

Micromegas-SVT Integration into CLAS12

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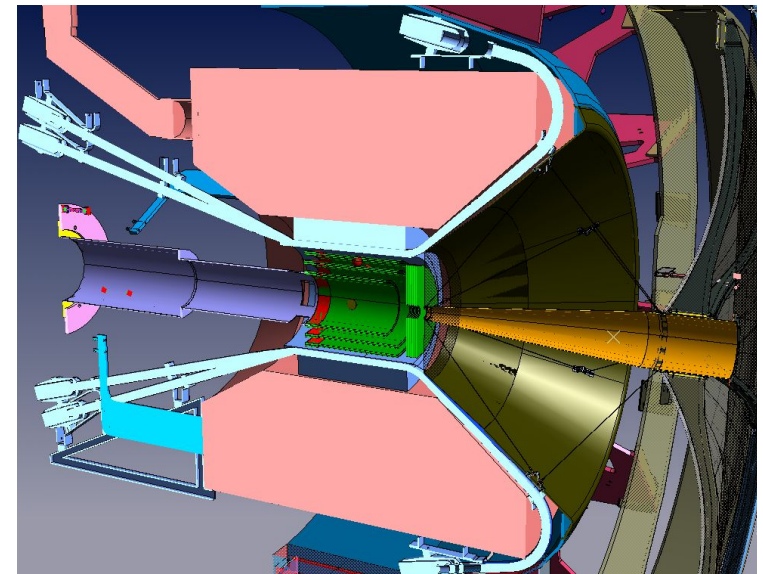
CLAS12

Why mixed Si-MM solution as central tracker

Description of current baseline design

Integration of Micromegas

Plan for 2010



On behalf of Saclay Micromegas Team

Micromegas for CLAS12 Central Detector - Why ?

Why Micromegas for the CD :

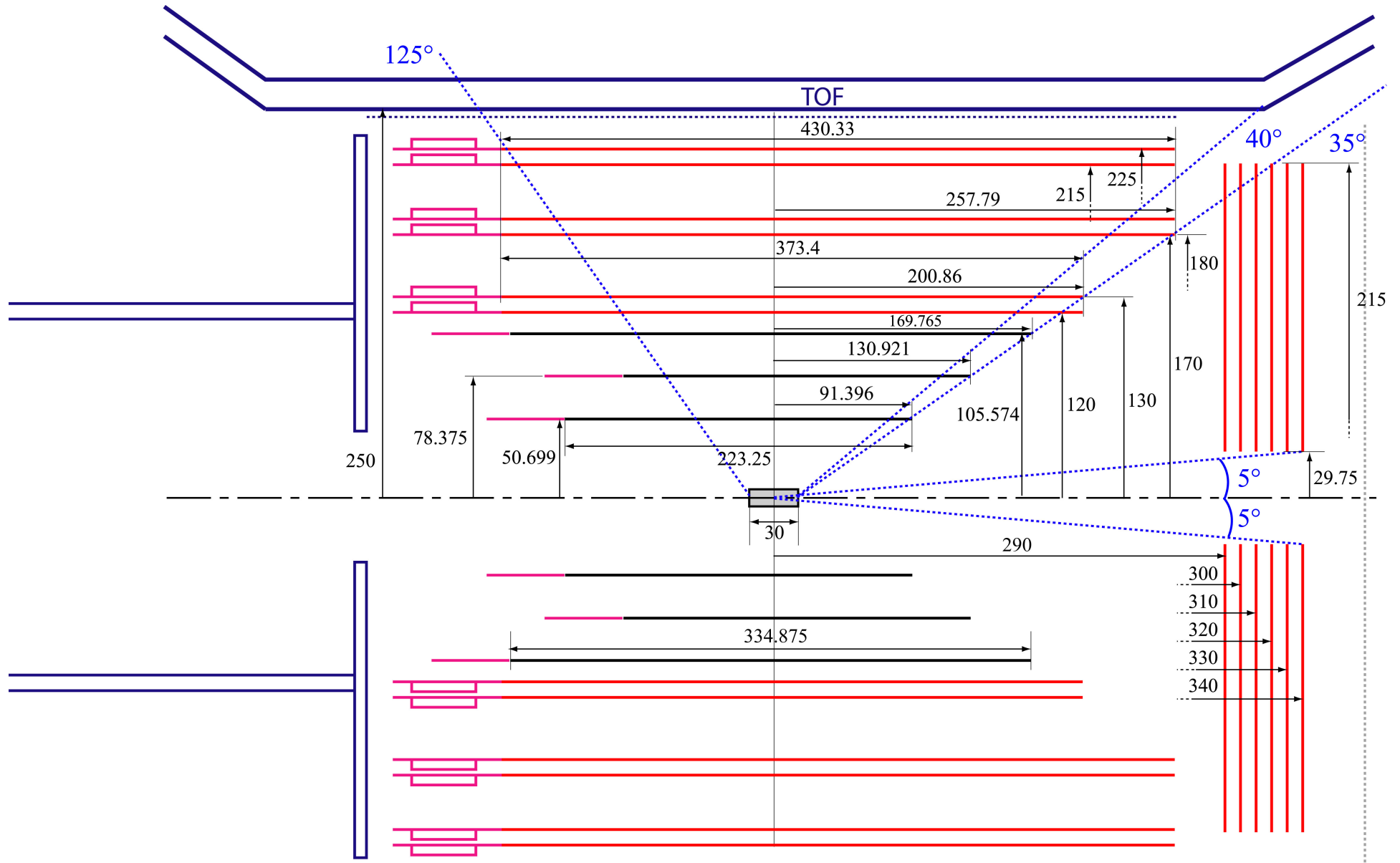
- **Complements** the silicon vertex tracker (x10 better θ resolution, more lever arm at large radius for better p resolution)
- **Cheap**: Detector itself is ~\$1000/unit
- **Geometry** : cylindrical shape are now possible, which allows to use the best geometry for physics
- **Only reasonable available option** for forward central tracker

For the barrel part :

