Focal Plane Status

February 14, 2018

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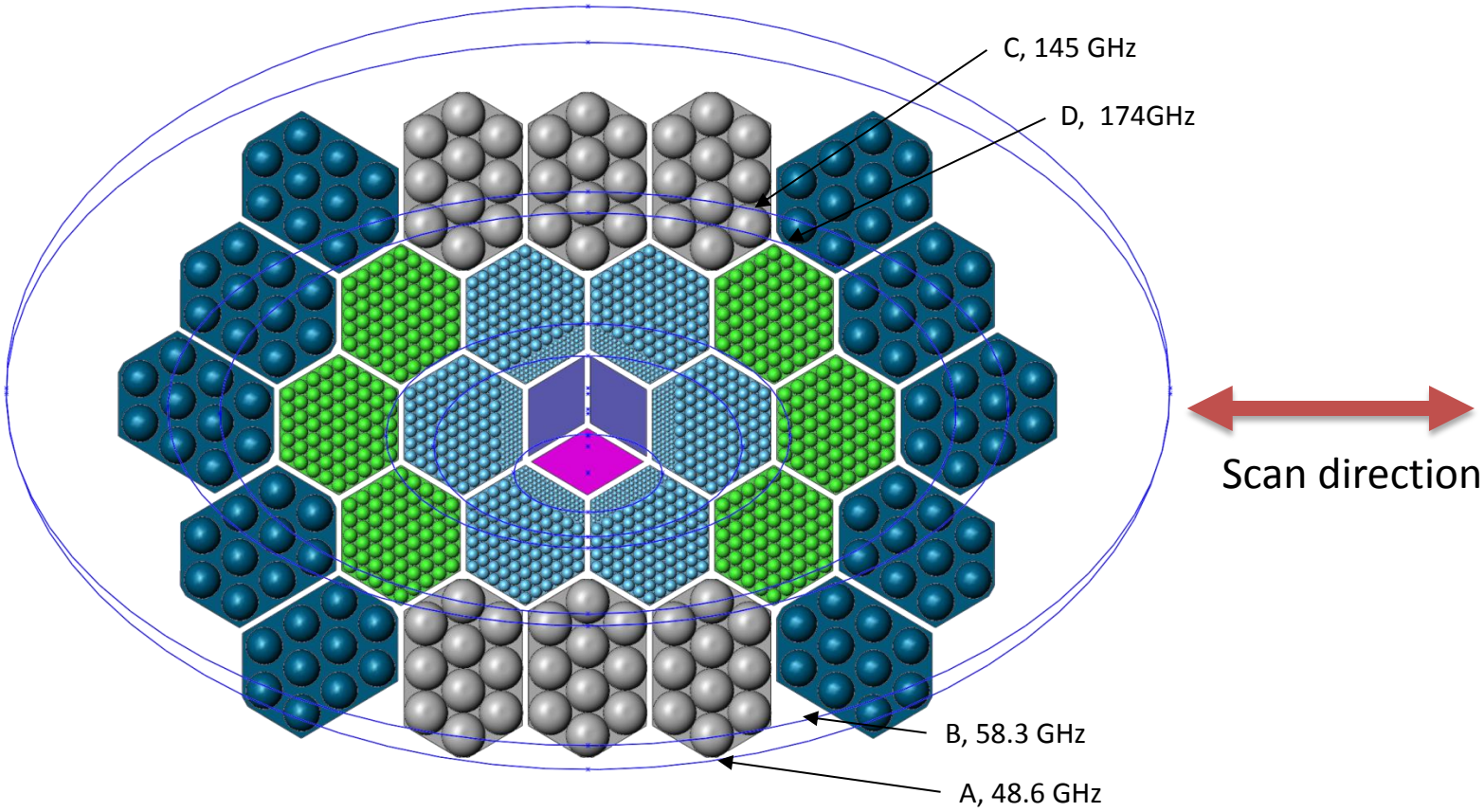
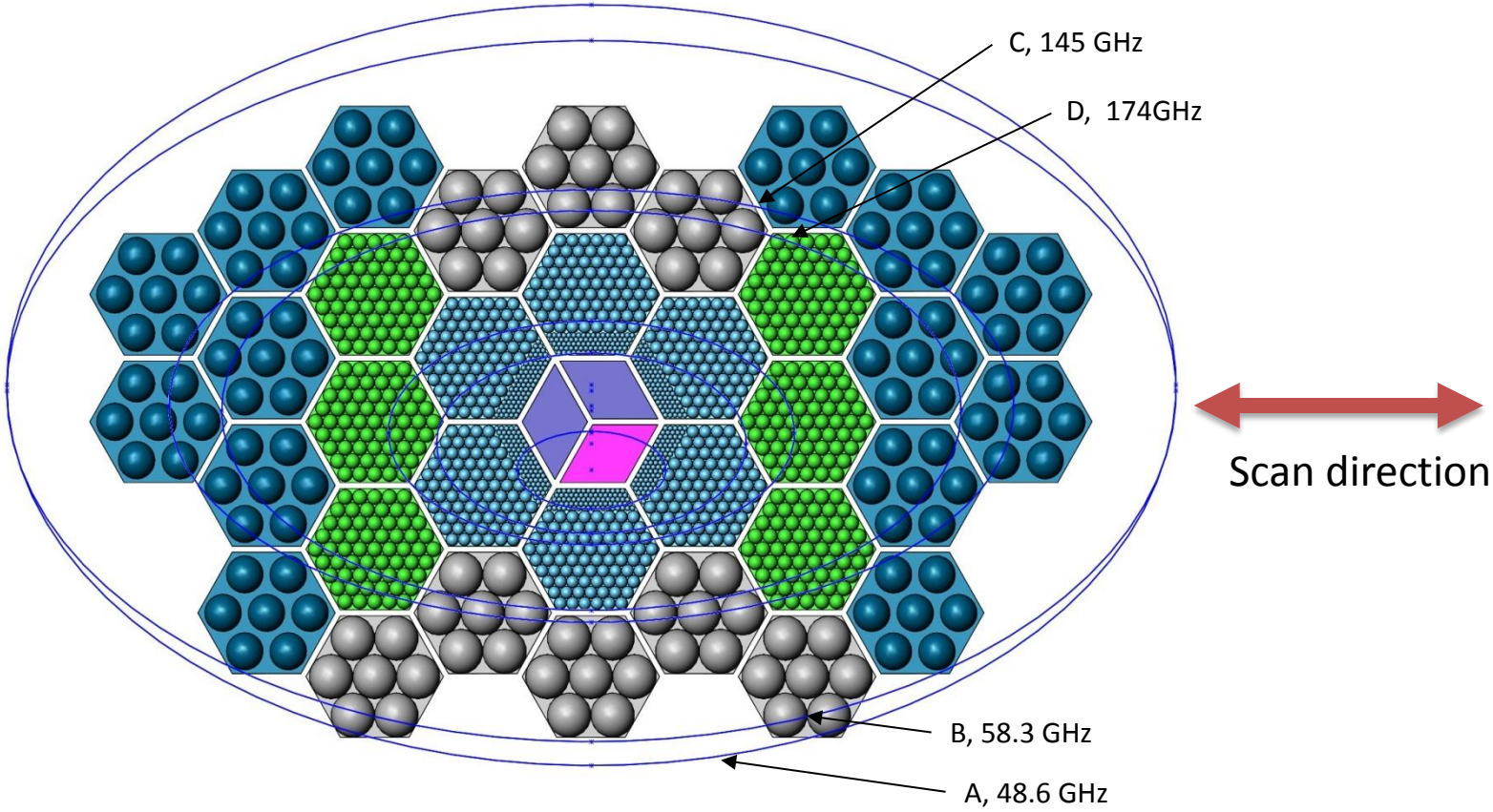
Focal Plane V5

