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

		Tracking							trons and Photo	π/K/p		HCAL				
η	Nomenclature	Resolution	Relative Momentun	Allowed X/X ₀	Minimum-p _T (MeV/c)	Transverse Pointing Res.	Longitudinal Pointing Res.	Resolution	PID	Min E Photon	p-Range	Separation	$\begin{array}{c} \text{Resolution} \\ \sigma_{\text{E}}/\text{E} \end{array}$	Energy	Muons	
< -4.6	Low-Q2 tagger															
-4.6 to -4.0			Not Accessible													
-4.0 to -3.5								Reduced Perf	omance							
-3.5 to -3.0			σ _p /p ~					1%/E	π suppression							
-3.0 to -2.5			0.1%×p⊕2%					⊕2.5%/√E ⊕1%	up to 1:10 ⁻⁴	20 MeV		_	50%/VE		Muons	
-2.5 to -2.0	Backward Detector		σ _p /p ~		150-300						≤10 GeV/c		⊕ 10%		useful for	
-2.0 to -1.5			0.02% × p ⊕ 1%			dca(xy) ~ 40/p _T	$dca(z) \sim 100/p_T$	2%/E ⊕(4-8)%/√E	π suppression up to 1:(10 ⁻³ -10 ⁻²)	50 MeV					background suppression	
-1.5 to -1.0			w 174			µm ⊕ 10 µm	µm ⊕ 20 µm	⊕2%	ap to 1:(1010-)			ļ			and	
-1.0 to -0.5			o _r /p ~			dca(xy) ~	dca(z) ~	2%/E							improved resolution	
-0.5 to 0.0	Barrel		0.02% × p	~5% or less	400	30/p _T µm	30/p _T µm	⊕ (12-14)%/VE	π suppression up to 1:10 ⁻²	100 MeV	≤6 GeV/c	≥ 3 σ	100%/√E	~500MeV		
0.0 to 0.5			⊕ 5%	10'55		⊕5µm	⊕5µm	⊕(2-3)%	4910 1.10				⊕ 10%			
0.5 to 1.0												ļ				
1.0 to 1.5			сµ/р∼ 0.02% × р			dca(xy) ~ 40/p _T µm ⊕ 10 µm	dca(z) ~ 100/p _r									
1.5 to 2.0	E		⊕1%		150-300	hau @ io hau	µm ⊕ 20 µm	2%/E ⊕(4*-12)%/√E	3σ e/π	50 May 1			50%/VE			
2.0 to 2.5 2.5 to 3.0	Forward Detectors				150-300			⊕2%	up to 15 GeV/c	50 MeV	≤50 GeV/c		⊕ 10%	/		
2.5 to 3.0 3.0 to 3.5			сµ/р∼ 0.1%×p⊕2%												<u>├</u>	
	Losto umortation to econorate															
3.5 to 4.0	Instrumentation to separate charged particles from photons						Red	uced Performa	ance							
4.0 to 4.5								Not Accessible	9							
> 4.6	Proton Spectrometer															
24/0	Zero Degree Neutral Detection															

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/).

10/25/2024

		Nomen	alatura		Tracking			E	ectrons and	l Photons	π/Κ	p PID		Muons	
η	Nomenclature			Min p⊤	Resolution	Allowed X/X ₀ Si-Vertex		Min Resolutio E n σ _E /E		PID	p-Range (GeV/c)	Separation	Min E Resolution		
-6.95.8			low-Q² tagger		δθ/θ < 1.5%; 10.6 < Q ² < 10.2 GeV ²										
	↓ p/A	Auxiliary													
-4.54.0		Detectors	Instrumentation to												
-4.03.5	1		separate charged particles from γ											~50%/√E+6%	
-3.53.0								2%/√E+ (1-3)%							
-3.02.5	1				σ _p /p ~ 0.1%×p+2.0%		σ _{xy} ~30µm/pr+ 40µm		(1.0)//						
-2.52.0	1		Backwards Detectors			1								~45%/√E+6%	
-2.01.5	1		Detetions		σ _p /p ~ 0.05%×p+1.0%		σ _{xy} ~30µm/p _T + 20µm		7%/√E+		≤7 GeV/c				
-1.51.0							2. opini		/4 230/	π suppression					
-1.00.5										up to 1:104					
-0.5 0.0		Central	Barrel	100 MeV π 135 MeV K	$\sigma_p/p \sim 0.05\% \times p+0.5\%$	~5% or less	σ _{xvz} ~ 20 μm,	p) MeV					~500 MeV	~85%/√E+7%	
0.0 - 0.5		Detector					d ₀ (z) ~ d ₀ (rφ) ~ 20/p _T GeV μm + 5 μm σ _{xy} ~30μm/p _T +				≤ 10 GeV/c	≥ 3 0			Useful for bkg.
0.5 — 1.0											≤ 15 GeV/c	-			improve resolution
1.0 - 1.5									(10-12)%/	,	≤ 30 GeV/c				resolution
1.5 - 2.0					σ _p /p ~ 0.05%×p+1.0%				√E+(1-3)%						
2.0 - 2.5			Forward		opp 0.00000 p 110 m		20µm			3σe/π	≤ 50 GeV/c				
2.5 - 3.0			Detectors				σ _{xy} ~30μm/p _T + 40μm			30 6/1	≤ 30 GeV/c	c		~35%/√E	
3.0 - 3.5					$\sigma_p/p \sim 0.1\% \times p{+}2.0\%$		40μm σ _{xy} ~30μm/p _T + 60μm				≤ 45 GeV/c				
3.5 - 4.0			Instrumentation to				60µm				5 45 Gevic		<u> </u>		
4.0 - 4.5			separate charged												
4.0 - 4.5	îe	Auxiliary	particles from y					<u> </u>					<u> </u>		
> 6.2	e	Detectors			σ _{intrinsic} (i])/ t < 1%;								<u> </u>		
20.2			Proton Spectrometer		Acceptance:										
			opectionieter		0.2< pt<1.2 GeV/c										