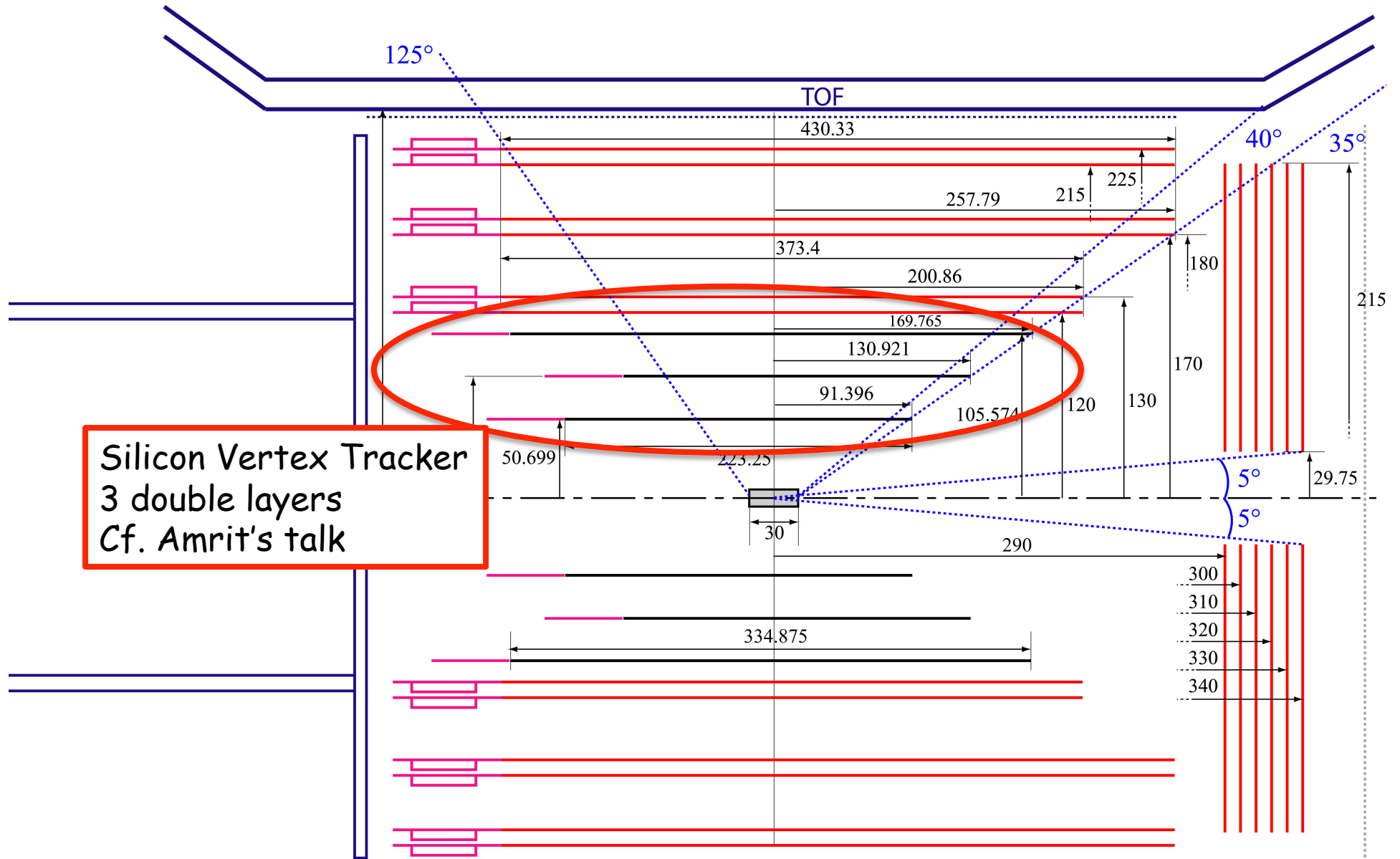
	4 x 2MM	4 x 2SI	2 x 2SI + 3 x 2MM	Specs.
σ_{p_T}/p_T (%)	2.9	2.1	1.6	5
σ_θ (mrad)	1.3	15.1	1.4	<10-20
σ_ϕ (mrad)	10.9	2.9	2.6	<10
σ_z (μm)	212	1522	267	tbd.

A **mixed** solution **combines advantages** of both the silicon (SI) and micromegas (MM) detectors

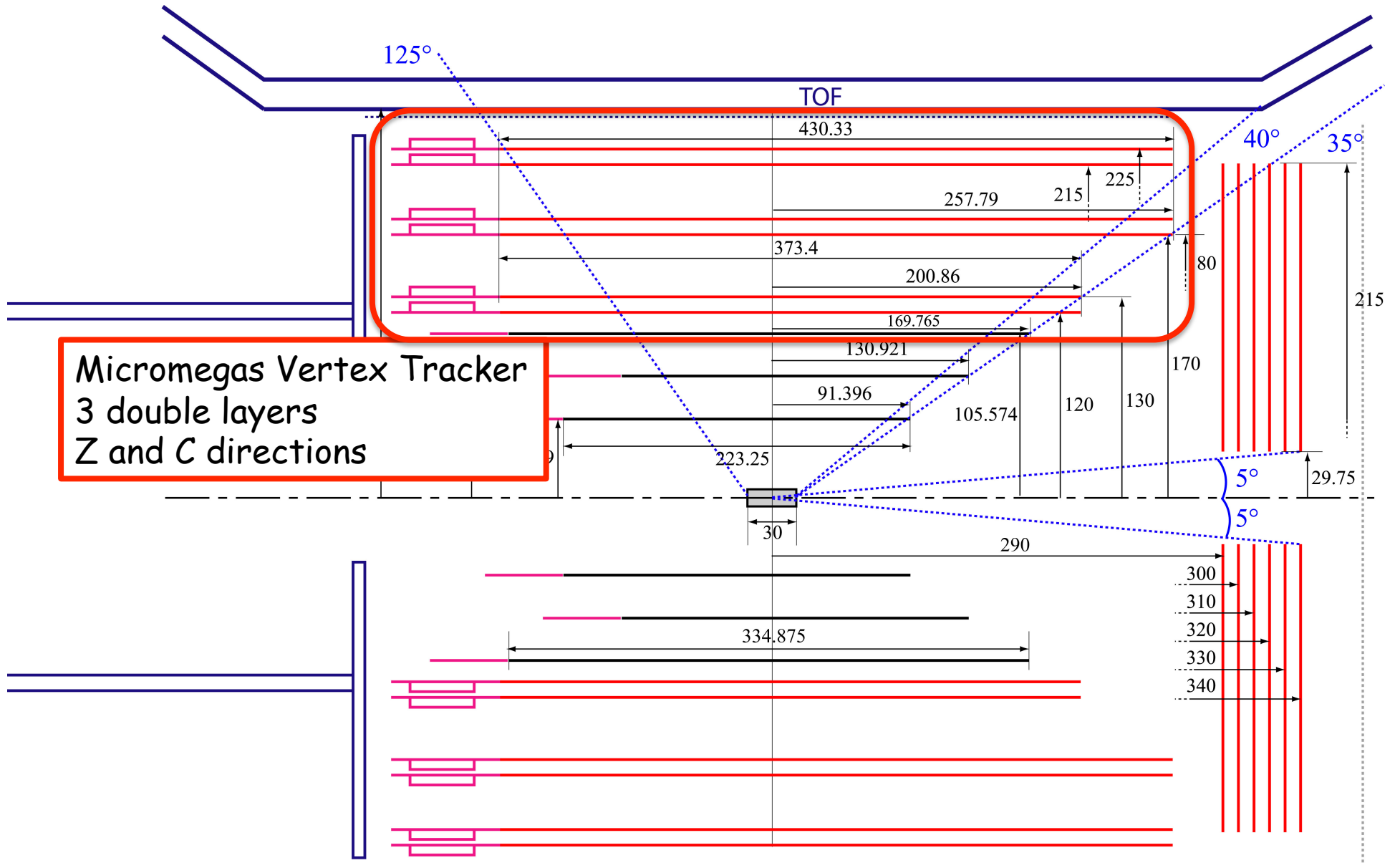
Micromegas for CLAS12 Central Detector - Where ?



