Diffraction & Tagging: Quick updates

- ~100 people on the list, wide range of topics, overlap with several WG
- Recent preprints since Temple (non exhaustive)
  - diffractive gluon jet production [Peccini, Moriggi, Machado] https://arxiv.org/abs/2004.06972
  - dijet photoproduction [Guzey, Klasen] https://arxiv.org/abs/2003.09129 https://arxiv.org/abs/2004.06972
- Exclusive WG meeting tomorrow:
  - “Update on exclusive diffractive di-jet production” [Zhengqiao Zhang]
  - “Exclusive VMP decay” [Sylvester Joosten]
  - “u-channel event generator” [Bill Wenliang]

  https://indico.bnl.gov/event/8299/

- Request for computing needs @BNL/JLab info [link]
  - Storage [TB -- backed-up/volatile]
  - CPU needs/resources
  - Additional special reqs [I/O etc.]
- Call to collect questions about IR and accelerator design [E-C Aschenauer, P. Newman]
  - Compile FAQ

SC (Rolf's) slides at Temple

YR Timeline (I)

From 01/23/2020 EICUG Remote Meeting, folding in lab/project planning

January 2020	Software tutorials are given, all activities are underway
March 19-21	First workshop at Temple University – Philadelphia *Goal: 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	Second workshop at U of Pavia – Pavia, Italy *Goal: 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	Status reports at EICUGM @ FIU – Miami, FL *Goal: Conveners/sub-conveners inform community about status and progress. Conveners identify possible issues (if any) in meeting with EICUG Steering Committee.*
September 17-19	Third workshop at CUA – Washington, DC *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).*
November 19-21	Fourth workshop at UCB/LBL – Berkeley, CA or Final Meeting (assembly of Yellow Report(s)) *Goal: distribute draft YR sections before meeting*
January 2021	~~(optional) Final Meeting~~ **Completion of Yellow Report**

Straw-man plan of attack

- Review previous existing work related to your subgroup
  - Todo: collect resources on YR wiki
- Converge on a set of important and representative measurements for your subgroup
  - What is being worked on is “important”, we will learn which ones drive detectors most
- **Pavia Focus**
  - Break-down physics deliverables into “physics objects” (PO)
    [electron, hadron (ID/noID), muon, jet]
  - map out kinematics for each PO
- Cross-check PO maps across physics subgroups to determine the most challenging constraints in terms of detector design; resolve overlaps [decide who runs what].
- Focus on fast simulations for the most demanding measurements first; determine the optimal/acceptable detector performance; confirm/check resulting impact on the rest of the measurements

Simulation baseline parameters

- Your choice of a set below:

p-e	275 on 18 GeV	100 on 10 GeV	100 on 5 GeV	41 on 5 GeV
d/^{3}He/^{4}He-e	110 on 18 GeV	110 on 10 GeV		41 on 5 GeV
C/^{40}Ca/Cu-e	110 on 10 GeV	110 on 10 GeV		41 on 5 GeV
Au-e	110 on 18 GeV	110 on 10 GeV		41 on 5 GeV

(For nuclei the energy refers to the energy per nucleon)

- Integrated luminosities of 10 fb^{-1} and 100 fb^{-1} per nucleon
  (*or specify what the physics requires [D&T]*)

- polarization of 70% [e and ions]

Exchanges with Detector WG

- Communicate completed studies which have revealed specific detector requirements to the DWG
  - not a request for large event samples but for **specific numbers**, such as resolution requirements, in the detector matrix

η	Nomenclature			Tracking			Electrons		π/K/p		HCAL	Muons
				Resolution	Allowed X/X0	Si-Vertex	Resolution σE/E	PID	p-Range (GeV/c)	Separation	Resolution σE/E	
-6.9 to -5.8	↓ p/A	Auxiliary Detectors	low-Q2 tagger	σθ/θ < 1.5%; 10-6 < Q2 < 10-2 GeV2								
...												
-4.5 to -4.0			Instrumentation to separate charged particles from photons									
-4.0 to -3.5												
-3.5 to -3.0				σp/p ~ 0.1%⊕0.5%			2%/√E					
-3.0 to -2.5												
-2.5 to -2.0			Backward Detector	σp/p 0.1%⊕0.5%		TBD	2%/√E		≤ 7 GeV/c		~50%/√E	
-2.0 to -1.5				σp/p 0.05%⊕0.5%			7%/√E					
-1.5 to -1.0							7%/√E					
-1.0 to -0.5		Central Detector						π suppression up to 1:10^4				
-0.5 to 0.0			Barrel	σp/p ~0.05%⊕p⊕0.5%	~5% or less X	σxyz ~ 20 µm, d0(z) -d0(rΦ) ~ 20/pTGeV µm + 5 µm			≤ 5 GeV/c	≥ 3 σ		TBD
0.0 to 0.5												
0.5 to 1.0												
1.0 to 1.5			Forward Detectors	σp/p ~0.05%⊕p⊕1.0%		TBD	(10-12)%/√E		≤ 8 GeV/c		~50%/√E	
1.5 to 2.0												
2.0 to 2.5									≤ 20 GeV/c			
2.5 to 3.0				σp/p ~ 0.1%⊕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	σintrinsic(|t|)/|t| < 1%; Acceptance: 0.2 < pT < 1.2 GeV/c								

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