Yellow Report – Detector Working Group



<u>Conveners:</u> Ken Barish (UC Riverside), Tanja Horn (CUA), Peter Jones (U. Birmingham), Silvia Dalla Torre (Trieste/INFN)

Eight Working Groups – two have been working together since the start

- Tracking (+vertexing), Conveners: Kondo Gnanvo (UVA), Leo Greiner (LBNL), Annalisa Mastroserio (INFN), Domenico Elia (INFN)
- Particle ID, Conveners: Tom Hemmick (SBU), Patrizia Rossi (JLab)
- Calorimetry (EM and Hadronic), Conveners: Vladimir Berdnikov (CUA), Eugene Chudakov (JLab)
- Far-Forward Detectors, Conveners: Alexander Jentsch (BNL), Michael Murray (Kansas)
- DAQ/Electronics, Conveners: Andrea Celentano (INFN), Damien Neyret (CEA Saclay)
- Polarimetry/Ancillary Detectors
 - Conveners: Elke Aschenauer, Dave Gaskell
- Sentral Detector/Integration & Magnet, Conveners: William Brooks, Alexander Kiselev (BNL)
- Forward Detector/IR Integration, Convener: Yulia Furletova (JLab)
- Infrastructure and Installation, Convener: TBA
- Detector Complementarity, Conveners: Elke Aschenauer (BNL), Paul Newman (Birmingham)

□ All detector working groups are very active and have made good progress

- All have regular meetings most posted in Google calendar
- Complementarity group added a convener: P. Newman (U. Birmingham)

Yellow Report – Detector Working Group



The level of advancement is diverse as starting points are different

In a synergistic effort some groups have already initiated joint meetings with some or all of the DWGs – will see such joint efforts at this meeting and even more at the CUA YR Workshop

Thursday morning sessions



Towards joint discussion of topics

Selected Yellow Report Collaborative Tools



Groups have started implementing/developing the tools into the workflow

Indico: archives meetings, discussion material, notes

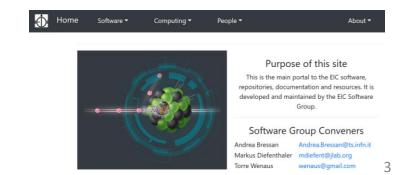
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	Calorimetry	9 events	\rightarrow			
	Ancillary-Polarimetry	4 events	+			
	Far Forward	empty	+			
	DAQ/Electronics	4 events	\rightarrow			
	Central Detector/Integration/Magnet	4 events	\rightarrow			
	Forward Detector/IR Integration	8 events	+			
	Infrastructure and Installation	empty	+			
	Detector Complementarity	3 events	-+			

EIC Wiki: Storage of documentation, e.g. manuals

https://wiki.bnl.gov/eicug/index.php/Main_Page



Dropbox: Storage of larger file	les
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GitHub Pages: Software documentation https://eic.github.io/

Yellow Report – Detector Working Group



□ Some groups have started documentation towards the Yellow Report

Writing tool: Overleaf

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Information Work Flow between PWG+DWG



Discussion on Thursday 16:00-17:30 (ET) Joint Session Part 4

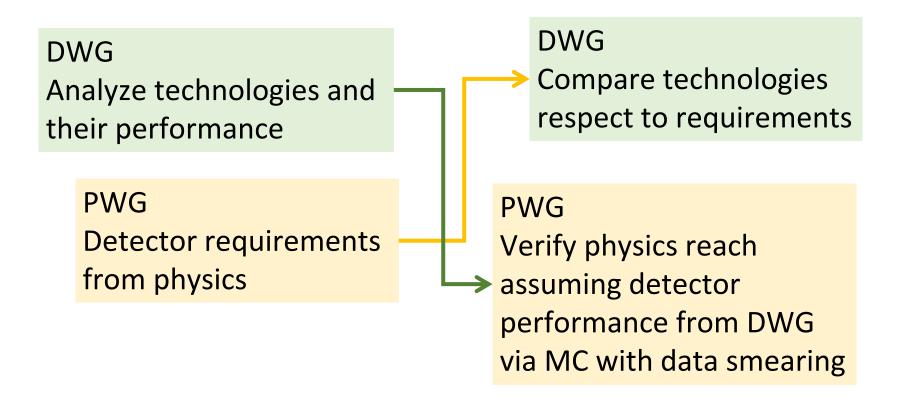
- Two types of information to consider regarding communication about requirements from physics and performance of different detector technologies
 - > Updates, e.g. requirements from PWG
 - Iteration, e.g. the "response" from DWG informed by performance of different technologies and iteration

