Layer 0 and STT

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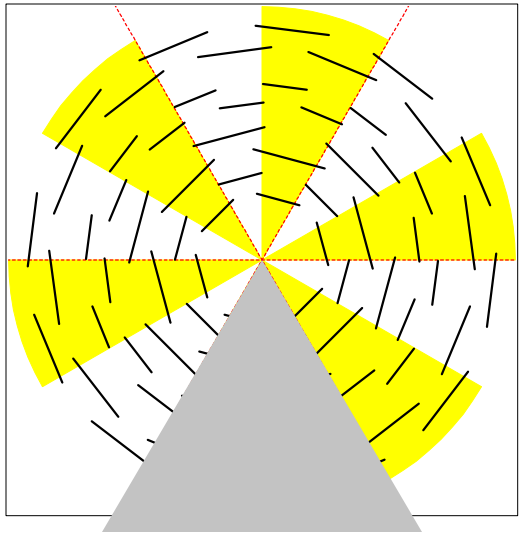
Run 2A STT

- 6 VME crates – each covering 2x30^o in ϕ

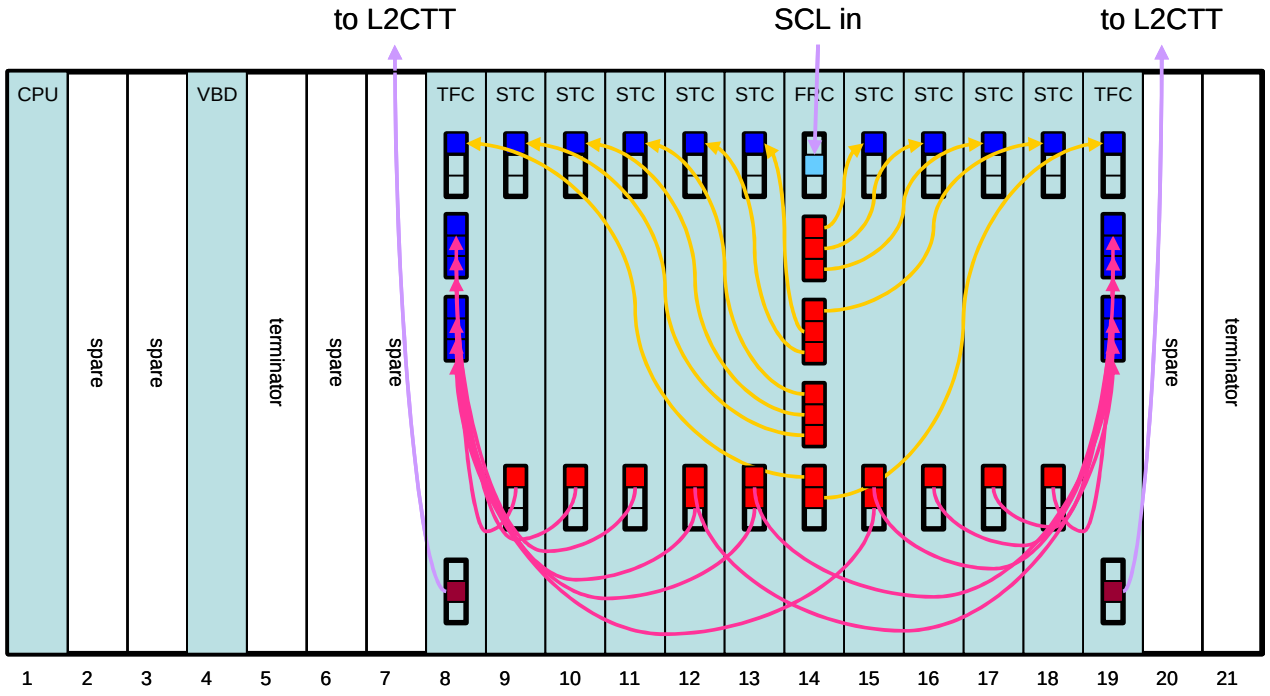


1 FRC

9 STCs

2 TFCs

per crate



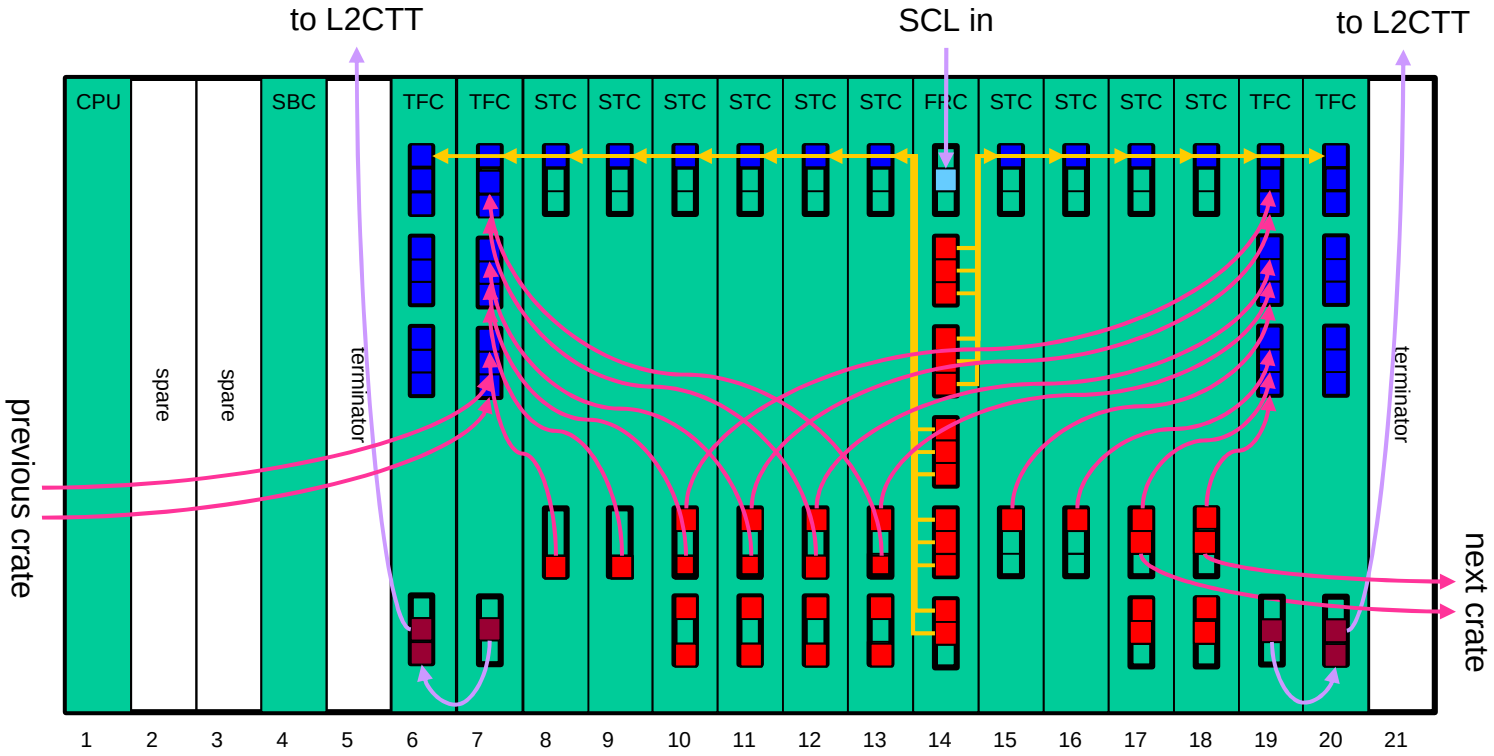
Run 2A STT

- SMT inputs
  - 432 HDIs
  - 8 HDIs/STC
  - Need 9 STCs/crate
  - 3 spare slots/crate
- TFC inputs
  - 6 STC inputs/TFC
  - Maximum 8
- FRC outputs
  - 11 (1 per STC/TFC)
  - Maximum 15

layer	Readout units		
	ϕ	z	total
1	12	6	72
2	12	6	72
3	24	6	144
4	24	6	144
Grand total			432

