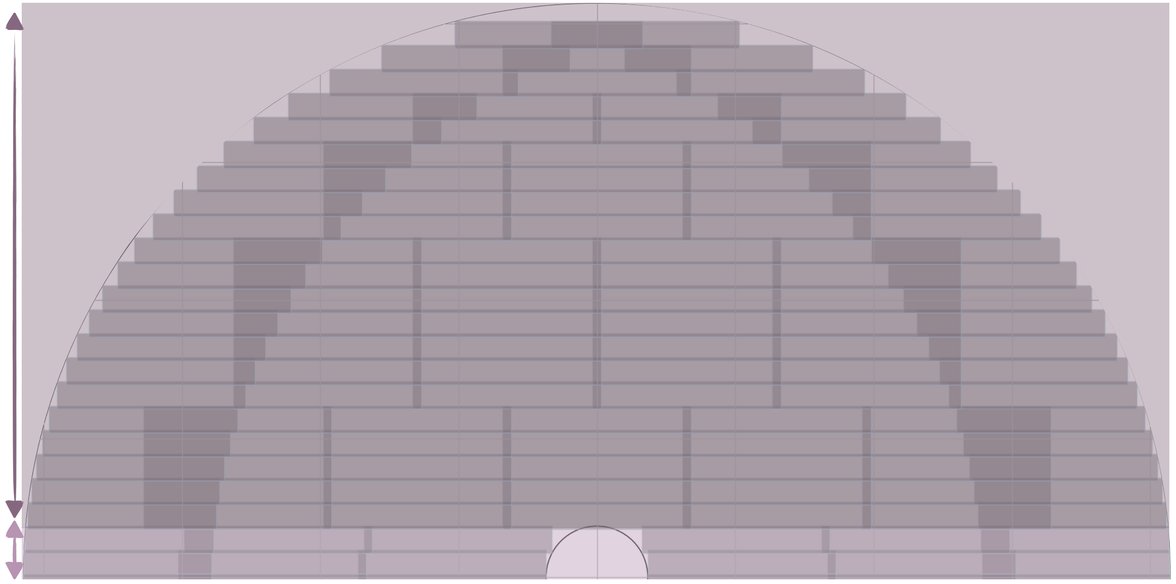
ePIC SVT detector
Electron & Hadron Endcaps paving

EIC Meeting

Algorithmic approach



Zone 1:

Strategy for minimum overlap in the inner region, maximum at the outer region. Vertical overlap is constant between all zones (2.175 mm)

- Inner circle:

  Symmetric filling -> cut zone in 2, x<0 and x>0.

  Filling starts at $min(\sqrt{R_{in}^2 - y^2}, \sqrt{R_{in}^2 - (y + sensor\ height)^2})$, closest possible to beam pipe, with overlap of 6 mm between each sensor to cover the readout strips. Stop filling at one sensor outside of the outer circle, last one is then pushed back in at $max(\sqrt{R_{out}^2 - y^2}, \sqrt{R_{out}^2 - (y + sensor\ height)^2})$. *Mirrored coordinates for x>0.*

- Double inner circles:

  Same logic for inner circle, difference in filling starts at:

  x<0:

  $min(\sqrt{R1_{in}^2 - y^2}, \sqrt{R1_{in}^2 - (y + sensor\ height)^2}, \sqrt{R2_{in}^2 - y^2}, \sqrt{R2_{in}^2 - (y + sensor\ height)^2})$

  x>0:

  $max(\sqrt{R1_{in}^2 - y^2}, \sqrt{R1_{in}^2 - (y + sensor\ height)^2}, \sqrt{R2_{in}^2 - y^2}, \sqrt{R2_{in}^2 - (y + sensor\ height)^2})$

  + Taking into account x if circle not centered around (0,0)

Zone 2:

Same strategy for minimum overlap in the inner region, maximum at the outer region.