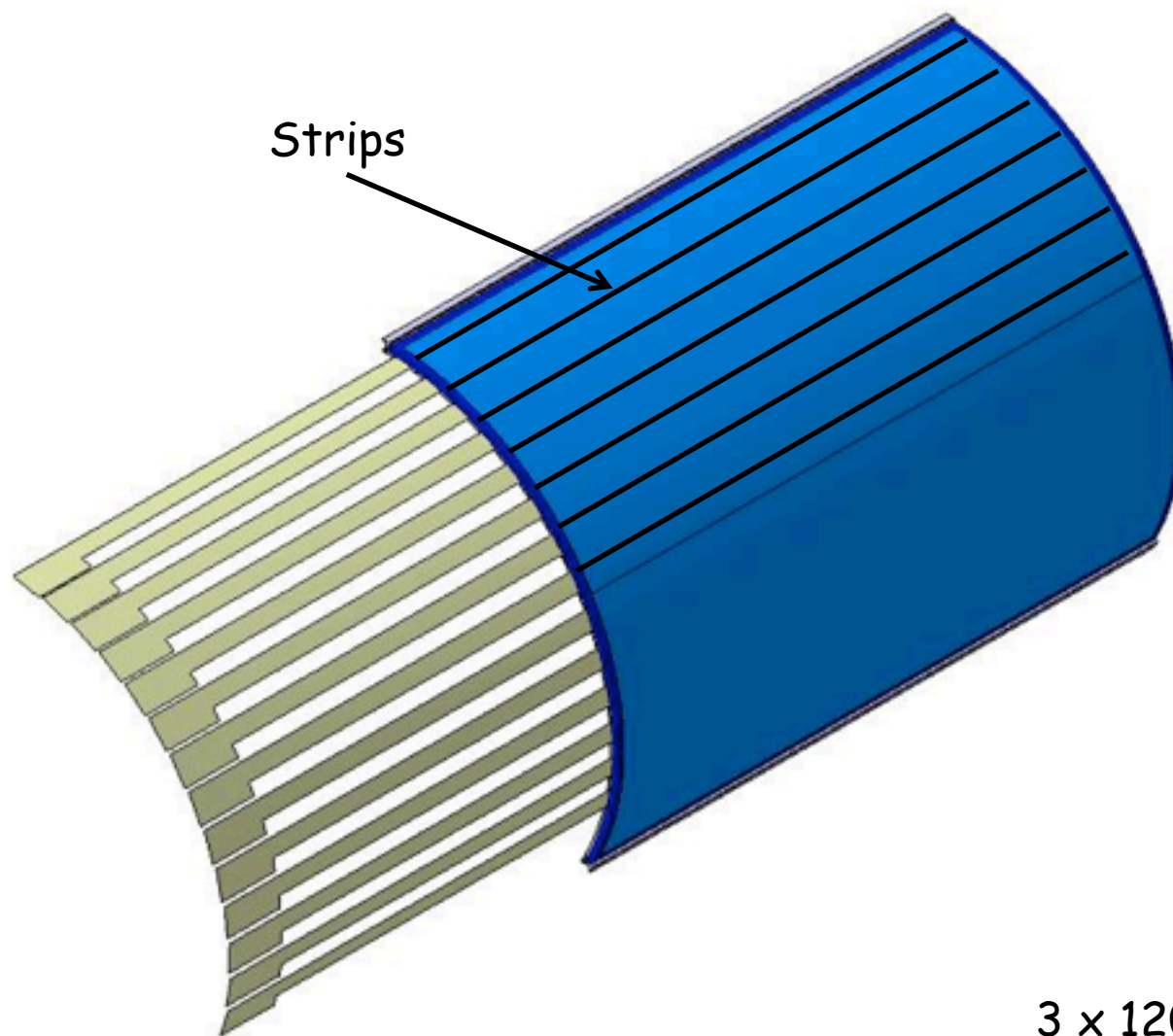
Micromegas for CLAS12 Central Detector - Where ?



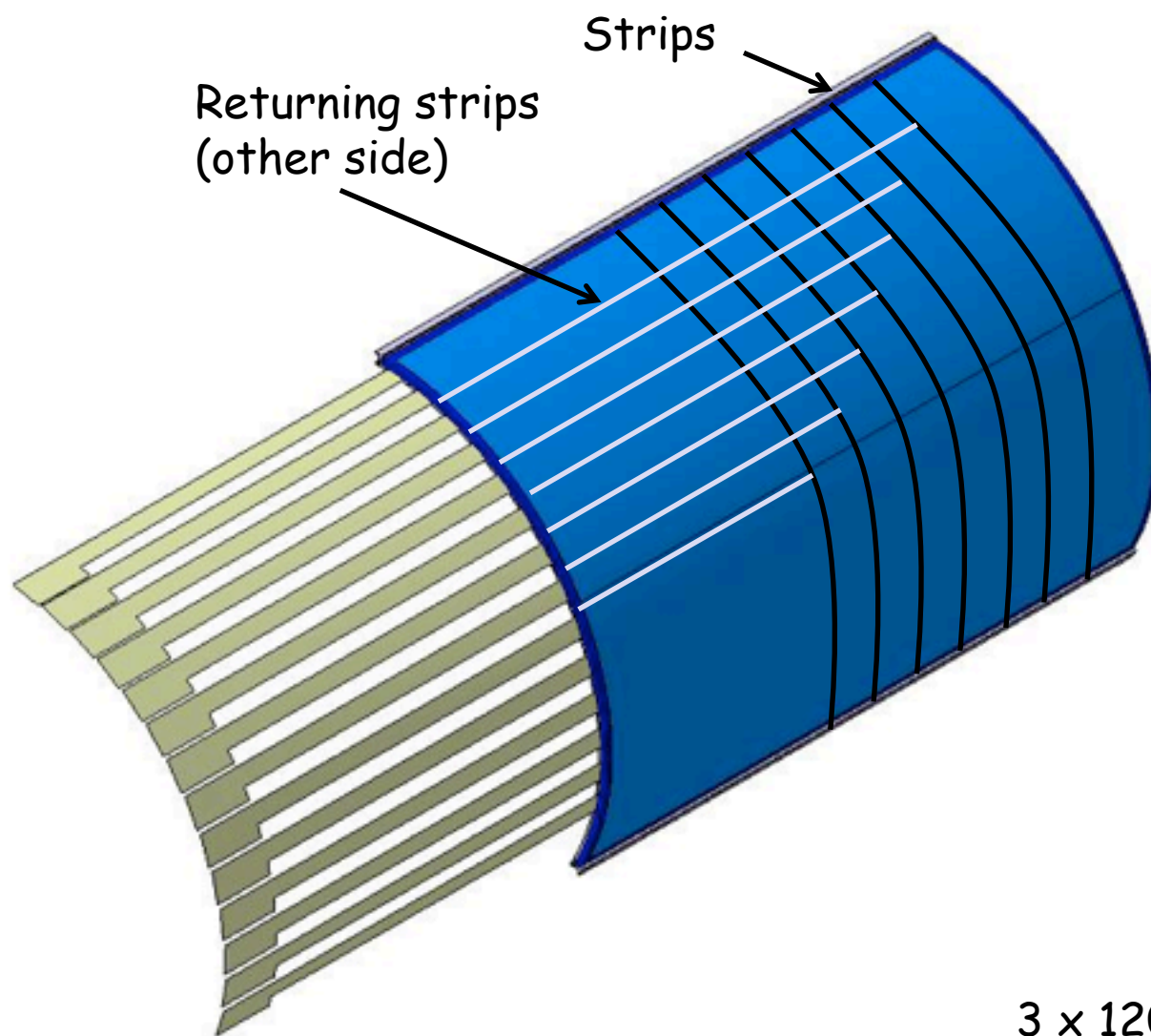
Micromegas for CLAS12 Central Detector - Where ?