- Central wafer split, due to different technology types
  - Fewer F pixels, more G,H,I pixels
- approximately 19 x 12 deg, 65 x 45 cm.



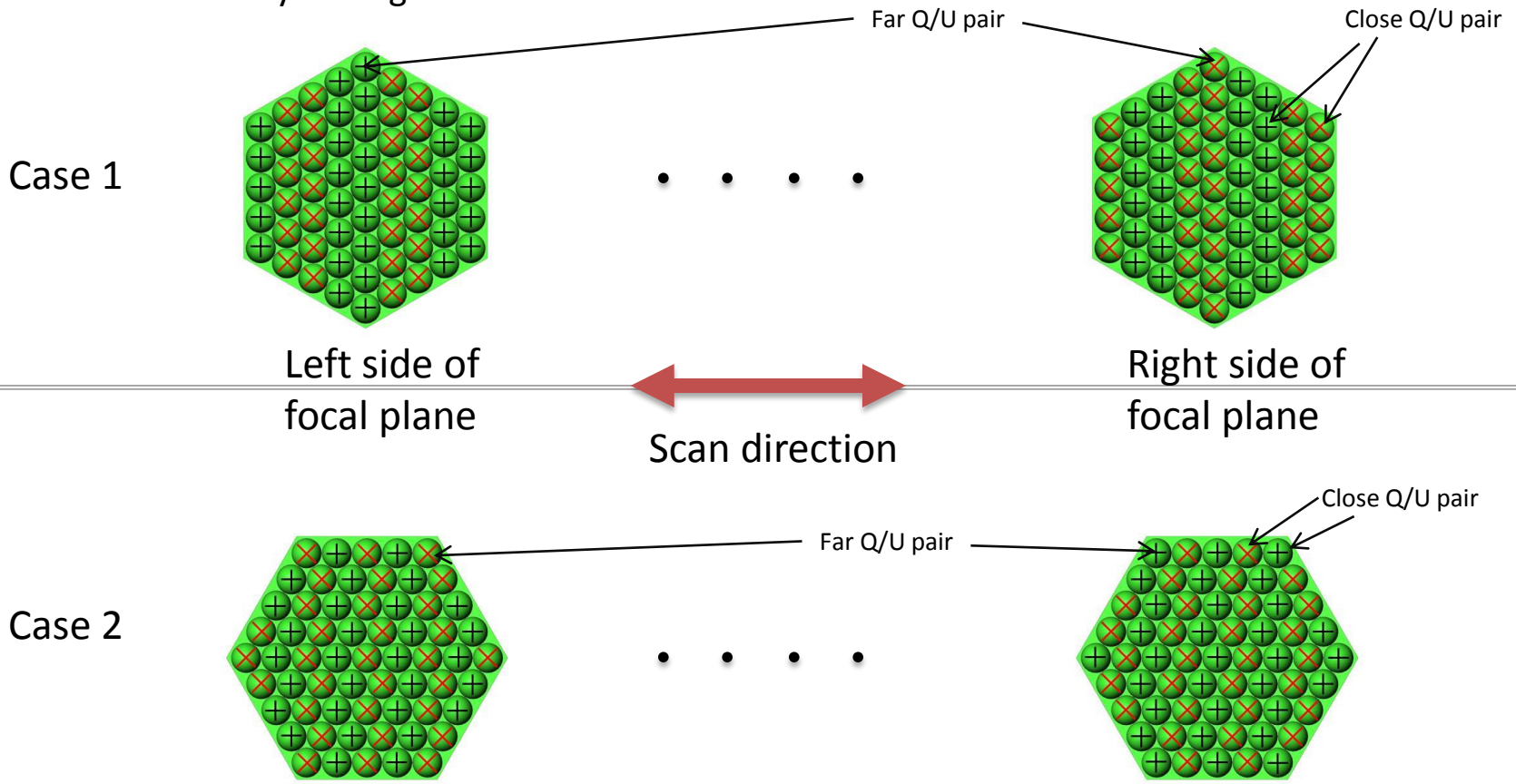
Focal Plane rotated

- Rotated by 30 deg to put rows along scan direction.
- Nearly same pixel numbers (-2 dark blue pixels, -4 gray pixels)
- approximately 20 x 11.5 deg, 69 x 43 cm.