Suggested Scheme of the activity flow



Discussion on Thursday 16:00-17:30 (ET) Joint Session Part 4

- for discussion
- purpose: general agreement before defining procedure details
- the arrows indicate INFORMATION FLOW



YR Overall Timeline and Goals

http://www.eicug.org/web/content/ yellow-report-initiative

Date 2020	Event	Goals
March 19-21	1 st Workshop	present progress for various groups and sub-groups , with much discussion and work time, initiate detector complementarity study based on detector technologies
May 22-24	2 nd Workshop	present initial physics measurements and detector requirements following five chosen processes/tools (inclusive measurements, semi- inclusive measurements, jets and heavy quarks, exclusive measurements, diffractive measurements & tagging), present detector concepts and implications for physics measurements. Complete detector requirements table including segmentation needs.
August 3-7	EICUGM	Conveners/sub-conveners inform community about status and progress. Conveners identify possible issues (if any) in meeting with EICUG Steering Committee.
Sept 17-19	3 rd Workshop	present mature studies of detector requirements from physics processes, balance detector concepts versus impact on physics measurements. Discuss possible systematics reduction among complementary detector choices. Complete final "to-do" list for YR(s).
Nov 19-21	4 th Workshop	distribute draft YR sections before meeting

With CD-0 and Site selection made, expect the expedited timeline with Yellow Report release in January 2021

DWG and YR Timeline



The main mandate of the Yellow Report is to consider and compare all possible technologies for two EIC detectors.

- The YR timeline is very short and it may not be possible to complete the study of all technologies up to the end within this timeframe.
- Therefore, even if it is clear that we would like to make significant progress, e.g. towards reconstruction, it is likely that we will have to rely on some parameterizations for a while.
- Since time is short it is important to focus on the main priorities first. In particular for simulation development, one has to make choices, e.g. between (1) complete Geant4 simulation including all materials, support structures, and a downselect of a subset of possible technologies and (2) intermediate Geant4 simulations keeping the path open to alternative technologies. Option (2) better answers the YR main mandate

The DWG follows option (2), to keep the path open to alternative technologies, which better answers the YR mandate

DWG specific goals

http://www.eicug.org/web/content/ yellow-report-initiative



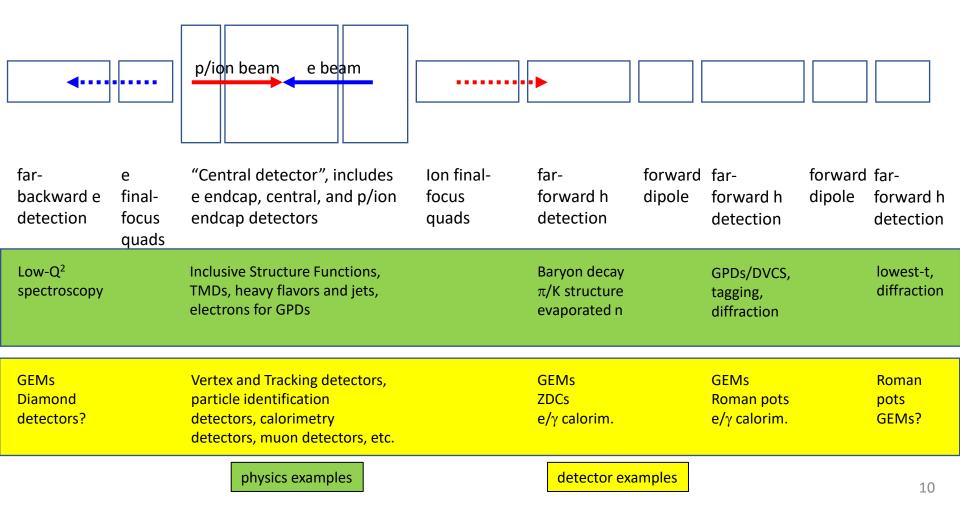
Develop a strategy for each subgroup to meet the overall goals, e.g.

