

EIC tracking WG meeting - 20 May 2021

Introduction

F. Bossu, D. Elia, L. Gonella, M. Posik

Tracking Working Group meeting organisation

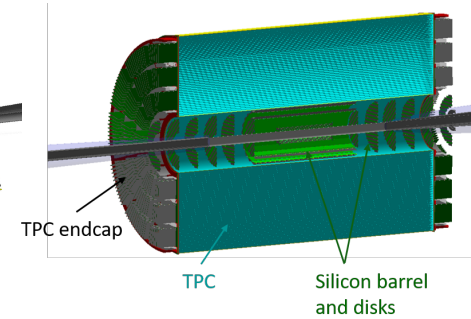
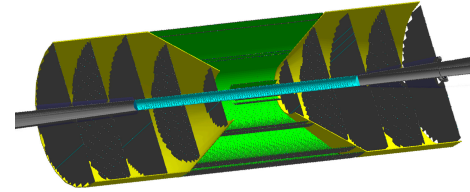
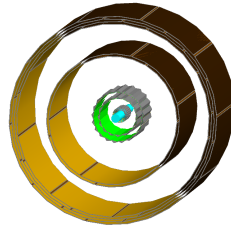
- The meeting will take place weekly on Tuesday at 12 pm EDT
 - 1-1.5 hour long
 - Going forward the frequency can switch to bi-weekly but a lot of work is needed between now and June!

- We will have thematic meetings
 - Today the focus is on updated (post YR) simulation results of various detector concepts
 - **Next week will continue discussion on detector concepts**
 - **Please let us know if you want to present something**
 - In two weeks we propose to have a discussion on technology options for silicon and gas detectors
 - When preparing talks for next-to-next week please consider assessments of technical capabilities, available workforce and technology readiness
 - The aim is to converge within a month or so on some initial layouts

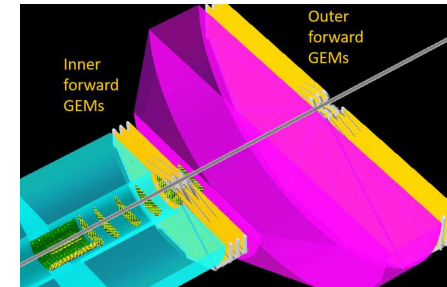
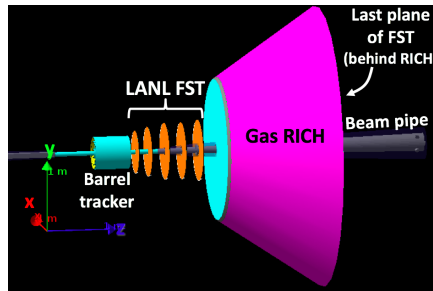
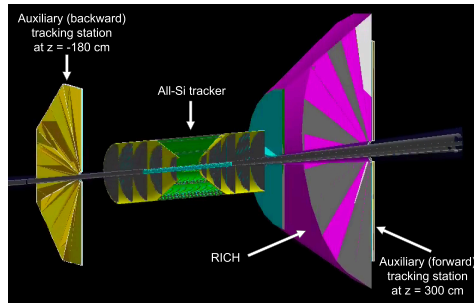
YR concepts

- Baseline concepts: all-silicon and hybrid (MAPS + TPC)

- MAPS + MPGD-based barrel



- Alternative tracking options exist in the backward and forward tracking regions



Tracking requirements

- Basics tracking requirements:

Tracking requirements from PWGs						
			Momentum res.	Material budget	Minimum pT	Transverse pointing res.
η						
-3.5 to -3.0	Central Detector	Backward Detector	$\sigma/p \sim 0.1\% \times p \oplus 0.5\%$	$\sim 5\% X_0$ or less	100-150 MeV/c	$dca(xy) \sim 30/pT \mu\text{m} \oplus 40 \mu\text{m}$
-3.0 to -2.5			100-150 MeV/c			
-2.5 to -2.0			100-150 MeV/c		$dca(xy) \sim 30/pT \mu\text{m} \oplus 20 \mu\text{m}$	
-2.0 to -1.5			100-150 MeV/c			
-1.5 to -1.0		100-150 MeV/c				
-1.0 to -0.5		Barrel	$\sigma/p \sim 0.05\% \times p \oplus 0.5\%$		100-150 MeV/c	$dca(xy) \sim 20/pT \mu\text{m} \oplus 5 \mu\text{m}$
-0.5 to 0			$\sigma/p \sim 0.05\% \times p \oplus 0.5\%$		100-150 MeV/c	
0 to 0.5					100-150 MeV/c	
0.5 to 1.0					100-150 MeV/c	
1.0 to 1.5		Forward Detector	$\sigma/p \sim 0.05\% \times p \oplus 1\%$		100-150 MeV/c	$dca(xy) \sim 30/pT \mu\text{m} \oplus 20 \mu\text{m}$
1.5 to 2.0			100-150 MeV/c			
2.0 to 2.5			100-150 MeV/c		$dca(xy) \sim 30/pT \mu\text{m} \oplus 40 \mu\text{m}$	
2.5 to 3.0			100-150 MeV/c			
3.0 to 3.5		$\sigma/p \sim 0.1\% \times p \oplus 2\%$	100-150 MeV/c		$dca(xy) \sim 30/pT \mu\text{m} \oplus 60 \mu\text{m}$	

*From YR 11.2.2 at
arXiv:2103.05419*

- Additional features

- PID, bunch crossing timing info, ...