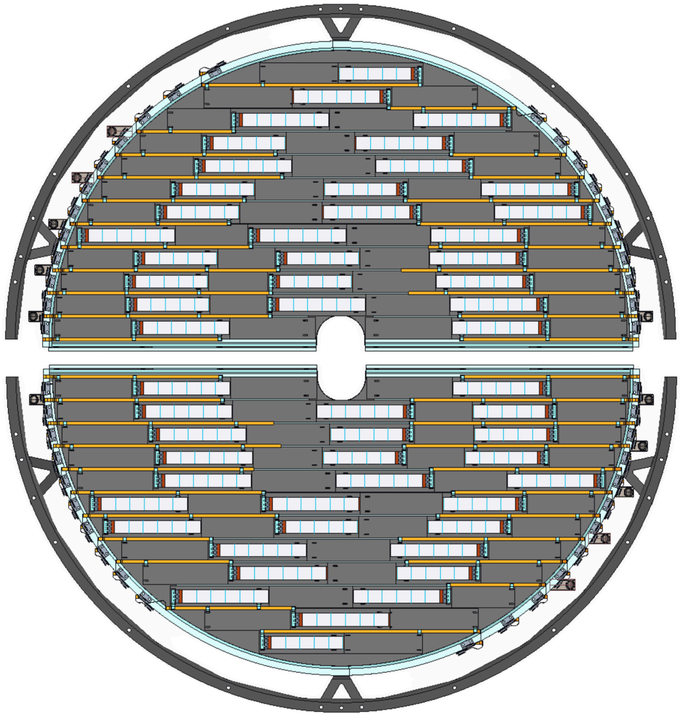
Start filling with first sensor at $max(\sqrt{R_{out}^2 - y^2}, \sqrt{R_{out}^2 - (y + sensor\ height)^2})$, with overlap of 6 mm between each sensor to cover the readout strips. Stop filling at one sensor outside of the outer circle, last one is then pushed back in at $min(\sqrt{R_{out}^2 - y^2}, \sqrt{R_{out}^2 - (y + sensor\ height)^2})$.

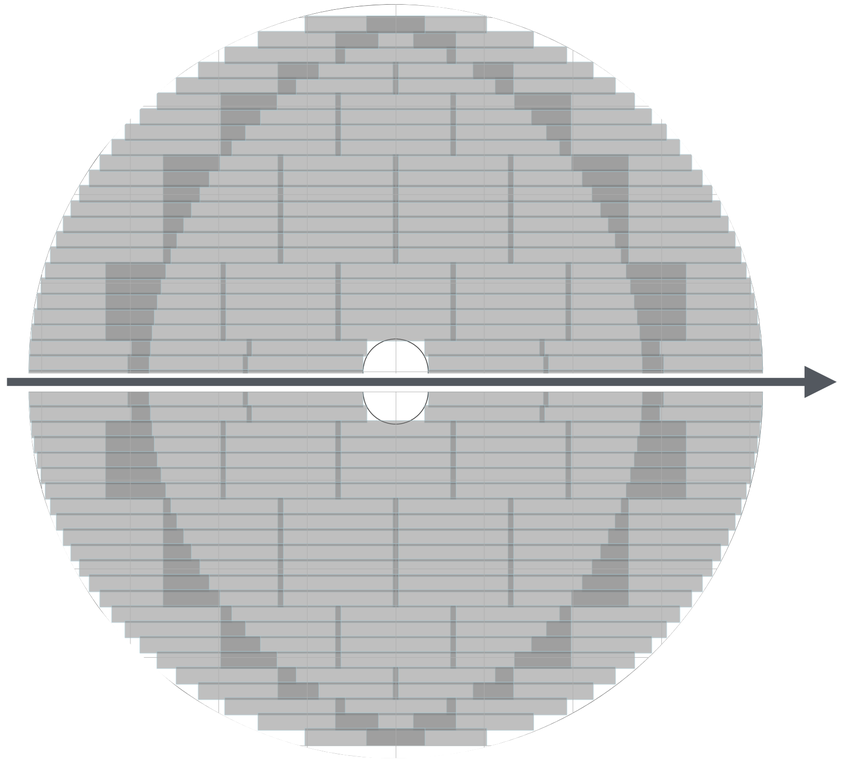
The overlap is divided by 2 and distributed on both sides.

+ Filling done with both 5-RSUs and 6-RSUs sensors, best scenario (least additional overlap) is selected for paving.

+ 5 mm added to the inner circles to take into account bake out.