- Define tasks and deliverables
- Identify resources
- Develop a plan for interaction with PWG and SWG
- Start collecting for each technology input for detector complementarity studies (information collection will continue in the next months at least till the August meeting), e.g.
 - Performance (momentum, energy resolution, material budget, ...)
 - What drives the systematics of a detector using this technology
 - Time needed until the technology is ready for mass production and available workforce

Cartoon/Model of the Extended Detector and IR

EIC physics covers the entire region (backward, central, forward)

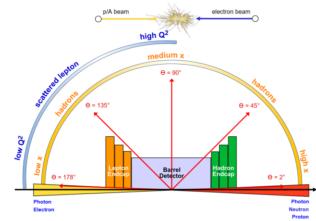
Many EIC science processes rely on excellent and fully integrated forward detection scheme



The Interactive Detector Matrix

https://physdiv.jlab.org/DetectorMatrix/

- Supersedes the EIC Detector Handbook
- Collects physics requirements "real time", lists all technologies for a given region, and links to studies that established the numbers



Is the official EIC set of physics requirements and technology parameters

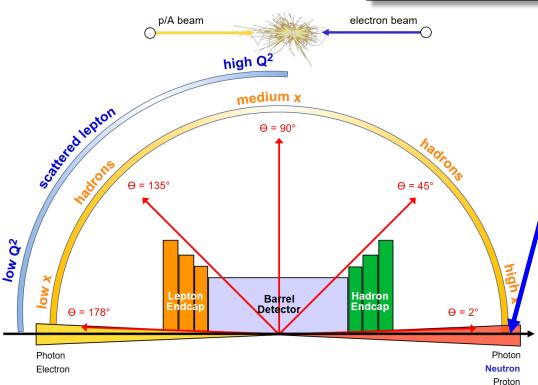
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					Tracking		Electrons		π/К/р		HCAL	
η		N	omenclature	Resolution	Resolution Allowed X/XO Si-Vertex Re		Resolution σ_E/E PID		p-Range (GeV/c)	Separation	Resolution σ_E/E	Muons
-6.9 to -5.8			<u>low-Q2 tagger</u>	<u>σθ/θ < 1.5%; 10-6 < Q2 < 10-2 GeV2</u>								
	. ↓p/A	Auxiliary										
-4.5 to -4.0	1 biv	Detectors	Instrumentation to separate charged particles									
-4.0 to -3.5			from photons				<u>2%/√E</u>					
-3.5 to -3.0				<u>σ_D/p ~ 0.1%⊕0.5%</u>			270/ 12					
-3.0 to -2.5				<u>op/p</u>								
-2.5 to -2.0			Backward Detector	<u>σp/p 0.1%⊕0.5%</u>		TBD	<u>2%/√E</u>		<u>≤ 7 GeV/c</u>		<u>~50%/√E</u>	
-2.0 to -1.5				<u>σp/p 0.05%⊕0.5%</u>			<u>7%/√E</u>	<u>π suppression up to</u>				
-1.5 to -1.0				<u>op, p. 0.05 //w 0.5 //</u>			<u>7%/√E</u>	<u>1:10⁴</u>				
-1.0 to -0.5												
-0.5 to 0.0		Central Detector	Barrel	<u>σ_p/p ~0.05%×p+0.5%</u>	~5% or less X	<u>σxyz ~ 20 μm. d0(z) ~d0(rΦ) ~ 20/pTGeV</u>			<u>≤ 5 GeV/c</u>	<u>≥3 σ</u>		TBD
0.0 to 0.5			Darrei	<u></u>		<u>μm + 5 μm</u>			<u>=======</u>			100
0.5 to 1.0												
1.0 to 1.5									<u>≤ 8 GeV/c</u>			
1.5 to 2.0				<u>σp/p ~0.05%×p+1.0%</u>			<u>(10-12)%/√E</u>		<u>30 dev/e</u>			
2.0 to 2.5			Forward Detectors			TBD			<u>≤ 20 GeV/c</u>		<u>~50%/√E</u>	
2.5 to 3.0				<u>σ_p/p ~ 0.1%×p+2.0%</u>								
3.0 to 3.5									<u>≤ 45 GeV/c</u>			
3.5 to 4.0			Instrumentation to separate charged particles									
4.0 to 4.5		Auxiliary	from photons									
	↑e	Detectors	Neutron Detection									
> 6.2			Proton Spectrometer	<u> ø</u> intrinsic(<u> t)/ t < 1%; Acceptance: 0.2 < pt <</u> <u>1.2 GeV/c</u>								