Micromegas Z detectors

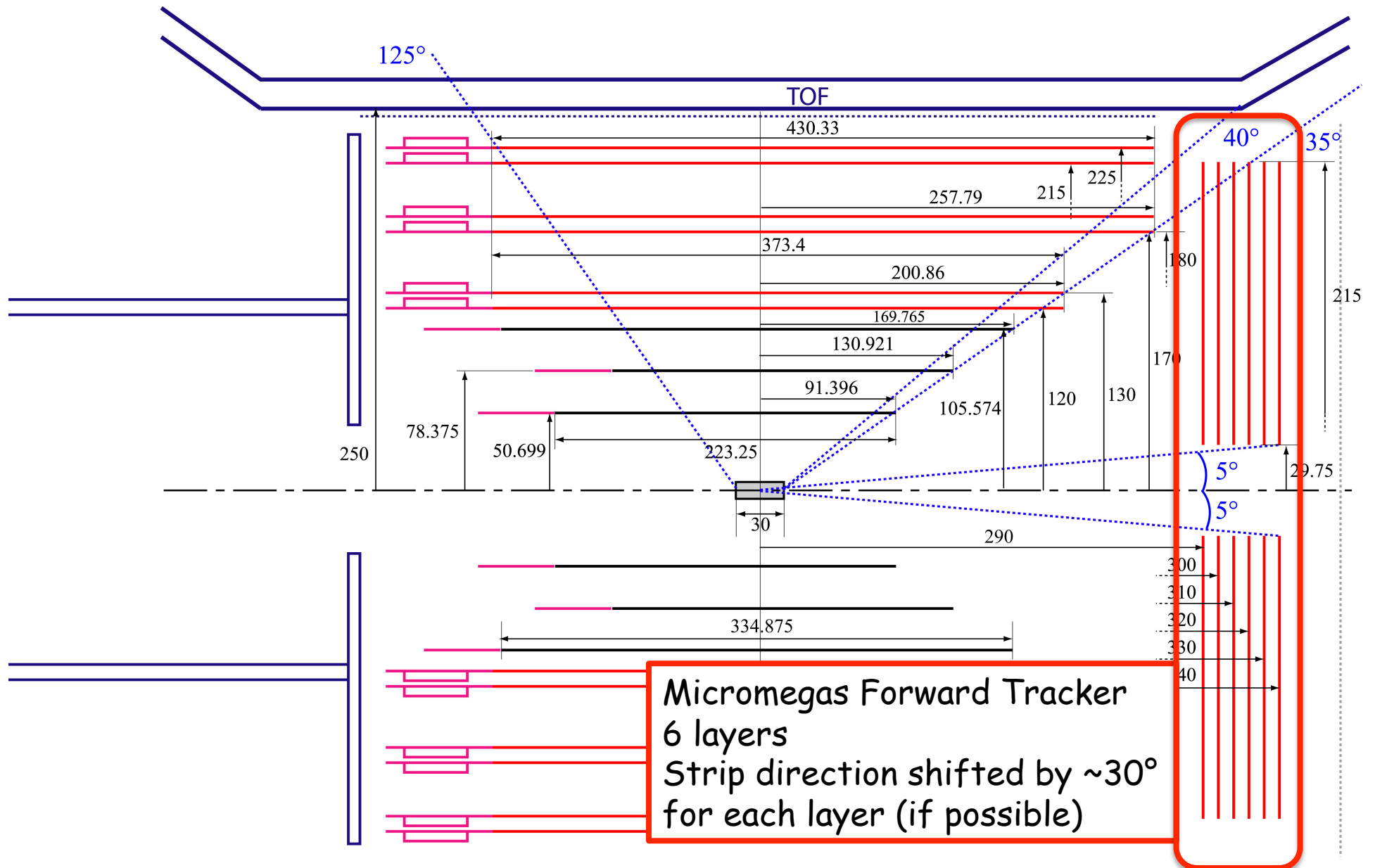


Micromegas C detectors

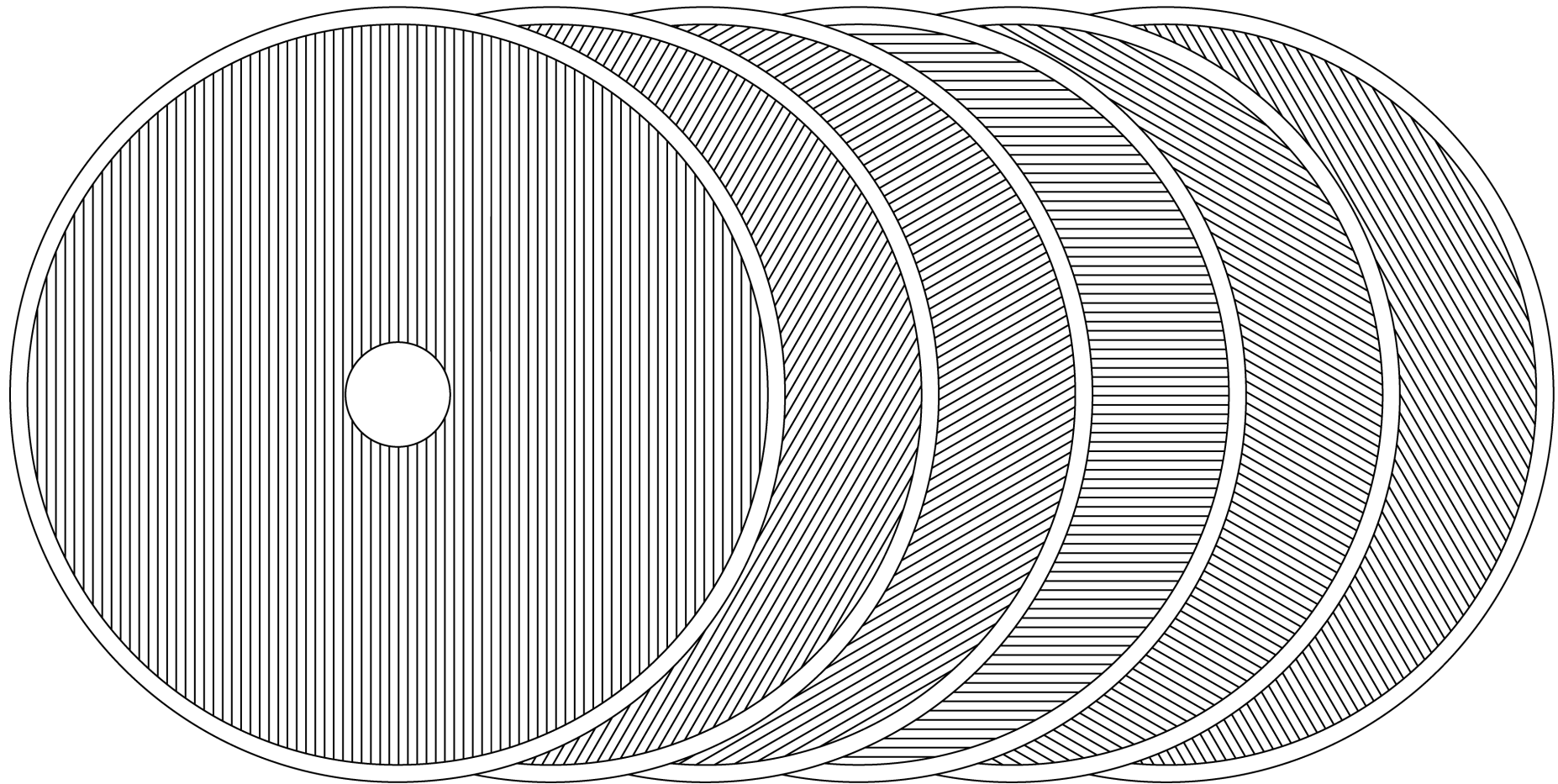


3 x 120° sectors

Micromegas for CLAS12 Central Detector - Where ?

