

- In the YR the matter of this link was summarized in tables
 - These tables requires to become a single table introducing appropriate refurbishing

- Please, note that in the YR there are **3 versions** of the table !
 - They are copied in the next slides (FYI)
 - You can note that they are not fully consistent

Table 3.1: This matrix summarizes the high level performance of the different subdetectors and a 3 T Solenoid. The interactive version of this matrix can be obtained through the Yellow Report Detector Working Group (<https://physdiv.jlab.org/DetectorMatrix/>).

η	Nomenclature	Tracking						Electrons and Photons			$\pi/K/p$		HCAL		Muons			
		Resolution	Relative Momentum	Allowed X/X_0	Minimum- p_T (MeV/c)	Transverse Pointing Res.	Longitudinal Pointing Res.	Resolution σ_E/E	PID	Min E Photon	p-Range	Separation	Resolution σ_E/E	Energy				
< -4.6	Low-Q2 tagger	Reduced Performance																
-4.6 to -4.0		Not Accessible																
-4.0 to -3.5		Reduced Performance																
-3.5 to -3.0	Backward Detector		$\sigma/p \sim 0.1\% \times p \oplus 2\%$	~5% or less	150-300			1%/E $\oplus 2.5\%/E$ $\oplus 1\%$	π suppression up to $1:10^{-4}$	20 MeV	≤ 10 GeV/c	—	50%/NE $\oplus 10\%$	~500MeV				
-3.0 to -2.5																		
-2.5 to -2.0																		
-2.0 to -1.5						$\sigma/p \sim 0.02\% \times p \oplus 1\%$	dca(xy) ~ 40/ p_T $\mu\text{m} \oplus 10 \mu\text{m}$								dca(z) ~ 100/ p_T $\mu\text{m} \oplus 20 \mu\text{m}$	2%/E $\oplus (4-8)\%/E$ $\oplus 2\%$	π suppression up to $1:(10^{-3}-10^{-2})$	50 MeV
-1.5 to -1.0																		
-1.0 to -0.5	Barrel		$\sigma/p \sim 0.02\% \times p \oplus 5\%$	~5% or less	400	dca(xy) ~ 30/ p_T $\mu\text{m} \oplus 5 \mu\text{m}$	dca(z) ~ 30/ p_T $\mu\text{m} \oplus 5 \mu\text{m}$	2%/E $\oplus (12-14)\%/E$ $\oplus (2-3)\%$	π suppression up to $1:10^{-2}$	100 MeV	≤ 6 GeV/c	$\geq 3\sigma$	100%/NE $\oplus 10\%$	~500MeV				
-0.5 to 0.0																		
0.0 to 0.5																		
0.5 to 1.0																		
1.0 to 1.5	Forward Detectors		$\sigma/p \sim 0.02\% \times p \oplus 1\%$		150-300	dca(xy) ~ 40/ p_T $\mu\text{m} \oplus 10 \mu\text{m}$	dca(z) ~ 100/ p_T $\mu\text{m} \oplus 20 \mu\text{m}$	2%/E $\oplus (4-12)\%/E$ $\oplus 2\%$	3σ e/ π up to 15 GeV/c	50 MeV	≤ 50 GeV/c		50%/NE $\oplus 10\%$					
1.5 to 2.0																		
2.0 to 2.5																		
2.5 to 3.0						$\sigma/p \sim 0.1\% \times p \oplus 2\%$												
3.0 to 3.5																		
3.5 to 4.0	Instrumentation to separate charged particles from photons	Reduced Performance																
4.0 to 4.5		Not Accessible																
> 4.6	Proton Spectrometer	Reduced Performance																
	Zero Degree Neutral Detection	Reduced Performance																