Disks overview

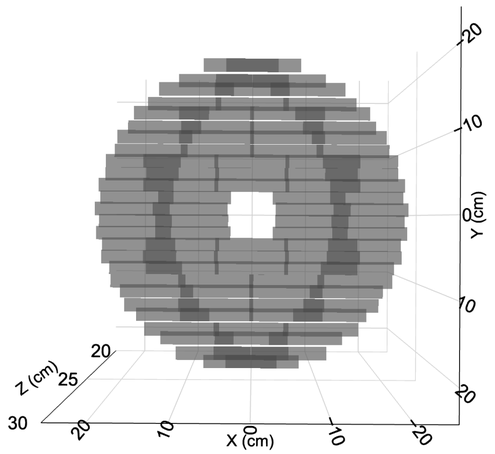


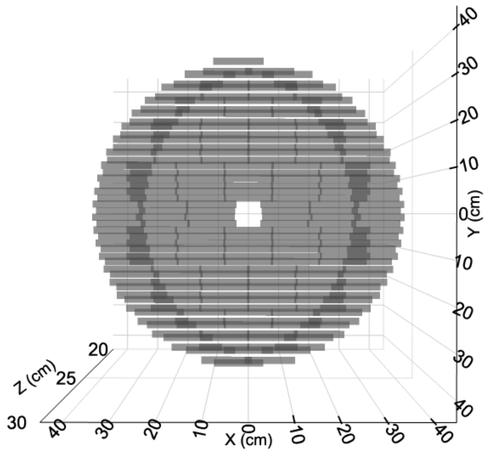


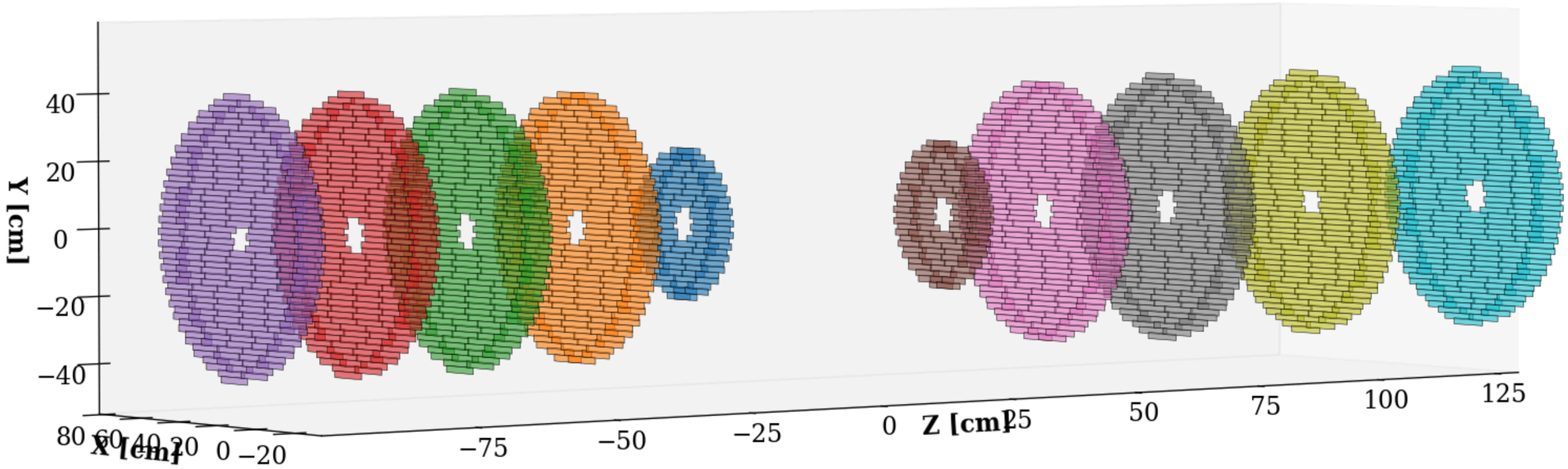
Region	Disk	z [mm]	inner radius* [mm]	outer radius [mm]	X/X0
EE	ED0	-250	36.76	240	0.24%
	ED1	-450	36.76	415	0.24%
	ED2	-650	36.76	421.4	0.24%
	ED3	-850	40	421.4	0.24%
	ED4	-1050	46.35	421.4	0.24%