Thanks to: Walt Akers, Elke Aschenauer, Rolf Ent, Thomas Ullrich 11

DWG Interactive Map

Goal: work out requirements to carry out the EIC physics

Goal: Integrate technologies to meet the requirements



https://physdiv.jlab.org/DetectorMatrix/

Details for Zero-Degree Neutron Detection Abstract: Geometry needs for zero-degree calorimeter used to detect neutrons from incoherent nuclear breakup reactions. **Referenced Files:** ZDC neutron angle as function of energy. Zero-Degree High Precision Hadronic Calorimetry. Notes: ZDC: size 60x60x200cm Example of zero-degree neutron detection **Interactive Map: to guide and** document the efforts towards these goals

DWG Interactive Map

Interactive table of detector requirements for each region of physics

https://physdiv.jlab.org/DetectorMatrix/

Details for the Barrel Calorimeter HCAL

Abstract:

The resolution was determined in a study, which looked to the energy-resolution of jets using a the information of a hadron calorimeter in the unfolding.

Referenced Files: • Jet study in Barrel HCAL

Notes:

Barrel HCAL: 75%/sqrt(E) + 15%

Example of Barrel Calorimeter HCAL

		Namanalatura			Tracking		L 30	trons	π/	K/p	HCAL	Muons
η		Nomenclature		Resolution	Allowed X/XO	Si-Vertex	Resolution σ_E/E	PID	p-Range (GeV/c)	Separation	Resolution σ_E/E	
-6.9 to -5.8			low-Q2 tagger	δθ/θ < 1.5%; 10-6 < Q2 < 10-2 GeV2								
	↓ p/A	Auxiliary Detectors										
-4.5 to -4.0			Instrumentation to separate									
-4.0 to -3.5			charged particles from photons				2%/√E					
-3.5 to -3.0				σ _p /p ~			270/ 1					
-3.0 to -2.5				0.1%×p+2.0%								
-2.5 to -2.0			Backward Detector	σ _p /p ~0.05%×p+1.0%		TBD			≤7 GeV/c		~50%/√E	
-2.0 to -1.5				7%/√E				π suppression up				
-1.5 to -1.0				770742				to 1:10 ⁴				
-1.0 to -0.5						σ _{xyz} ~ 20 μm,						
-0.5 to 0.0		Central Detector	Barrel	σ _p /p	~5% or less	dO(z) ~dO(rΦ) ~			≤5 GeV/c	≥3 σ	TBD	TBD
0.0 to 0.5				~0.05%×p+0.5%		20/pTGeV µm + 5						
0.5 to 1.0						μm				-		
1.0 to 1.5				σ _p /p ~					≤ 8 GeV/c			
1.5 to 2.0	4			0.05%×p+1.0%			(1O-12)%/√E			4		
2.0 to 2.5	-		Forward Detectors			TBD			≤ 20 GeV/c		~50%/√E	
2.5 to 3.0	4			σ _p /p ~ 0.1% ×p+2.0%					< 45 C -> 11	-		
3.0 to 3.5				×p+2.0%					≤ 45 GeV/c			
3.5 to 4.0 4.0 to 4.5	4		Instrumentation to separate charged particles from photons									
	4		Neutron Detection									
	∱e	Auxiliary Detectors	Neutron Detection									
> 6.2			Proton Spectrometer	σintrinsic(t)/ t < 1%; Acceptance: 0.2 < pt < 1.2 GeV/c								

