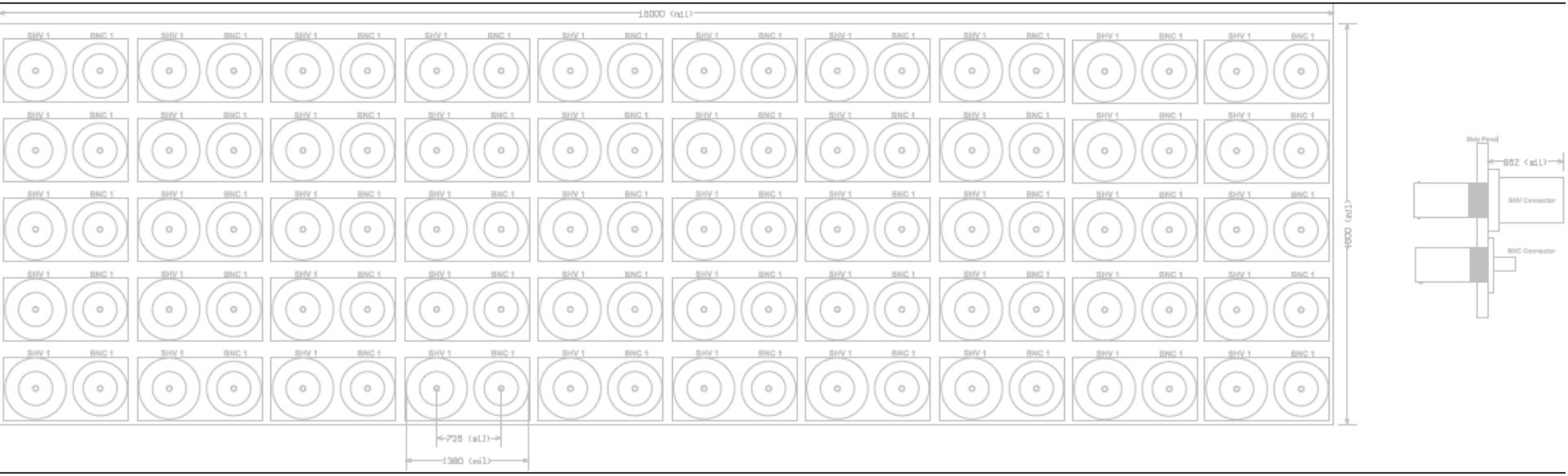
(3.5 by 3.5 would have nearly fit in 10.5 cm space of backplane)

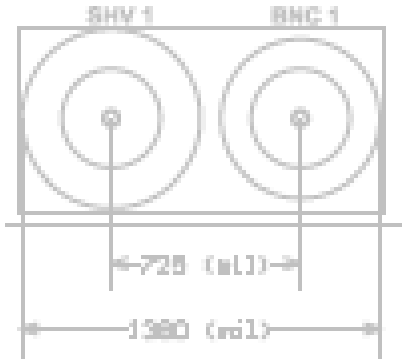




From Fernando, for the Hall D COMCAL – 100 channels split over two connector panels