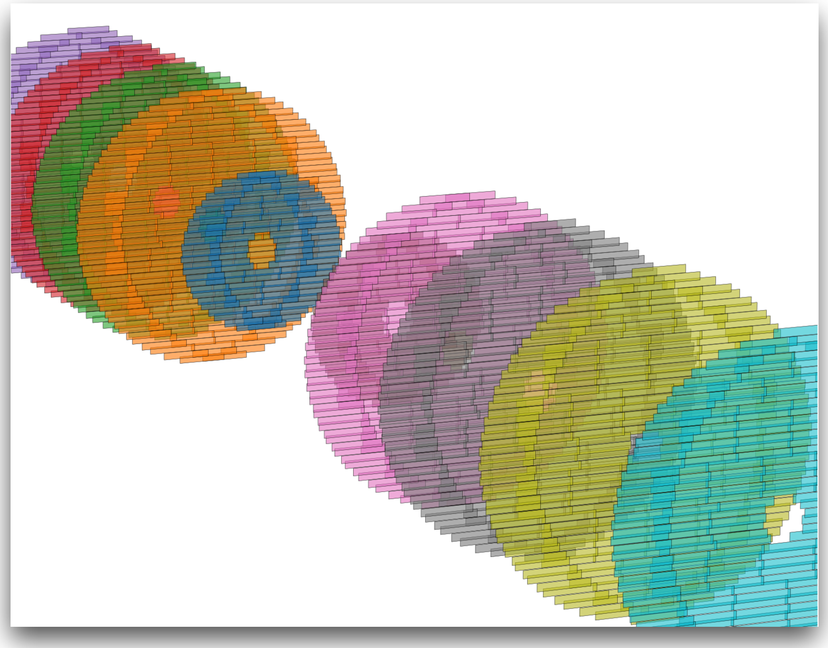
Region	Disk	z [mm]	inner radius* [mm]	outer radius [mm]	X/X0
HE	HD0	250	36.76	240	0.24%
	HD1	450	36.76	415	0.24%
	HD2	700	38.46	421.4	0.24%
	HD3	1000	53.43	421.4	0.24%
	HD4	1350	70.14	421.4	0.24%