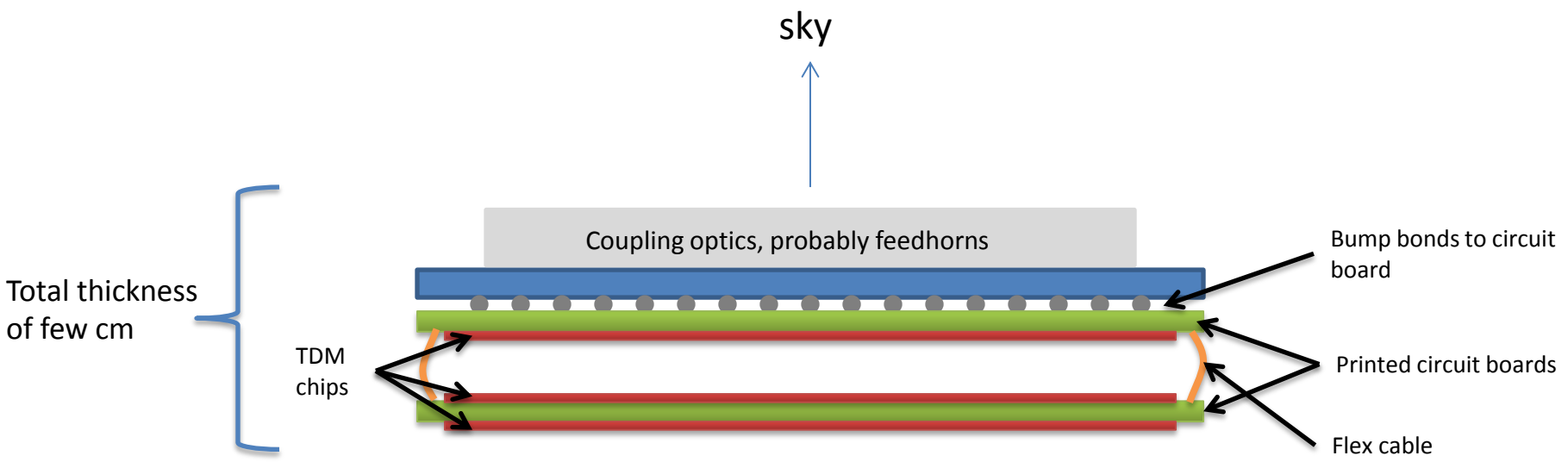
Orienting Q/U pixels

- Q/U pixel pairs should follow each along scan path.
- This is 0^{th} order. Not account for distortion by the optics.
- Showing only a single wafer pair, but all pairs would be similar.
- Case 1 is original layout
- Case 2 is rotated by 30 deg.