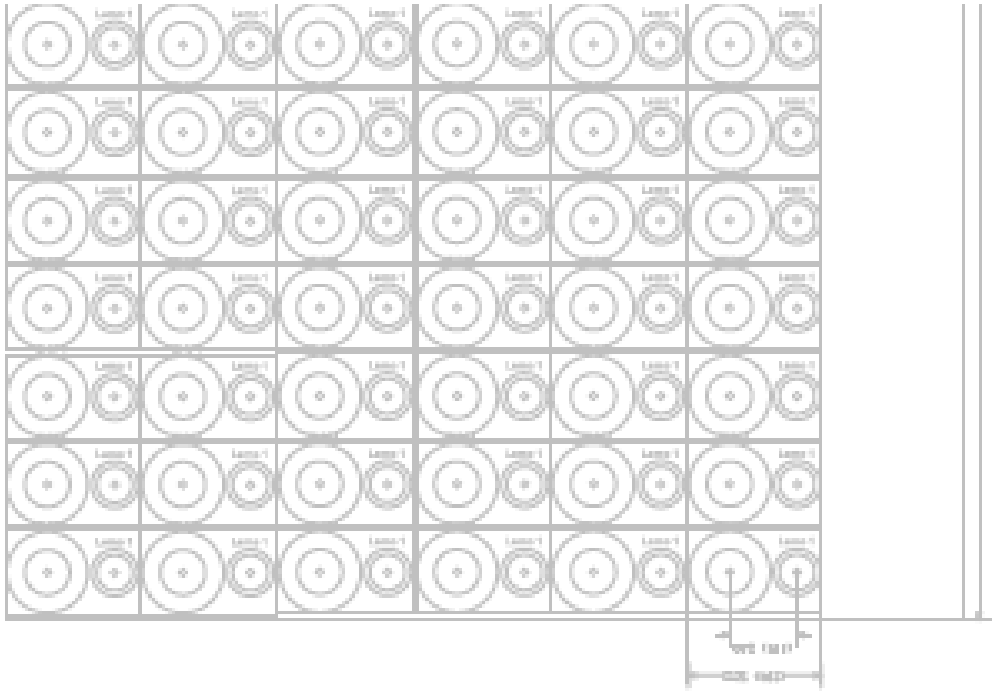
10 by 5 channels, 15000 mil by 4500 mil

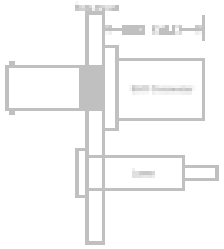


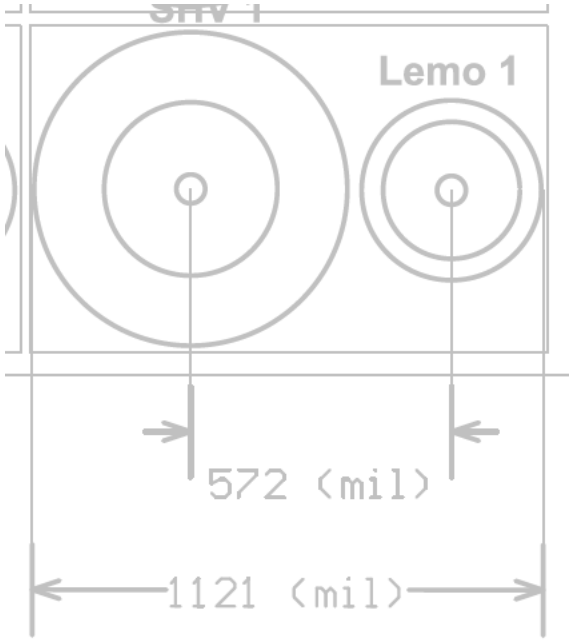


From Fernando, for the Hall C NPS – ~1200 channels split over two connector panels

25 by 25 channels, 29019 mil by 18686 mil







But, would be very advantageous if we could have only one connector panel on the top

→ *Never connectors (or cables) on beam-side*

→ *Could move detector beam right and beam left*

→ *Back is bad as one needs access to PMTs/dividers*

Minimum connector space requirement:
(SHV + BNC) = 3.26 by 3.26 cm^2, or 1285 by 1285 mil
(SHV + BNC) as per prototype = 3.0 by 3.0 cm^2, or 1185 by 1185 mil
(SHV + LEMO) = 2.64 by 2.64 cm^2, or 1040 by 1040 mil

30 by 36 crystal stack = 61.5 by 73.8 cm2
Minimum connector space (SHV + BNC) = 90.0 by 108 cm^2
(Or: Minimum connector space (SHV + BNC) = 97.8 by 117.4 cm^2 if assuming Fernando's numbers)

1) Can we fit a 90 by 108 cm^2 connector panel at the back of the crystals while not hitting the beam pipe for the configuration at 6 degrees and 4 meters? Vertical likely works, horizontal not clear/maybe.

   But, even if it fits, it would prevent access to PMTs and Dividers

   I.e., making a connector panel on the top (like HyCAL) is much better

2) Can we make a sketch how the cables would flare out from the divider to such a back connector plane?

