Yellow Report – Detector Working Group

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- Path Towards Integrated Detector Simulations

- Detector Matrix Review and Moving the Needle Forward

Detector matrix review and moving the needle forward

The Interactive Detector Matrix is the (only) official set of parameters for EIC

η	Nomenclature			Tracking			Electrons		π/K/p		HCAL	Muons
				Resolution	Allowed X/X_0	Si-Vertex	Resolution σ_E/E	PID	p-Range (GeV/c)	Separation	Resolution σ_E/E	
-6.9 to -5.8	↓ p/A	Auxiliary Detectors	low-Q2 tagger	$\sigma\theta/\theta < 1.5\%$; $10^{-6} < Q2 < 10^{-2}$ GeV2								
...												
-4.5 to -4.0			Instrumentation to separate charged particles from photons				$2\%/\sqrt{E}$					
-4.0 to -3.5												
-3.5 to -3.0		Central Detector	Backward Detector	$\sigma_p/p \sim 0.1\% \oplus 0.5\%$	~5% or less X	TBD		π suppression up to $1{:}10^4$	≤ 7 GeV/c	≥ 3 σ	~50%/√E	
-3.0 to -2.5												
-2.5 to -2.0				σ_p/p 0.1%⊕0.5%			2%/√E					
-2.0 to -1.5				σ_p/p 0.05%⊕0.5%			7%/√E					
-1.5 to -1.0							7%/√E					
-1.0 to -0.5			Barrel	$\sigma_p/p \sim 0.05\% \times p + 0.5\%$		$\sigma_{xyz} \sim 20$ μm, $d_0(z) \sim d_0(r\Phi) \sim 20/p_T$GeV μm + 5 μm	(10-12)%/√E		≤ 5 GeV/c			TBD
-0.5 to 0.0												
0.0 to 0.5												
0.5 to 1.0												
1.0 to 1.5			Forward Detectors	$\sigma_p/p \sim 0.05\% \times p + 1.0\%$		TBD			≤ 8 GeV/c		~50%/√E	
1.5 to 2.0												
2.0 to 2.5									≤ 20 GeV/c			
2.5 to 3.0				$\sigma_p/p \sim 0.1\% \times p + 2.0\%$								
3.0 to 3.5									≤ 45 GeV/c			
3.5 to 4.0	↑ e	Auxiliary Detectors	Instrumentation to separate charged particles from photons									
4.0 to 4.5												
...			Neutron Detection									
> 6.2			Proton Spectrometer	$\sigma_{intrinsic}(\|t\|)/\|t\| < 1\%$; Acceptance: $0.2 < p_t < 1.2$ GeV/c								

Detector matrix review and moving the needle forward

The interactive Detector Matrix is an evolving entity – needs input from YOU!

- How to communicate new requirements and make updates to the Detector Matrix (from Pavia Workshop)

- Once you think you have some concrete detector requirements out of your work, please follow the following procedure in order to let the DWG (and everybody else) know about them:

1. Discuss your results within your WG
2. Document the work in your WG wiki area
3. Your WG conveners will then contact the DWG conveners by email describing the results and pointing to the corresponding documentation in the wiki
4. The DWG conveners update the interactive detector matrix

Detector matrix review and moving the needle forward

Time line and YR Context

- **31 August 2020 – aim to freeze the Interactive Detector Matrix**
  - Period until 3rd YR Workshop will be used to prepare simulations
- **17-19 September 2020: 3rd YR Workshop (“Washington/CUA WS”)**
  - Period afterwards will mainly focus on writing the Yellow Report