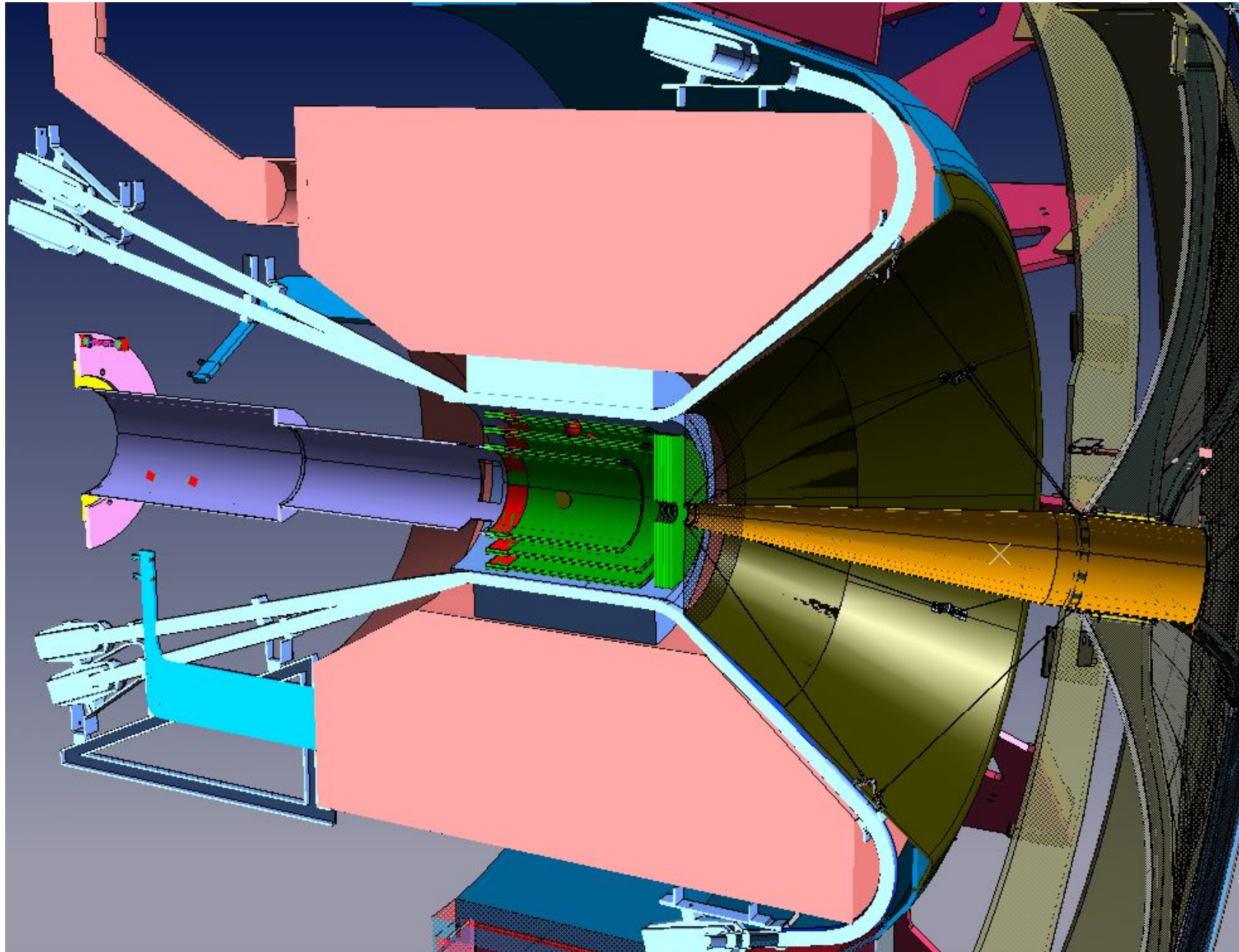


Forward Micromegas Tracker - Exploded View

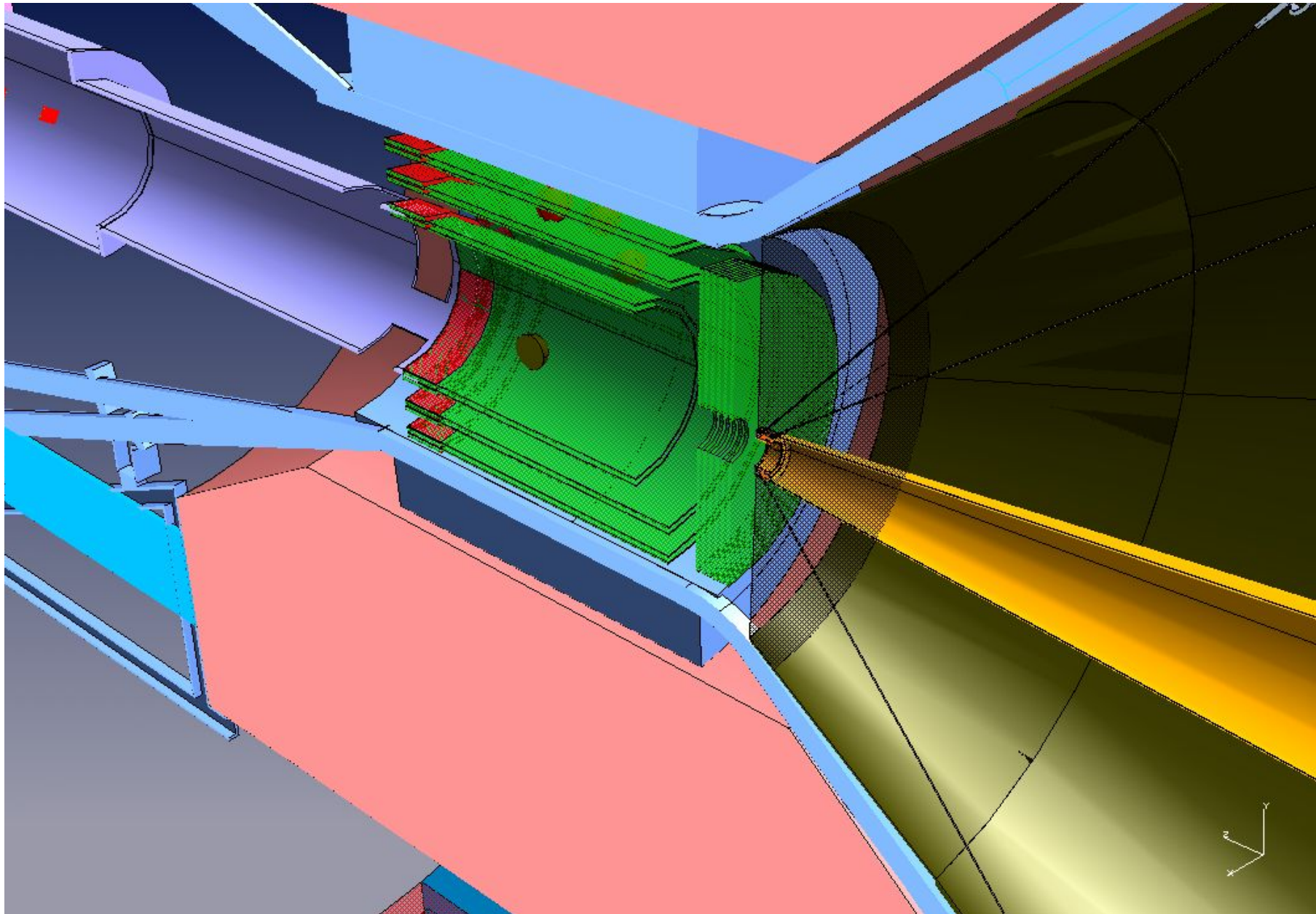


Might be a headache for tracking though !