For reference on possible space :
Interference at 6 degrees at a 4 m distance: 400 cm x sin(6^o) = 41.8 cm
Detector frame space ~ 84 cm wide when flared out to back of crystals.
Perhaps a bit larger and 90 cm would work, even if tight for connectors.
E.g., at 500 cm space = (41.8 + 10.4 – 5.1 (assuming <4" beam pipe) = 47.1 cm)

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30 by 36 crystal stack = 61.5 by 73.8 cm2
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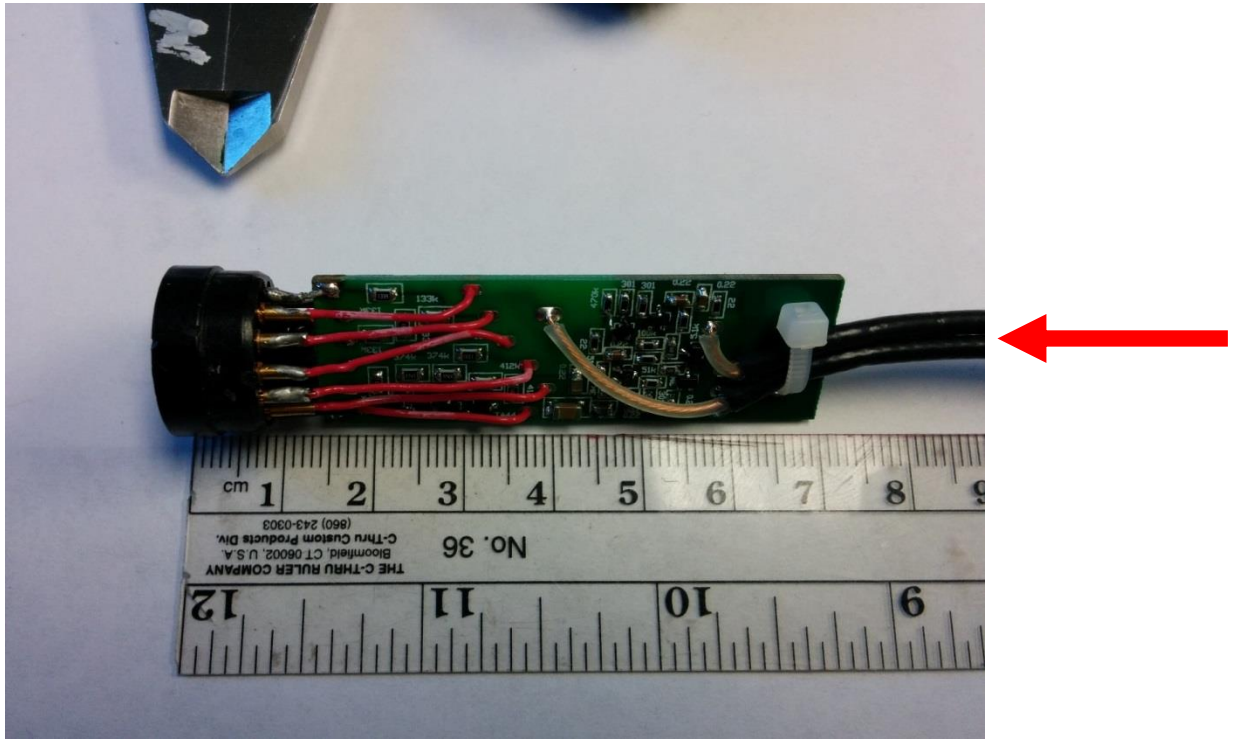
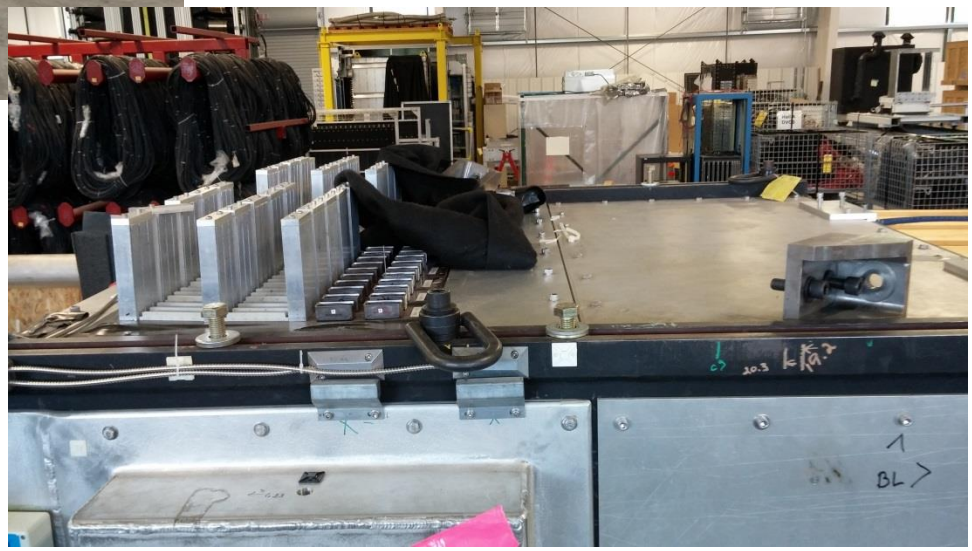
How do we flare out from the smaller crystals to the larger space need for connectors (SHV and BNC)? **Simple as divider ends in cables anyways.**