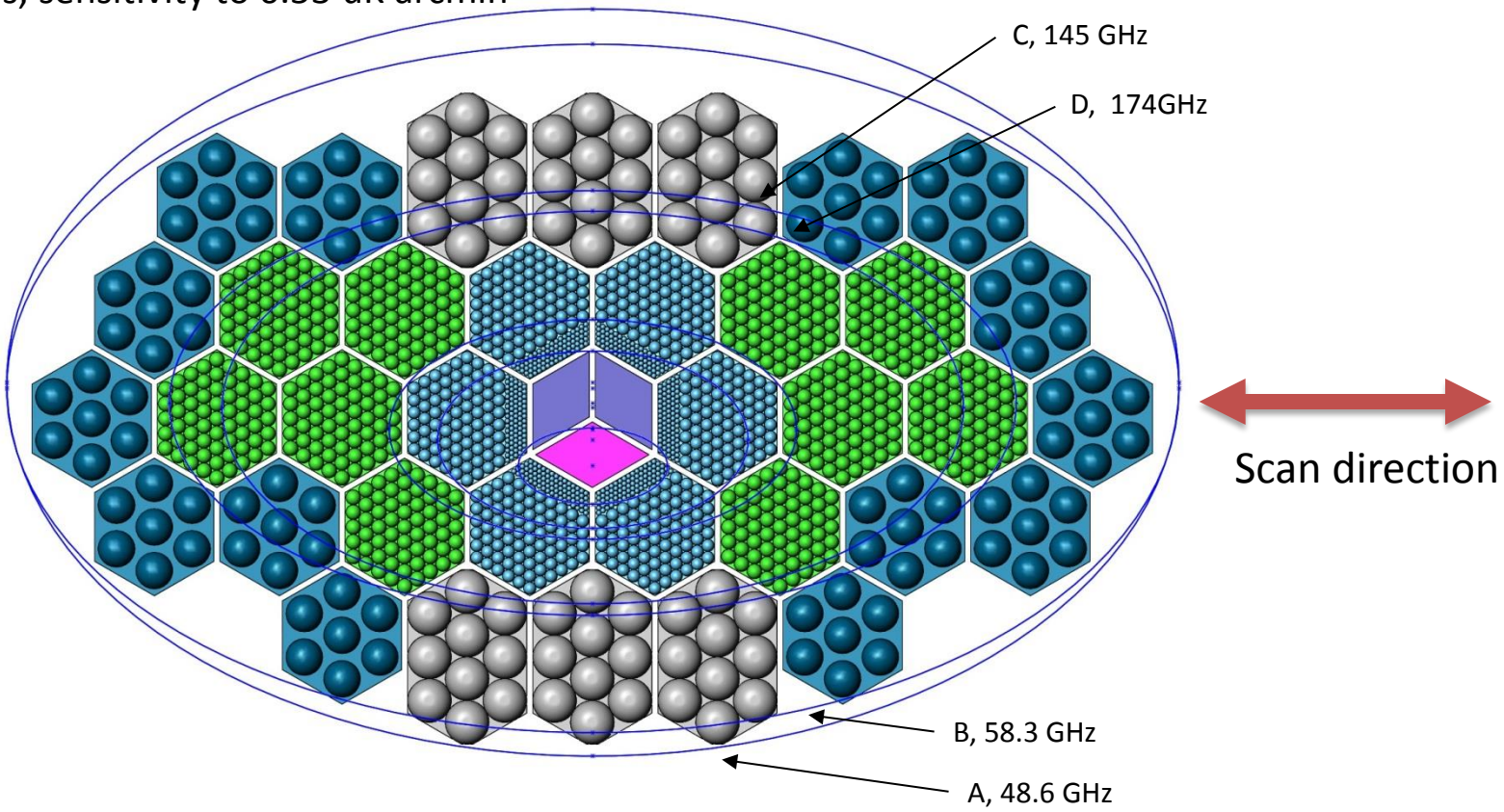
Readout for central wafers

- More TDM chips at 100 mK are needed than fit in the area behind 1 detector wafer
- We need bump bonds on the back of a wafer to connect the number of bolos to readout



Focal Plane, added 4 wafers

- 4 wafers added
- approximately 22.5 x 12 deg, 77 x 45 cm.
- Mirrors need to be larger in X dimension.
- Sensitivity was 0.61 uK arcmin
- If 4 ‘C’ wafers, sensitivity to 0.56 uK arcmin
- If 4 ‘D’ wafers, sensitivity to 0.53 uK arcmin