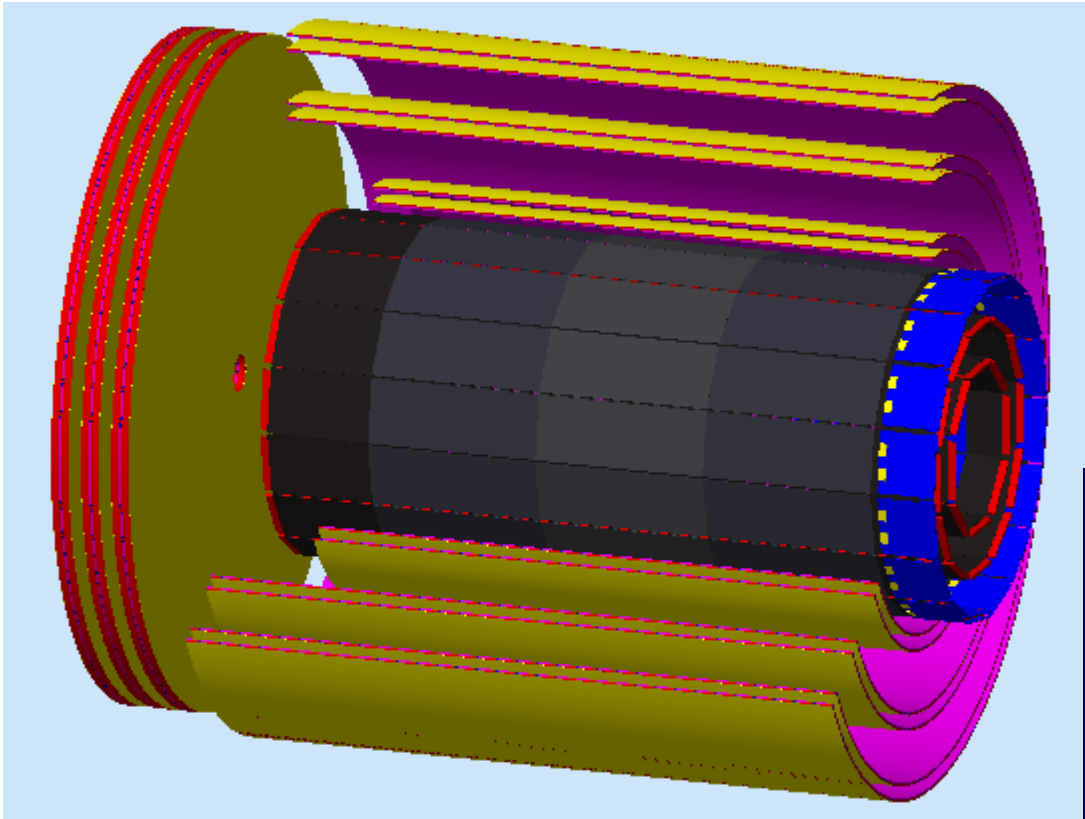
Integration work of MM into JLab CAD design just started



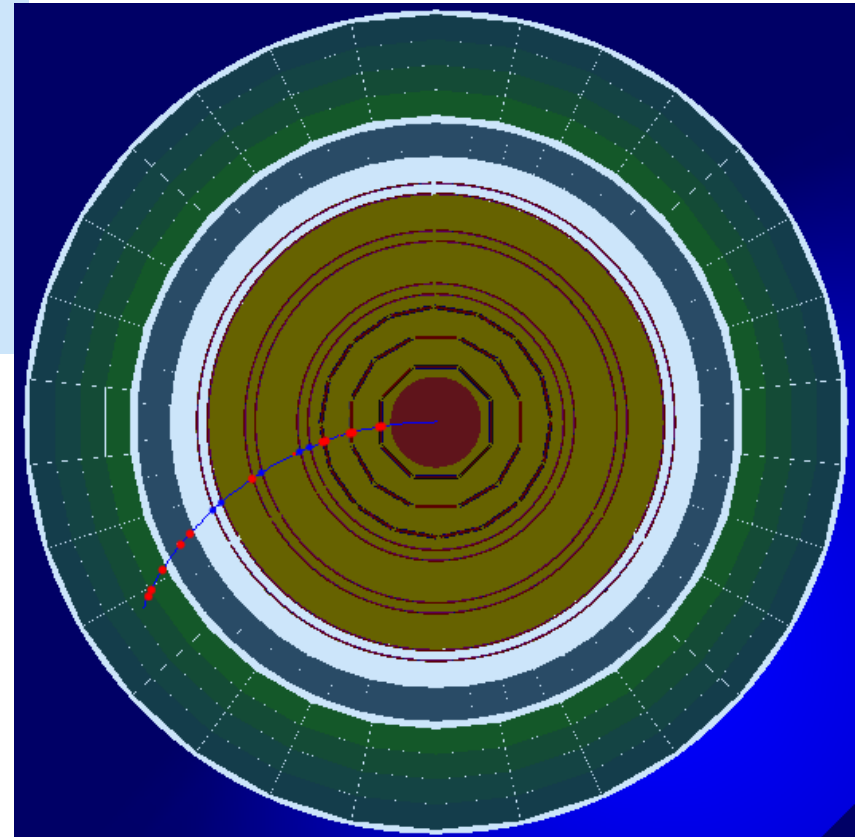
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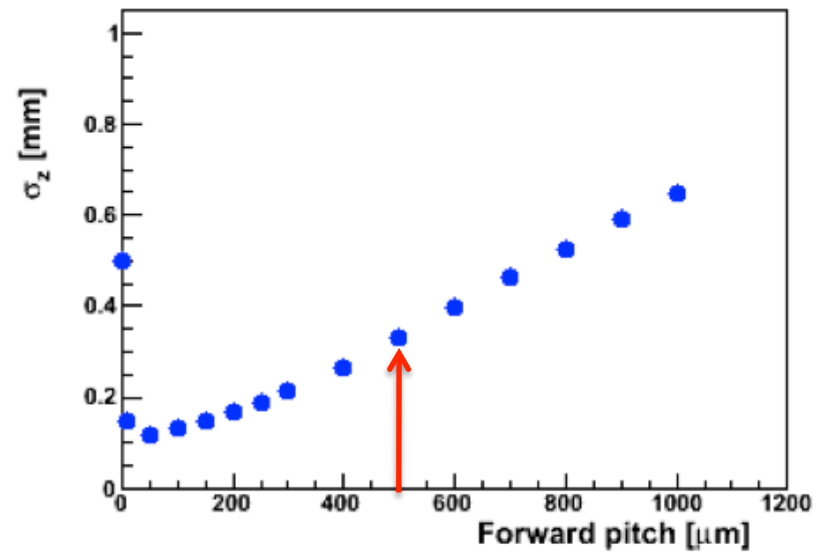
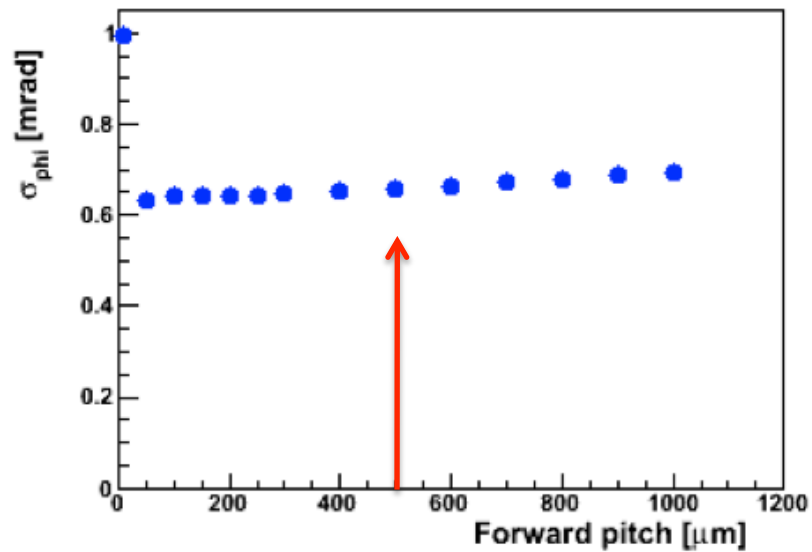
MM-Si geometry in GEMC