HyCAL readout is on top, through printed board strips that each are slightly movable to get access to PMTs and dividers (unscrew on top to move a bit laterally, on bottom can just push a bit).

Note that the HyCAL situation has more cables as they also use the dynode readout for their trigger, and thus need extra HV power cabling going to that dynode.



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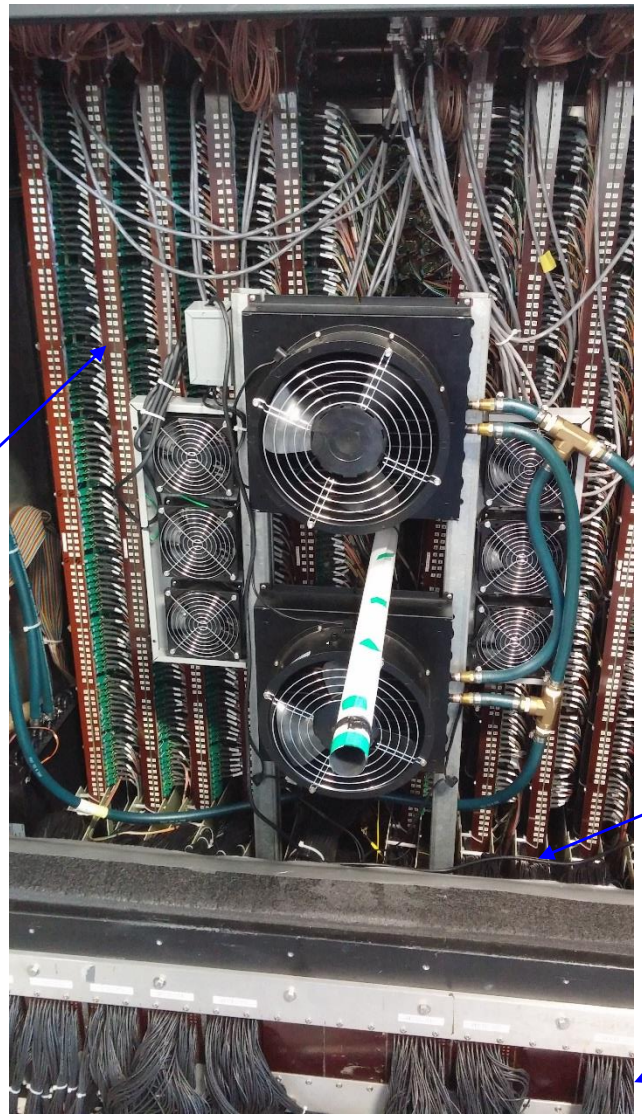
Note that the HyCAL situation has more cables as they also use the dynode readout for their trigger, and thus need extra HV power cabling going to that dynode. For HyCAL the dynode (LEMO) cables are in the bottom.



Printed board strips: divider cables connect here, and strips then lead to the connectors on top (for HV and signal)

Some free horizontal motion to get access

Dynode signal lemo cables guided to bottom

For NPS calorimeter:

Top plate likely has enough space for 1080 SHV and BNC connectors.

No need of strips, can use some channels/rods to tie bunches of cables to, such that rods can still easily be moved to the side when access to the PMTs is needed.