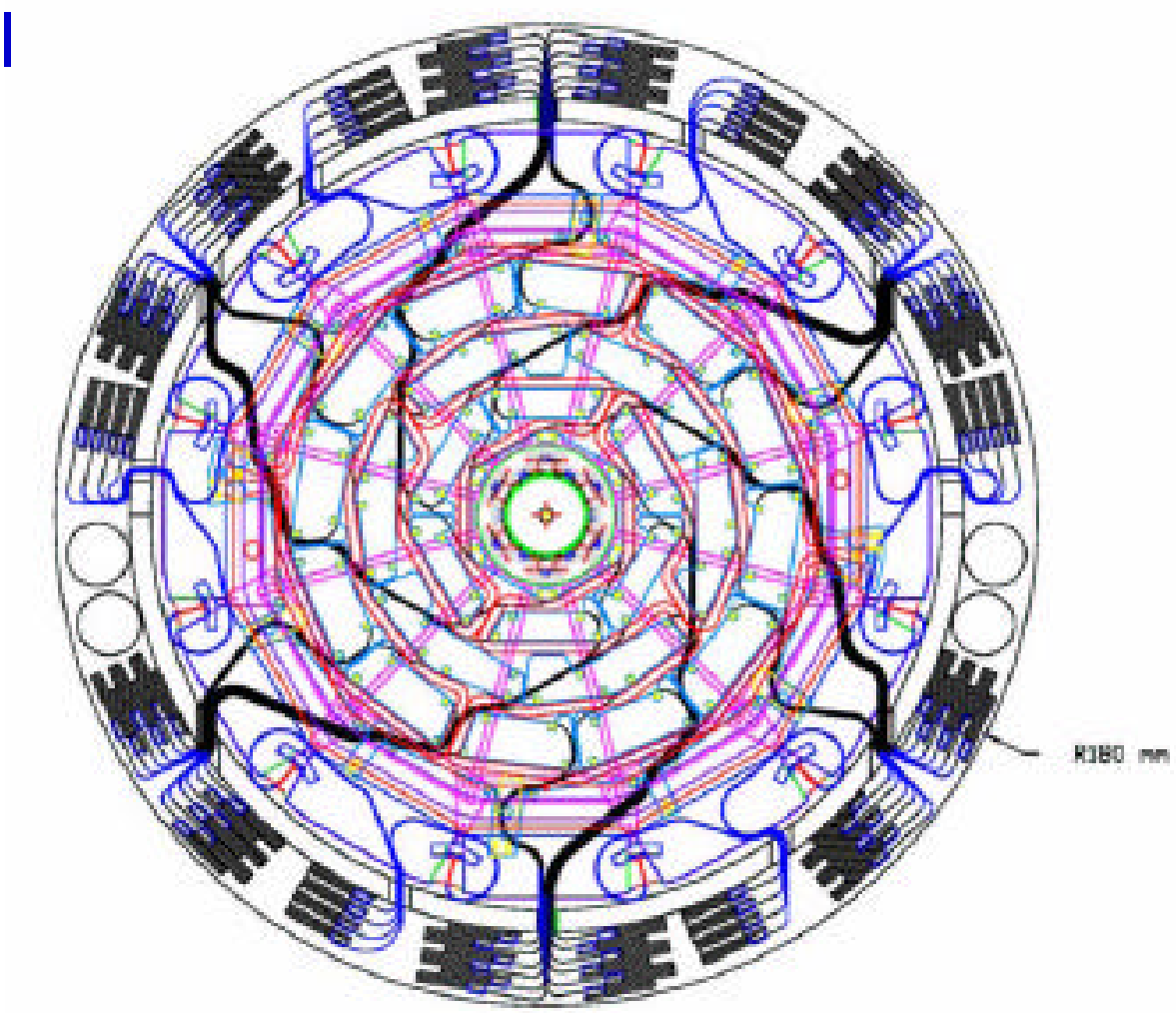
Run 2B Baseline Upgrade

1 FRC
10 STCs
4 TFCs
per crate



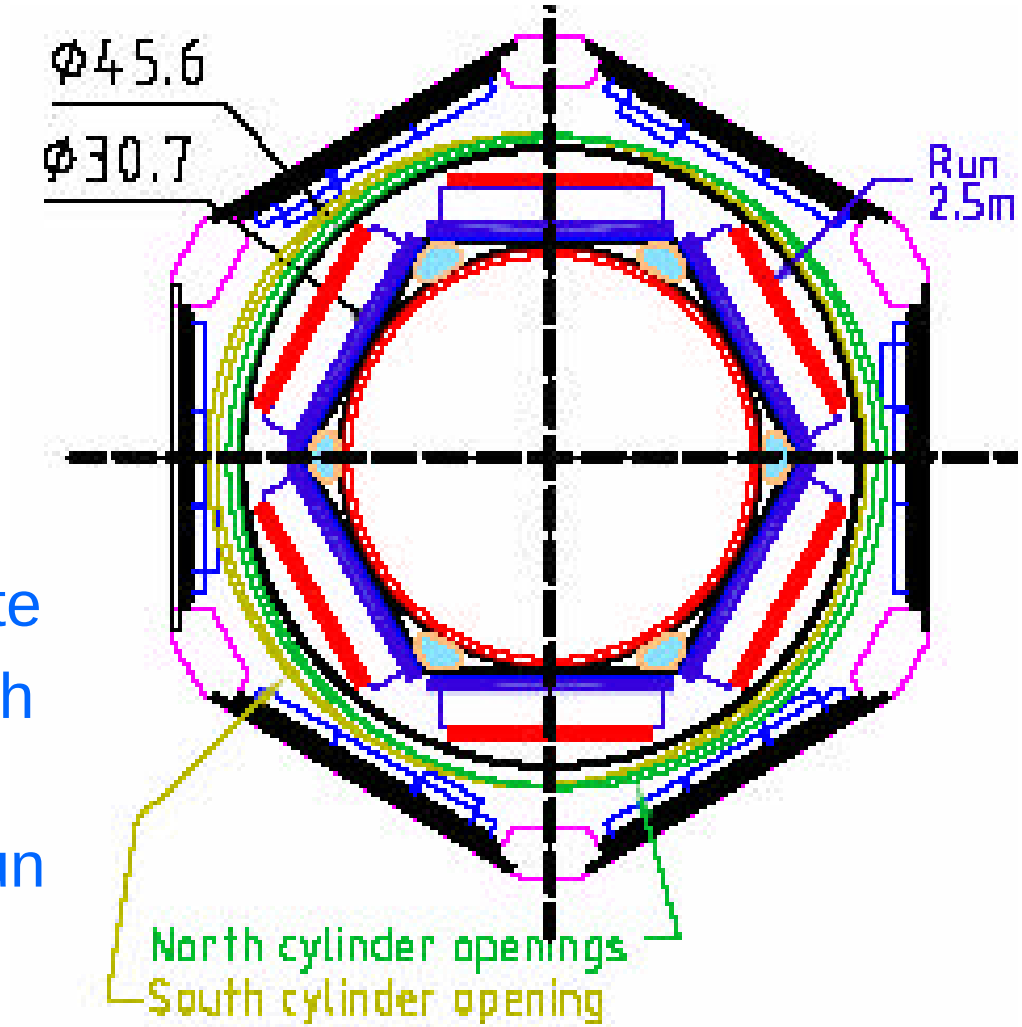
Layer 0 Detector

- Maximum channel count
  - 12 in ϕ
  - 12 in z
  - 144 total
- Need extra 3 STCs/crate
- Need new backplanes if we also go to 4 TFCs