3D view of all disks - sensors



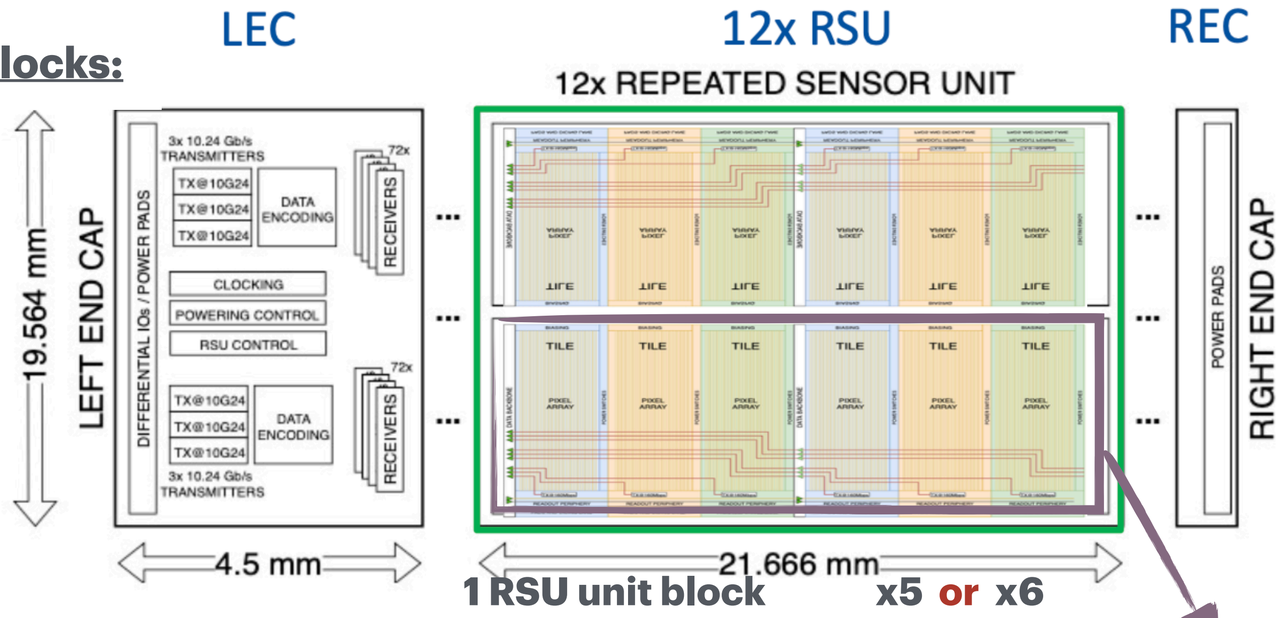


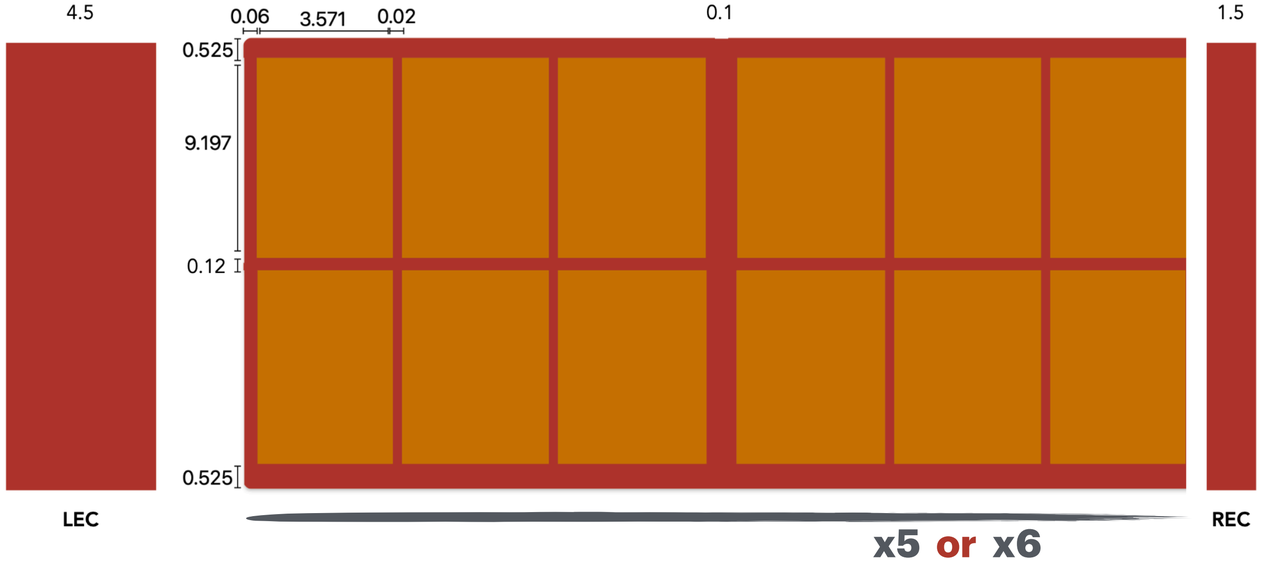


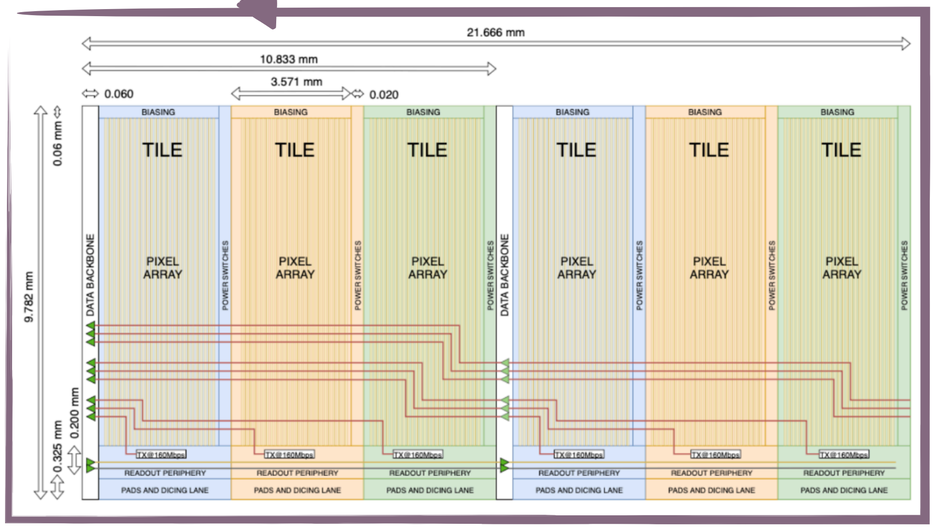


Unitary sensor dimensions

Sensors with 5/6 RSU unit blocks:







*: Readout area

*: Active area

Discussion time!