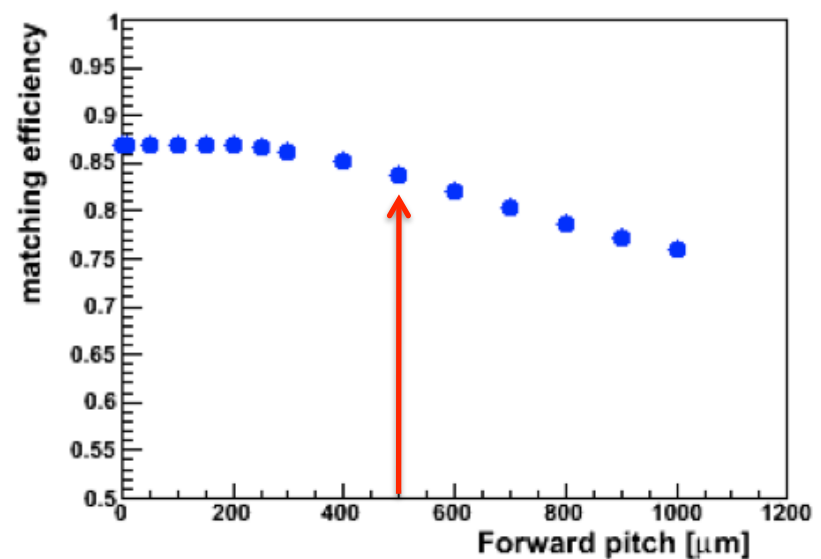
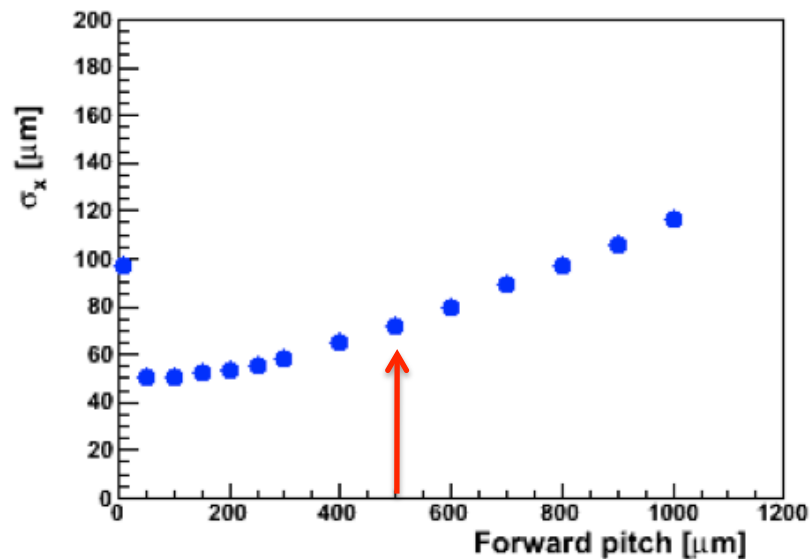
Only detectors, no mechanical structure so far



Optimization of strip pitch for Forward Micromegas Tracker



500 μm pitch is a good compromise



Channel/ASIC/FEU count

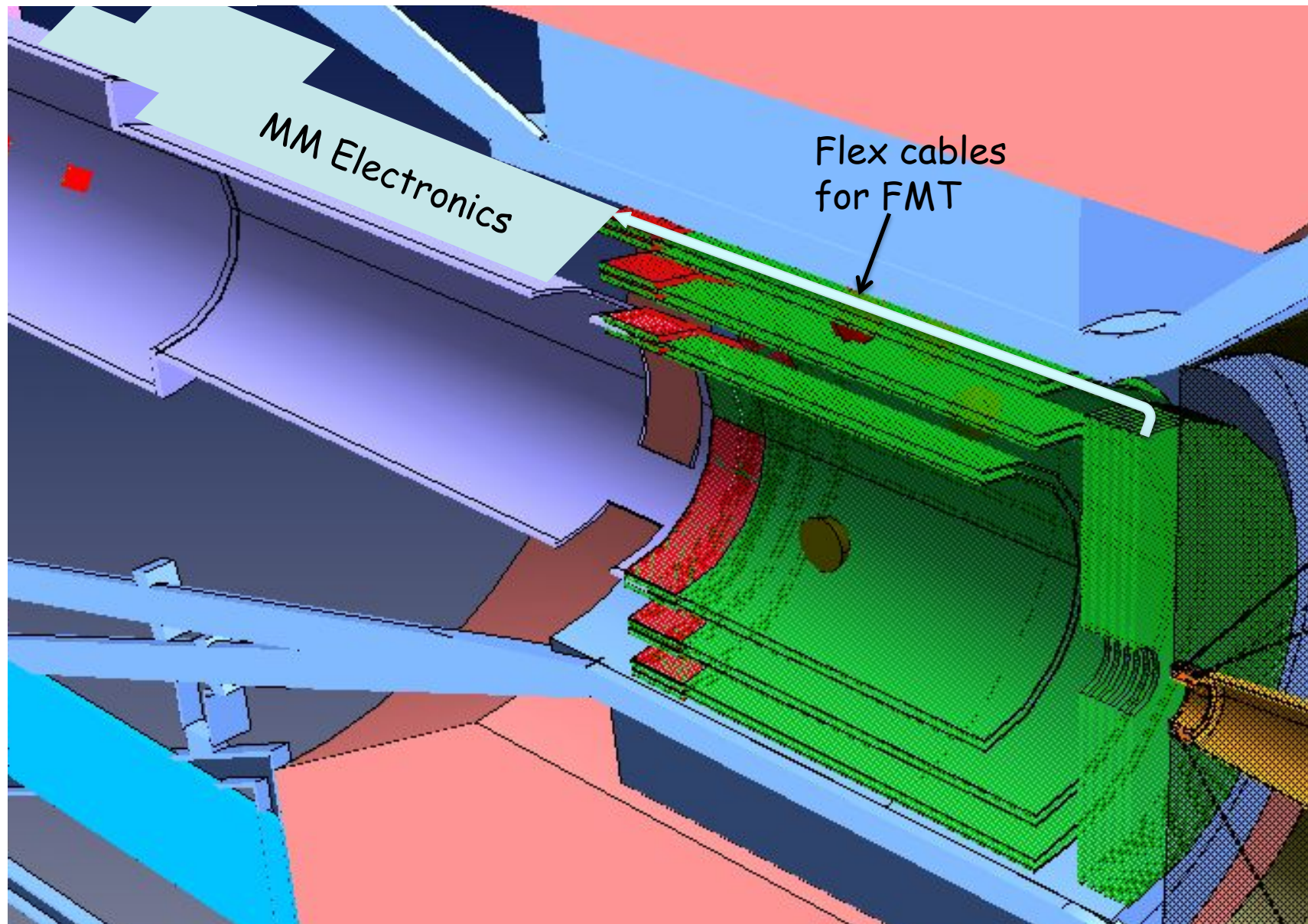
Channel count

Central Barrel Regions Z		
Type	Pitch (μm)	Strips
CR4Z	540	1457
CR5Z		1922
CR6Z		2446
		5825
Central Barrel Regions Y		
Type	Pitch (μm)	Strips
CR4Y	270	3422
CR5Y		4444
CR6Y		4811
		12677
Forward Regions		
Type	Pitch (μm)	Strips
FR1-6	500	960
		5760
		Total
		24262