Selection of last week's slides on following pages for reference

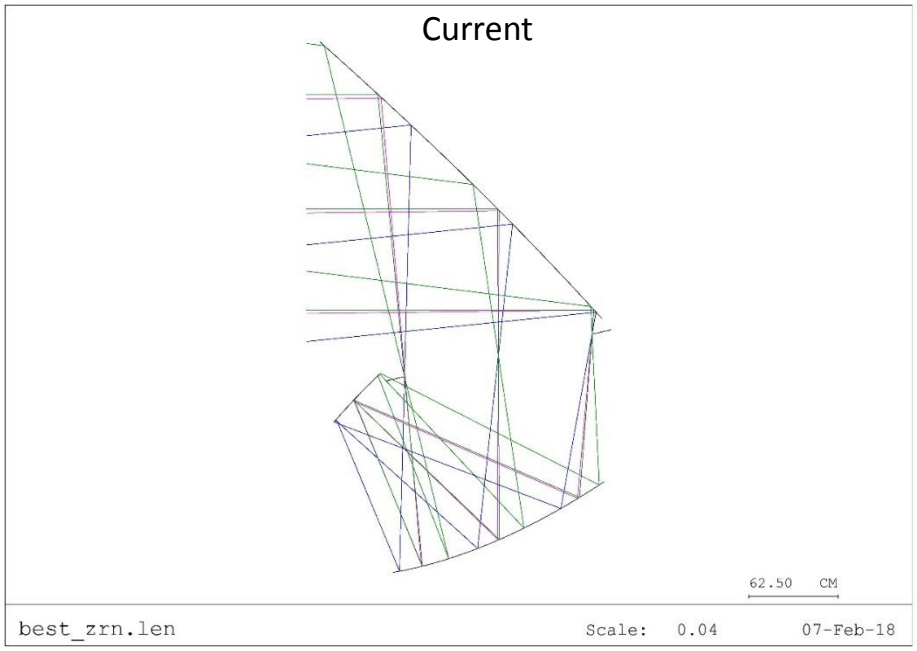
Focal Plane V5

- Wire bonding or bump bonding chips on focal plane?
  - Wire bonds have heritage and allow more flexibility.
    - Limited to 1400 detectors per wafer 1700 detectors per hex wafer (bond pitch = 80 um)
  - Bump bonds allow more density of connections per chip.
  - If KIDs (or similar) are dominate tech in 5 years this point is moot.
- Volume needed for 100 mK readout components? 4K readout components?
  - 100 mK TDM requires 4 mm^2 per channel (Hannes)
  - 100 mK FDM requires LCs, about 50-80 mm^2 channel (from EBEX-IDS, LCs on silicon wafer)
  - 4K, both need SQUIDs

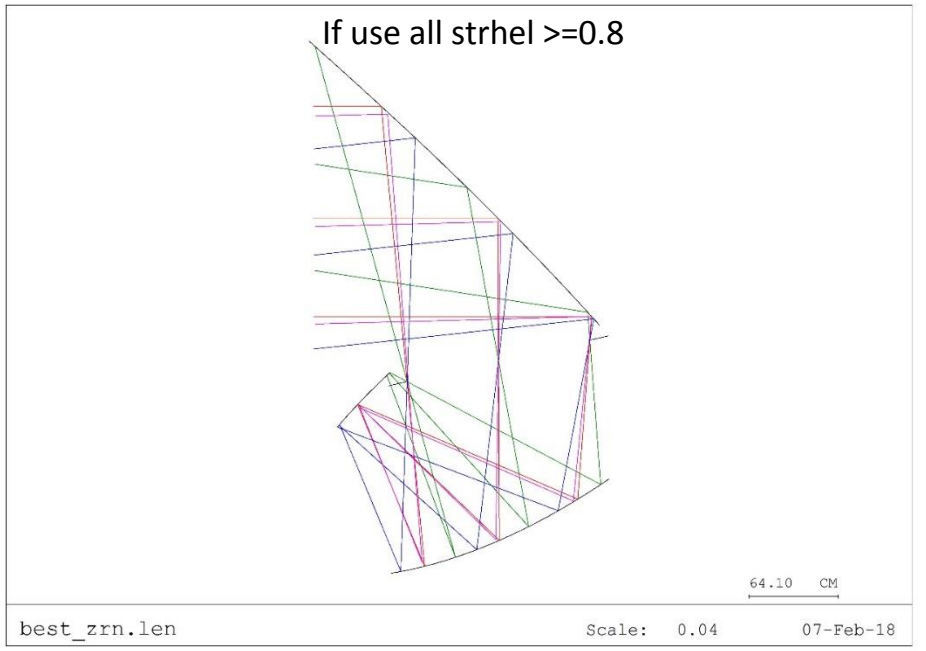
Pixel	Bands (GHz)	Upper edge of upper band (GHz)	V4 Number	V5 Number	Bolometers per wafer	Area behind 1 wafer (mm^2)	Area needed for TDM chips (mm^2)
A	**21, 30, 43**	**48.6**	**60**	**60**	**60**	**8100**	**240**
B	**25, 36, 52**	**58.3**	**100**	**100**	**60**	**8100**	**240**
C	**62, 90, 129**	**145**	**366**	**366**	**366**	**5700**	**1500**
D	**75, 108, 155**	**174**	**510**	**510**	**990**	**5700**	**3960**
E	**186, 268, 385**	**433**	**480**	**480**			
F	**223, 321, 462**	**520**	**550**	**450**	**1350**	**1730**	**5400**
G	**555**	**624**	**200**	**220**	**1000**	**1730**	**4000**
H	**666**	**749**	**160**	**200**			
I	**799**	**899**	**120**	**180**			