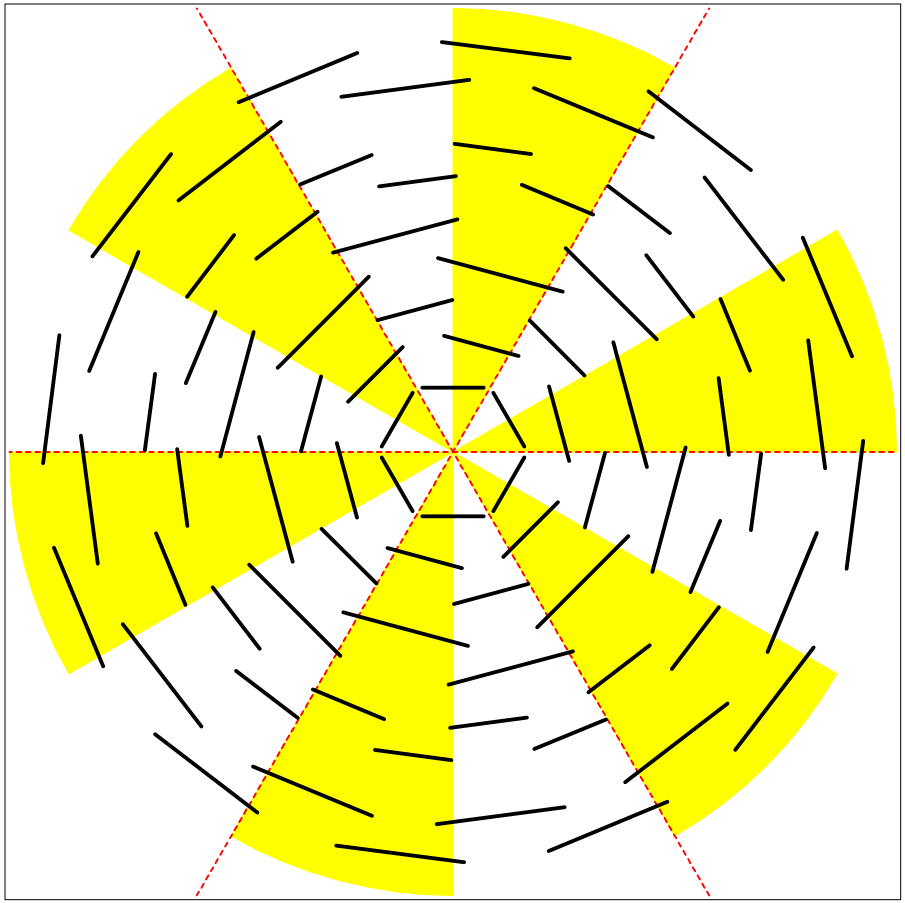
Layer 0 Detector

- No z-ganging
  - 6(ϕ) x 12(z) = 72
  - Need 2 extra STCs/crate
- With z-ganging
  - 6(ϕ) x 8(z) = 48
  - Need 1 extra STC/crate
  - Can add two TFCs with existing backplane
  - Fits within baseline Run 2B upgrade



L0 Detector

- Sector definition
  - Each ϕ segment has to correspond to one STT crate
  - All L0 detectors feed both TFCs



Summary of L0 options

# HDI in L0	STC	TFC inputs	# TFC	FRC outputs	backplane
12x12	+3	8	2	14	ok
			4	16	new
6x12	+2	8	2	13	ok
			4	15	new
6x8	+1	7	2	12	ok
			4	14	ok

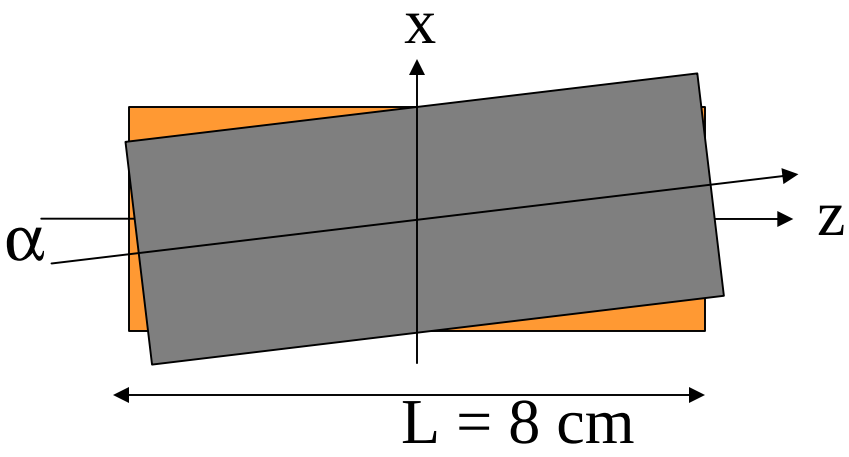
covered by baseline upgrade

requires substantial additional hardware

requires new hardware design

impossible

Alignment



- Need to know position of sensor center to ≈15 μm in x

- Cannot correct tilt within a sensor
- Broadening of L0 hits

$$\sigma = \frac{L \sin \alpha}{\sqrt{12}}$$

- $\sigma < 15\ \mu m$ implies $\alpha < 650\ \mu rad$

Summary

- Align ϕ segments with STT crate (60°sectors)
- Prefer $\leq$ 48 additional HDIs
- Can accommodate up to 144 L0 HDIs with additional hardware
- How well can it be aligned?