Backup

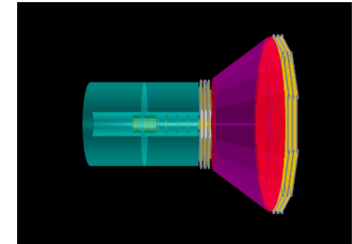
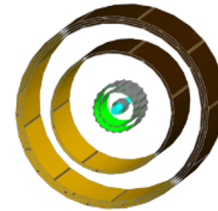
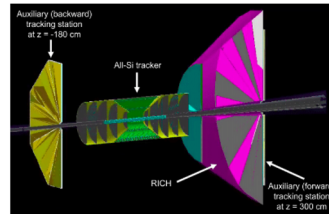
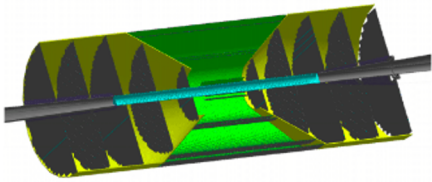
Detector working group deliverables

1. Technology choice

- Identify no more than two options from the various systems and technologies that will be costed and integrated into full simulation framework.
- The choice will depend strongly upon scientific input, assessments of technical capabilities, available workforce and technology readiness
- Technology choices should be supported with simulation work.

2. Estimate of services, supports + active materials

- Required services, readout, and mech. supports could play important role in selecting technologies.
- Experts are encouraged to work with tracking working group to provide information

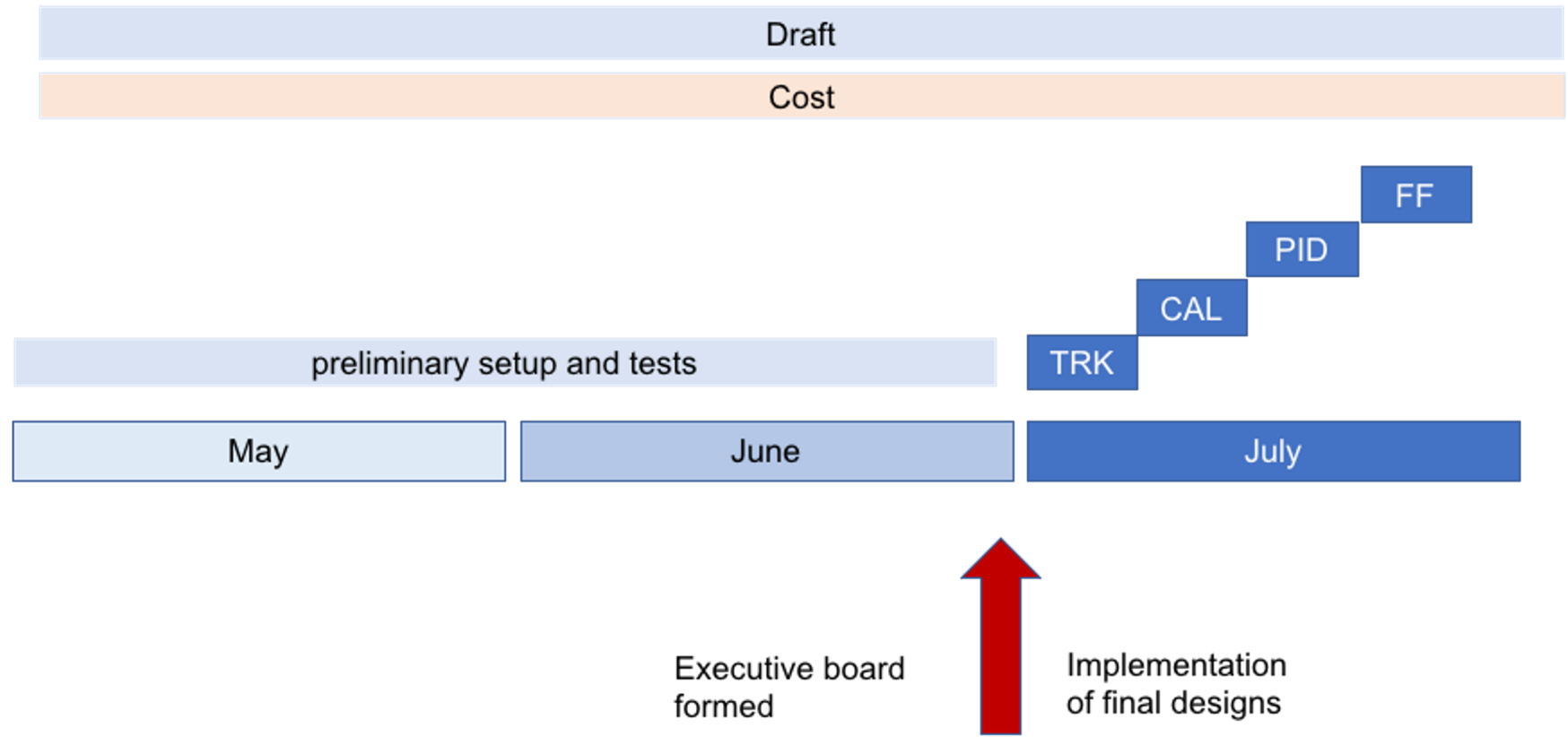


These are the most urgent items to address and will be the focus of the next few meetings

Detector working group deliverables

3. Implementation into the global experiment model
 - Integration group will be formed: member from each detector WG, experts on IR, physics, and engineers
4. Simulation of subsystems performance in the global experiment
 - Integrated detector concept will be implemented into full simulation framework (central DD4HEP-based development by the SWG)
 - Assess performance and quantify impact of active and non-active materials on the physics performance.
 - WG should assign someone to take lead on overseeing this is done accurately.
5. Costing of each sub-system
 - Costing group will be formed consisting of at least one member per detector WG and costing experts.
6. Consider what else the WG can contribute to help producing a winning proposal
 - Identify the number of anticipated readout channels, data rate, readout electronics used, etc.

Timeline towards the proposal



Timeline towards the proposal