η	Nomenclature		Tracking				Electrons and Photons			$\pi/K/p$ PID		HCAL		Muons			
			Min p_T	Resolution	Allowed X/X_0	Si-Vertex	Min E	Resolution σ_E/E	PID	p-Range (GeV/c)	Separation	Min E	Resolution σ_E/E				
-6.9 — -5.8	↓ p/A	Auxiliary Detectors	low- Q^2 tagger	$\delta\theta/\theta < 1.5\%$; $10^{-6} < Q^2 < 10^{-2} \text{ GeV}^2$													
...																	
-4.5 — -4.0			Instrumentation to separate charged particles from γ														
-4.0 — -3.5													-50%/√E+6%				
-3.5 — -3.0	Central Detector	Backwards Detectors	100 MeV π 135 MeV K	-5% or less	$\sigma_{xz} \sim 20 \mu\text{m}$, $d_0(z) \sim d_0(r\phi) \sim 20/p_T \text{ GeV}$ $\mu\text{m} + 5 \mu\text{m}$	50 MeV	$2\%/ \sqrt{E} + (1-3)\%$	π suppression up to $1:10^4$	$\leq 7 \text{ GeV}/c$	$\geq 3\sigma$	~500 MeV	-45%/√E+6%	Useful for bkg. improve resolution				
-3.0 — -2.5																$\sigma_p/p \sim 0.1\% \times p + 2.0\%$	$\sigma_{xy} \sim 30 \mu\text{m}/p_T + 40 \mu\text{m}$
-2.5 — -2.0																$\sigma_p/p \sim 0.05\% \times p + 1.0\%$	$\sigma_{xy} \sim 30 \mu\text{m}/p_T + 20 \mu\text{m}$
-2.0 — -1.5																	
-1.5 — -1.0																	
-1.0 — -0.5																	
-0.5 — 0.0																	
0.0 — 0.5																	
0.5 — 1.0																	
1.0 — 1.5																	
1.5 — 2.0	Forward Detectors						$(10-12)\% / \sqrt{E} + (1-3)\%$	$3\sigma e/\pi$	$\leq 30 \text{ GeV}/c$	$\geq 3\sigma$		-85%/√E+7%					
2.0 — 2.5															$\sigma_p/p \sim 0.05\% \times p + 1.0\%$	$\sigma_{xy} \sim 30 \mu\text{m}/p_T + 20 \mu\text{m}$	
2.5 — 3.0																$\sigma_{xy} \sim 30 \mu\text{m}/p_T + 40 \mu\text{m}$	
3.0 — 3.5															$\sigma_p/p \sim 0.1\% \times p + 2.0\%$	$\sigma_{xy} \sim 30 \mu\text{m}/p_T + 60 \mu\text{m}$	
3.5 — 4.0	↑ e	Auxiliary Detectors	Instrumentation to separate charged particles from γ														
4.0 — 4.5																	
...																	
> 6.2		Proton Spectrometer		$\sigma_{\text{intrinsic}}(\eta)/ \eta < 1\%$; Acceptance: $0.2 < p_T < 1.2 \text{ GeV}/c$													

Table 8.20: Summary of the Physics Working Group detector requirements

The correlation between chapter 2 and detector requirements (Sec. 8.1) was discussed within the coordinator team.

OUTCOME:

- 2 phases:
 1. Parallel actions of (i) physics WG with AC coordination and of (ii) TC-office with CC WG conveners
 2. Merging the outcome of the two parallel actions

- **We are now starting phase 1:**

(i) Physics WGs

- The detector requirements are discussed in the various subsections of chapter 2 justified by physics scope
 - tentative example: DIS requires electron reconstruction with
 - Momentum resolution: ... (values for different pseudorapidity range)
 - Angular resolution: ... (values for different pseudorapidity range)
 - Energy resolution: ... (values for different pseudorapidity range)
 - Sample purity: ... (values for different pseudorapidity range)
 - ...

(ii) TC-office and CC WGs

- Identify what in the old YT is totally unrealistic:
 - What is really needed and cannot be obtained by a single subsystem have to be addressed with a holistic approach combining the performance of more subsystems

GOAL: clarify requirements in chapter 2 and have 1 single table at the opening of chapter 8 (Sec. 8.1)