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Yellow Report – Updates from the WGs

Tracking WG: status and strategy

Current status:

- working on the following main deliverables:
 - ✓ evaluate all-silicon vs hybrid (silicon & gaseous) trackers, both technology and performance sides
 - compare realistic alternatives (TPC, MPGD options) for gaseous detectors, both barrel and forward regions
- ongoing performance studies (mainly EicRoot-based simulations):
 - ✓ central region Si-vertex + TPC + Fast MPGD Layers
 - ✓ endcap region GEM (MPGD) trackers
 - ✓ all-silicon (barrel) tracker + forward/backward silicon disks
 - ✓ comparisons all-silicon vs BeAST (Si-vertex + TPC + MPGDs) concepts
- available results and interactions with other groups:
 - ✓ relative momentum and pointing resolutions, preliminary angular resolutions at PID positions
 - ✓ started interactions with PID and Integration WGs (this week also with Calorimetry)

Future plan:

- finalize technology survey and simulation studies within EicRoot
- increase effort on Fun4All and ESCalate simulations (close connection with SWG):
 - ✓ finalize current implementations of all-silicon tracker in Fun4All and G4E
 - ✓ implementing services and material for all tracker detector configurations in Fun4All and G4E
 - join simulation campains and project tracking performance to physics-oriented studies (connection with PWGs)
- keep following / increasing interactions with other WGs, including Complementarity and PWGs

Tracking WG: technology input for complementarity

Tracking Si central detector (vertex + barrel + discs)

Technology: for the vertex, barrel and inner disc detectors, the only identified technology that meets the requirements are MAPS. No currently existing MAPS sensor appears to fully meet all of the EIC requirements (current simulations are based on ALPIDE sensors with a smaller pixel size 20 x 20 um^2). In order to produce a new sensor design that meets the EIC requirements a consortium of EIC groups are joining an ongoing sensor development effort at CERN. There are contingency plans for modification of existing sensor designs to meet EIC requirements should this CERN effort be unsuccessful.

There is general consensus that this is a promising path to pursue to deliver an EIC sensor in the given timeframe. Momentum and pointing resolution performance studies are in progress. EIC requirements seem satisfied.

ITS3 silicon design parameters

Parameter	Wafer-scale sensor (this proposal)
Technology node	65 nm
Silicon thickness	20-40 µm
Pixel size	O(10 x 10 µm)
Chip dimensions	scalable up to 28 x 10 cm
Front-end pulse duration	~ 200 ns
Time resolution	< 100 ns (option: <10ns)
Max particle fluence	100 MHz/cm^2
Max particle readout rate	100 MHz/cm^2
Power Consumption	$< 20 \text{ mW/cm}^2$ (pixel matrix)
Detection efficiency	> 99%
Fake hit rate	$< 10^{-7}$ event/pixel
NIEL radiation tolerance	10^{14} 1 MeV n _{eq} /cm ²
TID radiation tolerance	10 MRad

	Stave X/X0
ITS3 like vertexing	~0.1%
ITS3 like barrel (up to 1.5m length)	0.55 %
ITS3 like disc (up to 60 cm diameter)	0.24%

Si + gaseous detector vs. all silicon

U		
	Si + gaseous	All Si
Attributes for consideration	 dE/dx in gas for PID Well understood technology - less R&D needed. Costs less (likely) Less material in tracking region Worse single point resolution but more position samples 	 Readout faster than TPC Better momentum resolution than TPC at higher momentum (>~5GeV/c) Can be made more compact Less material in endcap regions Fewer calibration/correction issues Very high single point resolution