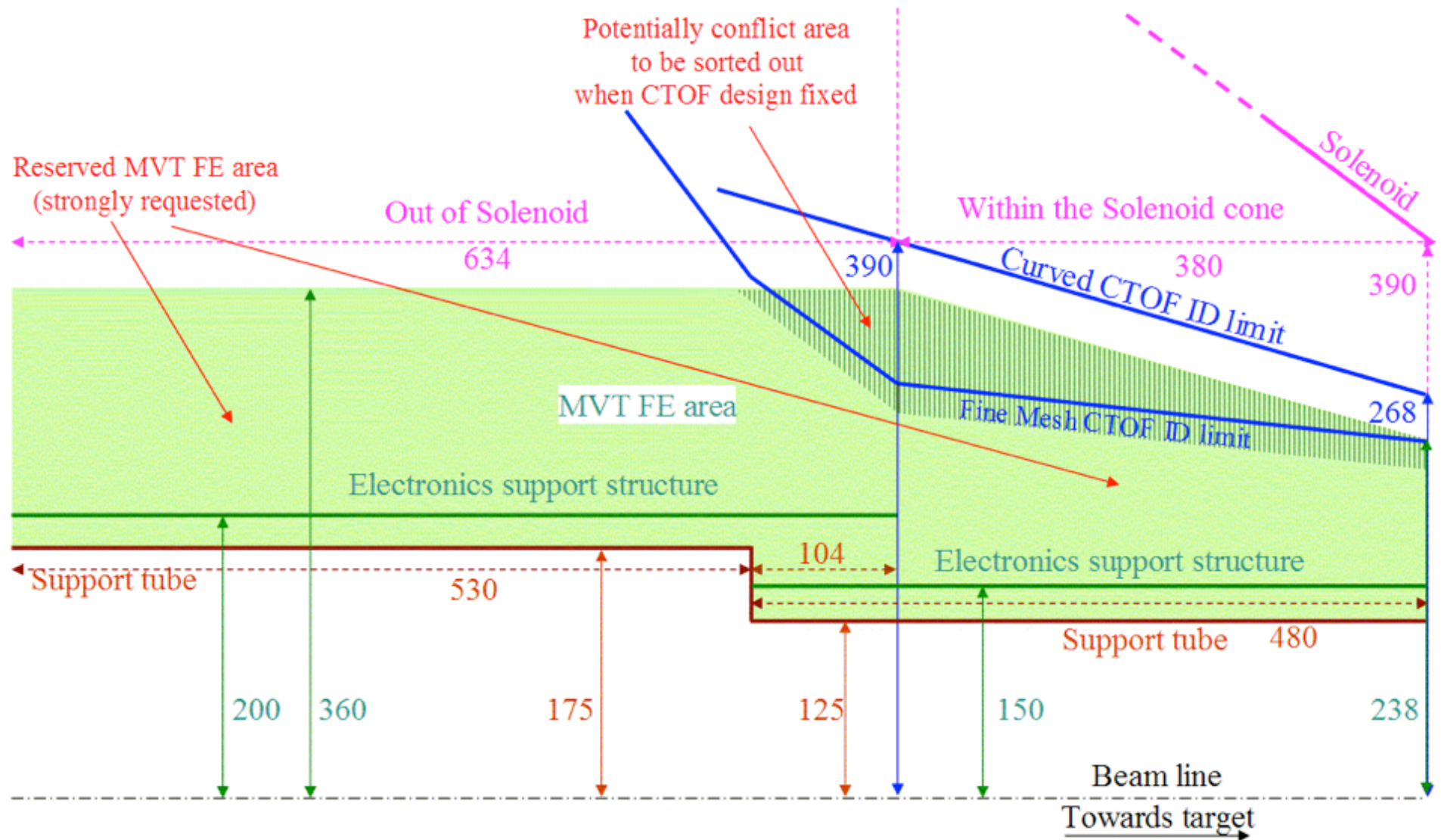
ASIC/Front-end unit count

Central Barrel Regions Z		
Type	FEU	ASIC
CR4Z	6	30
CR5Z	6	30
CR6Z	9	45
	21	105
Central Barrel Regions Y		
Type	FEU	ASIC
CR4Y	12	60
CR5Y	15	75
CR6Y	15	75
	42	210
Forward Regions		
Type	FEU	ASIC
FR1-6	3	15
	18	90
	Grand Total	
	81	405

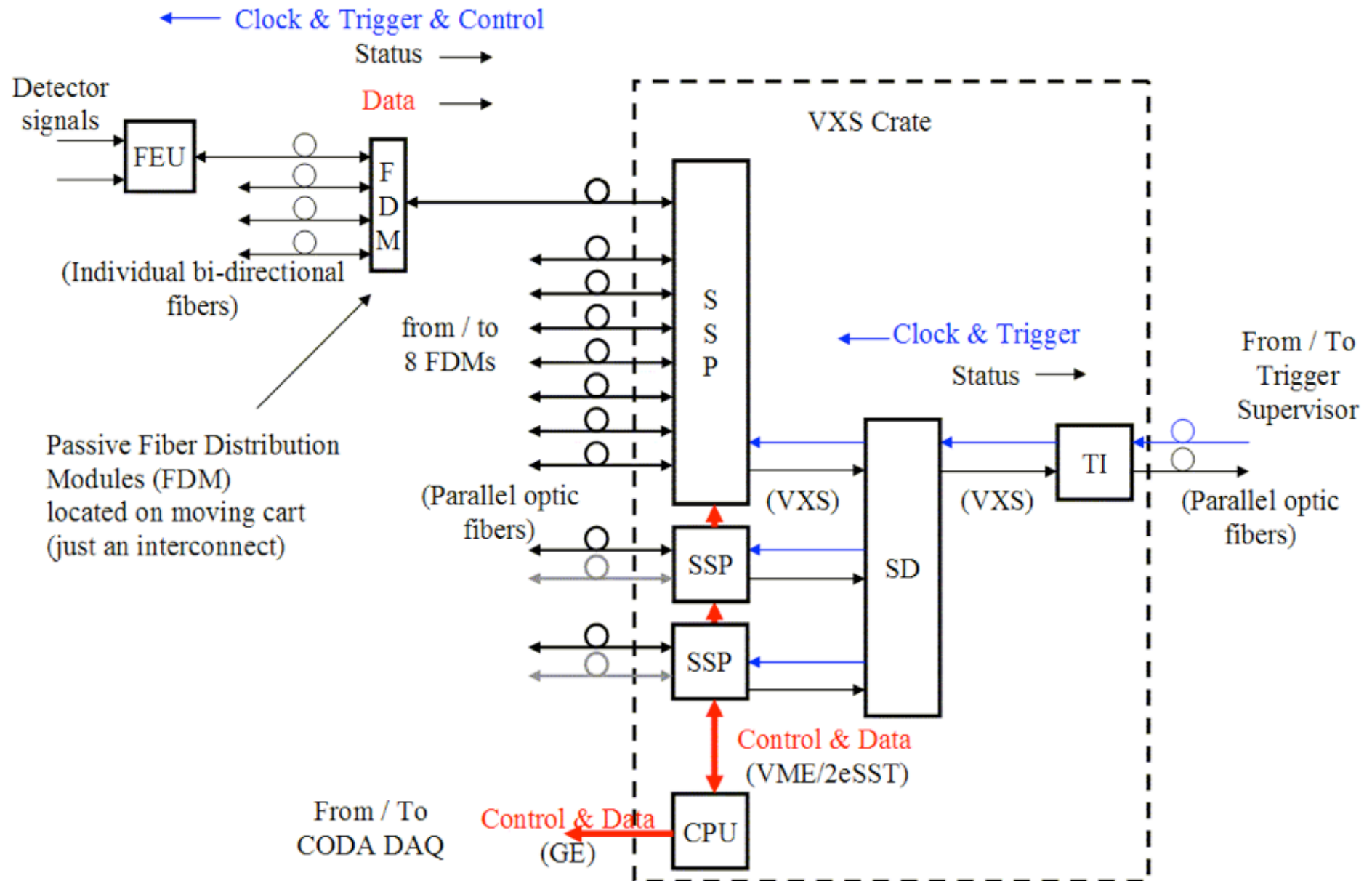
Location of electronics for Micromegas



Location of electronics for Micromegas



Electronics scheme for Micromegas



Plan for 2010

- Write technical note with baseline parameters: *CLAS NOTE 2010-003*
- Update *GEMC* geometry and perform checks: *Geometry updated, checks under study.*
- Monthly central tracker meetings, potentially with video link: *as soon as mid-march.*
- Finalize *CT* conceptual design: *MM* mechanical design will be done at Saclay. *SVT* design will be updated at JLab. Final checks/putting together everything : at JLab.
- Characterization of full size *MM* baseline prototypes at Saclay: *starting checks on Z detector, Y detector design done, into production. Forward detectors design started.*
- Start *MM ASIC* design in April 2010.
- Conceptual Design Review in June 2010.
- More discharge Studies for *MM* in September-October 2010.