Mirror limits to focal plane size

Current



If use all strhel >=0.8



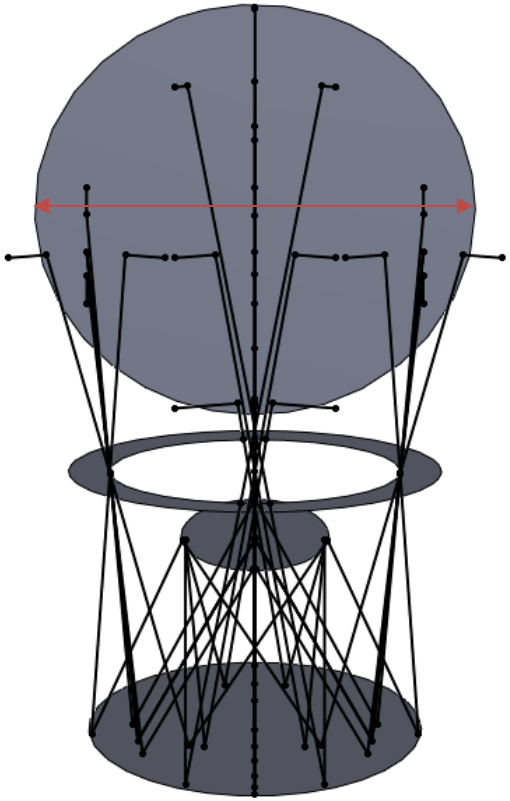
FOV	cm	deg
X	32.25	8.8
-X	-32.25	-8.8
Y	18.85	5.7
-Y	-25.65	7.0

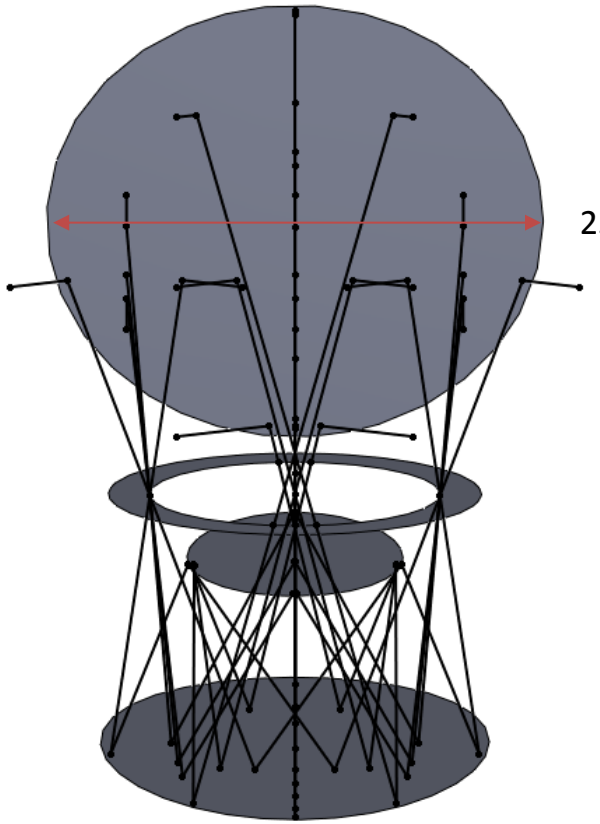
X: in & out
Y: on the page

FOV	cm	deg
X	46.9	12.9
-X	-46.9	-12.9
Y	20	6.1
-Y	-31.8	-8.6

Clearance to stop = 8.5 cm

Clearance to stop = 0 cm; as we go to –Y, clearance smaller





	Current	If use all Strehl >= 0.8
Primary Mirror	270 cm X 200 cm	285 cm X 230 cm
Secondary Mirror	152 cm X 158 cm	178 cm X 168 cm
Focal Plane	65 cm X 45 cm	100 cm X 54 cm