Tracking WG: technology input for complementarity

	TPC + Fast MPGD Layer	Cylindrical MPGD (Micromegas, µRWELL)	Drift Chambers / Straw Tubes	Planar MPGDs (GEM, Micromegas, μRWELL)	Small TGCs	MPGD-TRDs
Barrel region	Pros:Pros:- momentum res.;- Space point & angular res additional dE/dx;- Space point & angular res cost- Time resolution (< 10 ns)- Low material in barrel- Low material in End cap - Cost & robustnessCons:- Cost & robustness- End cap material charge distortion- Momentum res. - Fabrication challenges - Material budget in barrel		 Pros: momentum res.; additional dE/dx; cost Low material in barrel 	 Pros: Alternative to cylindrical MPGDs arrangement in polygons Easier fabrication 	N/A	N/A Radiator size
			Cons: - End cap material - calibration - Stability issues	Cons: - Momentum res. - Detector space barrel - Material budget in barrel		
Hadron End Cap	N/A		 Pros: momentum res.; additional dE/dx; cost Low material in barrel 	 Pros: Momentum & angular res. Low material (<0.4%) Cost & robustness 	 Pros: Momentum & angular res. Cost & robustness 	 Pros: Additional tracking Angular res. for RICH Additional e/π PID
			Cons: - Material budget - calibration - Stability issues	<u>Cons:</u> - ?	Cons: - Material budget	Cons: - Radiator size
Electro n End Cap		N/A Only planar option		 Pros: Momentum & angular res. Low material (<0.4%) Cost & robustness 	N/A Mainly because of material budget	Pros: - Additional tracking - Complement main e PID in electron end cap
				- ?		Cons: - Radiator size?

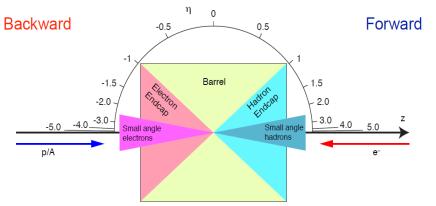
Particle ID WG - Where we are: Summary Table

	P Range	Contr.	Para m.	Pro/Co n	Ext. Const	MONTECARLO Sim.
psec TOF LGAD TOF	Up to 10 Depending on the $\sigma_{\rm T}$ and L	NO	~YES	YES	~ YES	NO
dual RICH (aerogel, gas)	2-60 @ 1.6 m	YES Chroma Emission Pixel Field Tracking 	YES	YES	YES • Simulated constant w/ momentum	YES • GEMC/Geant4 • Al-driven Optimization
GEM RICH (Gas Electron Multipliers)	20-50 @1m	 Chroma (Emission) Pixel Tracking 	YES	YES	YES	YES (Simplified)
modular RICH (mRICH)	2-10 @ 3 cm	YES Chroma Emission Pixel Tracking 	~YES	YES	YES (tracking)	~YES • GEMC/Geant4 work in progress
DIRC	2-6 @ 1.7 cm	YES • Tracking • Mult. Scat • Chrom, Emis, pix	YES 18	YES	YES	YES • GEMC/Geant4 without B field

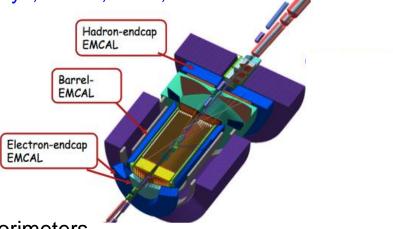
Important notes on the table

- Almost all «yes» but still many open questions:
 - Simulation are still preliminary except for a couple of detectors
 - For sensors and electronics in the detector acceptance radiation hardness can be an issue not yet evaluated
 - R&D on photon sensors is still on going (magnetic field tolerance? No currently proven sensor solution for 3T magnetic field)
 - No discussion on the material budget
 - Assumption on the available space in some cases is not realistic
 - Sensor time resolution for psTOF is very challenging (should be proven)

EIC Calorimetry overview



Several options including crystals, glass, W/SciFi, Shashlyk, Pb/Sc, PbGI, etc.