Table 8.20: Summary of the Physics Working Group detector requirements

10/25/2024

S. Dalla Torre

Table 10.6: This matrix summarizes the high level requirements for the detector performance. The interactive version of this matrix can be obtained through the Yellow Report Physics Working Group WIKI page (https://wiki.bnl.gov/eicug/index.php/Yellow_Report_Physics_Common).

- 1					Electrons		ons	л/К/р		HCAL		Muons			
iste		Nomenc	lature	Resolution	Allowed	minimum-pT	Si-Vertex	Resolution os/E	PID	min E	p-Range	Separati	Resolution or/E	Energy	Muon
9 to -5.8			low-Q2 tagger	σθ/9 < 1.5%; 10-6 < Q2 < 10-2 GeV2											
.0 to -4.5	1					300 MeV pions									
1.5 to -4.0			Instrumentation to separate charged particlas from photons			300 MeV pions		2%/√E(+1-3%)		50 MeV					
4.0 to -3.5	↓ p/A	Auxiliary D				_				50 MeV			~50%/√E + 6%		
3.5 to -3.0	4									50 MeV					
.0 to -2.5			Backward	αpT/pT ~ 0.1%⊕0.5%			σ_xy~30/pTμm +40 μm			50 MeV	≤7 GeV/c	~45%/√E+6%		muons	
2.5 to -2.0			Detector	σρΤ/ρΤ			σ xy~30/pTμm	2%/vE(+1-3%)	Π	50 MeV					us eful f
.0 to -1.5	-			σρΤ/ρΤ			+20 µm	7%/√E(+1-3%) 7%/√E(+1-3%)	sion up	50 MeV 50 MeV					bkg,
.5 to -1.0	-			0.05%⊕0.5%				/%/\E(+1-3%)	to 1:1E-			-			improv
.0 to -0.5	-	Central	Barrel	σρΤ/ρΤ	~5% or		σxyz ~ 20 μm, d0(z) -d0(rΦ)		4	50 MeV 50 MeV	≤ 10 GeV/c		-85%/√E+7% ~85%/√E+7%	~500	resolut
0 to 0.5	-	Detector	Darrei	~0.05%×pT+0.5%	less X		~ 20/pTGeV			50 MeV		≥3 σ	~85%/VE+7%	MeV	
.5 to 1.0	-	Denetion			1000 / 1		µm + 5 µm			50 MeV	≤ 15 GeV/c	1	~85%/vE+7%		
.0 to 1.5]			σρΤ/ρΤ		<100 MeV pions, 135 MeV kaons	σ xv∼30/aTum	1		50 MeV	≤ 30 GeV/c]		1	
.5 to 2.0	-			~0.05%×pT+1.0%		stoomev prons, 155mev kaons	+20 µm			50 MeV	≤ 50 GeV/c				
.0 to 2.5	-		Forward,					-		50 MeV		-			
.5 to 3.0			Detectors	σρT/pT ~			σ_xy~30/pTμm +40 μm	(10-	3σ e/π	50 MeV	≤ 30 GeV/c		35%/vE		
	-			0.1%×pT+2.0%			+40 μm σ_xy~30/pTμm	12)%/√E(+1-				-			
.0 to 3.5				0.170-01-2.070			σ_xy~ suγpiµm +60 µm	3%)		50 MeV	≤45 GeV/c				
8.5 to 4.0			Instrumentation to separate charged particles from photons	Tracking capabilities are desirable for forward tagging						50 MeV					
.0 to 4.5	Λe	Auxiliary						1		50 MeV			35%/√E (goal),		
		Detectors	Neutron			200 10-14-14-14-14		4.5%/√E for	<= 3				<50%/√E		
.5 to 5.0			Detection			300 MeV pions		photon energy > 20	cm granular	50 MeV			(acceptable)*, 3mrad/√E		
								GeV	granular ity				(goal)		
6.2	1		Proton Spectrometer	orintrinsic(t)/ t < 1%; Acceptance: 0.2 < pt < 1.2 GeWc									(gou)		

10/25/2024

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 <u>chapter 2</u> 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)

10/25/2024