Concluding Remarks

Joint CFNS & RBRC Workshop on Physics and Detector Requirements at Zero-Degree of Colliders

24-26 September 2019

Stony Brook University

Zero-degree physics

- GPD exclusive measurement
  - Fazio
- Spectator neutron and proton tagging in e+D/3He collisions
  - Weiss, Tu
- Geometry tagging
  - Baker, Chang
- Short range correlation and EMC effect
  - Strikman, Hauenstein, Nadel-Turonski, Schmookler

Zero-degree physics

- HERA review
  - Ciesielski
- Event generator
  - Broz
- CGC
  - Mantysaari
- Cosmic-ray and neutrino
  - Menjo, Liodakis, Zrake

Zero-degree detectors & IR design

- Calorimeters
  - Hyde, Tsai, Repond, Novitzky, Longo, Adams
- Roman pot
  - Guryn, Jentsch
- Particle ID
  - Chiu
- Detector design
  - Bazilevsky
- IR design & accelerator
  - Montag, Ptitsyn, Vafaei-Najafabadi, Furletova

Next goals

- Output of this workshop
  - Physics, detector and IR requirements at zero-degree
  - To be compiled in an EIC detector R&D letter of interest of the zero-degree apparatus
    - Jan.30-31, 2020 EIC detector R&D committee meeting at BNL
  - We expect your participation in the LoI
- Next workshop
  - To be planned before making an EIC detector R&D proposal (July, 2020)
    - Spring in 2020
    - Stony Brook? BNL?
    - Let us know any suggestions!

Thanks

- All participants and speakers
- Local organizers at CFNS
  - Joanna Kiryluk, Barak Schmookler, J.H. Lee
- CFNS support
  - Abhay Deshpande
  - Socoro Delquaglio, Marlene Vera-Viteri
- RBRC support

- See you again soon. Have a safe trip back!

Backup Slides

Zero-degree workshops

- HESZ
  - 2013 in Nagoya
    - Workshop on high-energy scattering at zero degree
  - 2015/2017 in Nagoya
    - Combined with Forward Physics WS
    - Workshop on forward physics and high-enegy scattering at zero degrees
  - to be held in 2021
- Forward Physics WS
  - 2018 in Stony Brook
    - CFNS workshop on forward physics and instrumentation from colliders to cosmic rays
  - 2019 (Nov. 18-21) in Guanajuato, Mexico
    - Workshop on forward physics and QCD at the LHC, the future Electron Ion Collider and cosmic ray physics

Zero-degree physics

- HERA
  - Leading proton/neutron
- LHC/RHIC
  - Roman pot and more tracking
  - ZDC: EM+Hadron
  - Polarimeters @ RHIC
- EIC
  - Polarized e+p/d/3He
  - e+A
    - Short Range Correlation and EMC effect, …
  - and more physics
    - Hadron spectroscopy, …
- Cosmic-ray and neutrino reaction

Zero-degree detectors

- EIC detector requirements and R&D handbook

EIC Detector Requirements

η	Nomenclature			Tracking			Electrons		π/K/p PID		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 — -5.8	↓ p/A	Auxiliary Detectors	low-Q^2 tagger	$\delta\theta/\theta < 1.5\%$; $10^{-6} < Q^2 < 10^{-2}$ GeV^2								
…												
-4.5 — -4.0			Instrumentation to separate charged particles from photons									
-4.0 — -3.5												
-3.5 — -3.0		Central Detector	Backwards Detectors	$\sigma_p/p \sim 0.1\%xp+2.0\%$	~5% or less	TBD	2%/√E	π suppression up to $1{:}10^4$	≤ 7 GeV/c	≥ 3σ	~50%/√E	
-3.0 — -2.5												
-2.5 — -2.0				$\sigma_p/p \sim 0.05\%xp+1.0\%$								
-2.0 — -1.5							7%/√E					
-1.5 — -1.0												
-1.0 — -0.5			Barrel	$\sigma_p/p \sim 0.05\%xp+0.5\%$		$\sigma_{xyz} \sim 20$ μm, $d_0(z) \sim d_0(r\phi) \sim 20/p_T$ GeV μm + 5 μm	(10-12)%/√E		≤ 5 GeV/c		TBD	TBD
-0.5 — 0.0												
0.0 — 0.5												
0.5 — 1.0												
1.0 — 1.5			Forward Detectors	$\sigma_p/p \sim 0.05\%xp+1.0\%$		TBD			≤ 8 GeV/c		~50%/√E	
1.5 — 2.0												
2.0 — 2.5									≤ 20 GeV/c			
2.5 — 3.0				$\sigma_p/p \sim 0.1\%xp+2.0\%$								
3.0 — 3.5									≤ 45 GeV/c			
3.5 — 4.0	↑e	Auxiliary Detectors	Instrumentation to separate charged particles from photons									
4.0 — 4.5												
…												
> 6.2			Proton Spectrometer	$\sigma_{intrinsic}(|f|)/|t| < 1\%$; Acceptance: $0.2 < p_T < 1.2$ GeV/c								

+ ZDC (EM+Hadron)