Detector Matrix for the calorimeters

η	Nomencla ture	EmCal						HCal			
		Energy resoluti on %	Spatial resolution mm	Granul arity cm^2	Min photon energy MeV	PID e/π πsuppre ssion	Technology examples*	Energy resolution %	Spatial resoluti on mm	Granula rity cm^2	Technolog y solution
-3.5 : -2	backward	2/√E ⊕ 1	3/√E ⊕ 1	2x2	50	100	PbWO ₄	50/√E⊕10	50/√E ⊕ 30	10x10	Fe/Sc
-2:-1	backward	7/√E ⊕ 1.5	3(6)/√E ⊕ 1	2.5x2.5 (4x4)	100	100	DSB:Ce glass; Shashlik; Lead glass	50/√E⊕10	50/√E ⊕ 30	10x10	Fe/Sc
-1:1	barrel	(10-12) /√E⊕2	3 /√E ⊕ 1	2.5x2.5	100	100	W/ScFi	100/√E⊕ 10	50/√E ⊕ 30	10x10	Fe/Sc
1:3.5	forward	(10-12) /√E⊕2	3/√E ⊕ 1	2.5x2.5 (4x4)	100	100	W/ScFi Shashlyk, glass	50/√E⊕ 10	50/√E ⊕ 30	10x10	Fe/Sc

*Technology selection depends on the space available Several other technologies are under consideration e/ π : pion suppression depends on the energy, and the energy and momentum resolutions Material in front will affect the resolution ²⁰

Status of Far-Forward Group

• Tasks and deliverables

- Understand detailed geometric acceptance with baseline IR design.
- Propose baseline detector concepts for FF hadron & photon detection and study resolutions.
- Iterate on the above points with possible, achievable improvements (e.g. ZDC energy resolution, pixel sizes, etc.)
- Use studies to help inform second IR design to potentially cover gaps in the baseline IR.
 - The complementarity discussion has begun along these lines.

<u>Resources</u>

- People from both JLAB, BNL, and universities and other labs actively working on simulations.
- People from JLAB, BNL, LANL, universities, etc. actively researching technology to meet requirements.
- Computing resources in use at both BNL (RACF, EicRoot, Fun4All, etc.) and at JLAB (ESCalate, g4e, etc.).

• Plan for interaction with PWG and SWG

• In progress – we have gotten MC input from both the exclusive and diffractive working groups that are being processed (or have already been processed) through the full IR simulation.

Electronics and DAQ

Sub WG strategy

Goal of the WG: Bring peoples from different laboratories together to imagine realistic scenarios for the readout electronics and DAQ system of the future EIC experiments Strong links to build with:

–detector WG \rightarrow What detector we will have to read ? Expected signal flux ? Detector online calibration and monitoring ?

–physics and software WG \rightarrow What physics events to read ? What background to reject ? Which rate for each ? What data treatment to do online ?

Gather state of the art on hardware electronics (in particular readout chips) and envisioned developments, to study their adaptation to the different detector readout requirements

Think about the different possible DAQ and readout structures, summarizing their adaptation to the EIC experimental context

Present status

Relations with others WG

-contacts taken with detector groups but too early to get extensive answers about detector characteristics

-interesting discussions with the software WG

Hardware electronics: some information gathered on 1-2 pages summary for each chip, need to amplify contacts with hardware developers

DAQ structure: 3 dedicated WG meeting in April and May, several readout structures presented, discussion foreseen during the Pavia workshop in order to conclude on this topic

Polarimetry and Ancillary Detectors

- Requirements for each system fairly well defined
 - Polarimeters: rapid, bunch-by-bunch measurements, assuming ~1% (or better) systematic uncertainty required
 - Luminosity monitor: again assuming ~1% systematic uncertainty, rapid measurements
- Development work for each system at different levels of maturity
 - Extensive knowledge of hadron polarimeters exists working on detailed Monte Carlo to make projections for EIC
 - Compton polarimeter GEANT4 simulation under development can already get rough idea of detector requirements from simple simulations without detailed detector response
 - GEANT4 simulation for lumi monitor exists. Work now focuses on refining details of setup
- Detector requirements for each system roughly known some details need to be investigated
 - What degree of segmentation for Compton photon/electron detectors? Photon detector energy resolution?
 - Extra detectors for hadron polarimetry?
 - Once detector requirements better understood, can make decision on technology (e.g., HVMAPS pixelated detector vs. strip detector, etc.)

Central / Integration / Magnet Working Group

- Task: become a central place where the detector concepts 'materialize'
- Membership: no integration experts, everybody is welcome
- Work in close contact with the other subgroups, DWGs and Complementarity WG in particular
- Solenoid magnet design team activities:
 - Solenoid requirement document to be released soon
 - Designer meetings on April 8 and May 15 (now under the OPC structure)

• Joint WG meetings organization

May 13: PID and Tracking WGs

Near future: topical discussions

- Crossing angle, IP shift, beam pipe design, high $|\eta|$ acceptance, ...
- t₀ counters, finite bunch length and all other timing issues
- Space allocations, projectivity, single- or multi-functional detectors, ...

Complementary Detector

Goal:

Collect crisp and clear arguments why two detectors will enhance the physics output of the EIC complementarity includes the IR design, but keeping consistency with accelerator design in mind

Approach:

Started to meet with the conveners of the different PWGs and discuss a set of questions documented at https://wiki.bnl.gov/eicug/index.php/Yellow_Report_Complementarity



Open MIC session Friday, 22nd of May at 8:45 am EDT

submit slides to <u>elke@bnl.gov</u> & <u>paul.newman@cern.ch</u> by Thursday CoB

Questions to address :

- Have you / your WG group identified requirements which conflict with the current baseline detector and IR design
- Do you have suggestion how to most effectively reach the goal
- ightarrow not more than 3 slides

Looking ahead to EIC YR Workshop #3

17 – 19 September at CUA/Washington DC (or remote?)

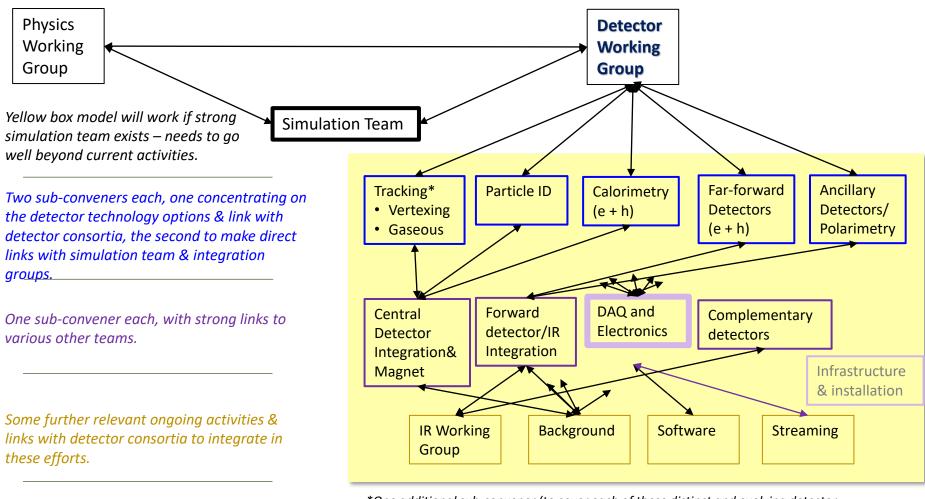


Overall goal: "present mature studies of detector requirements from physics processes, balance detector concepts versus impact on physics measurements. Discuss possible systematics reduction among complementary detector choices. Complete final "to-do" list for YR(s)"

- Expect that the common theme will shift to discussions of global issues that impact all (or a large number of) Physics and Detector Working Groups rather than individual ones
- Possibly a venue to hear global view on detectors activities?



Detector WG - Organogram



*One additional sub-convener (to cover each of these distinct and evolving detector technologies)