ePIC Overview

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INFN - Trieste

2023 RHIC/AGS Annual Users' Meeting
August 1-4, 2023

ePIC, the Context

- ePIC is the EIC Project Detector →
  - the whole path to the EIC is also the path to ePIC

White paper (2012, 2014)
the **NAS assessment** (2018)
the **Yellow Report by EICUG** (2020)

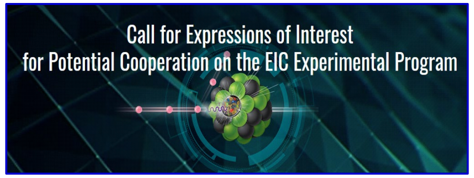
Long range plan for Nuclear Science (2015)
CD0 and site selection (Dec 2019/Jan 2020)
the **ECCE** and **ATHENA** proposals (2021)

Now published in Nuclear Physics A

arXiv:2103.05419

  - the whole EIC physics scope has to be addressed by ePIC

- <u>1 y ago</u> (@ EICUG annual meeting 2022, Stony Brook):
  - Merging of the ECCE and ATHENA Collaborations **forming a stronger collaboration for the Project Detector @ IP6 →** **ePIC**

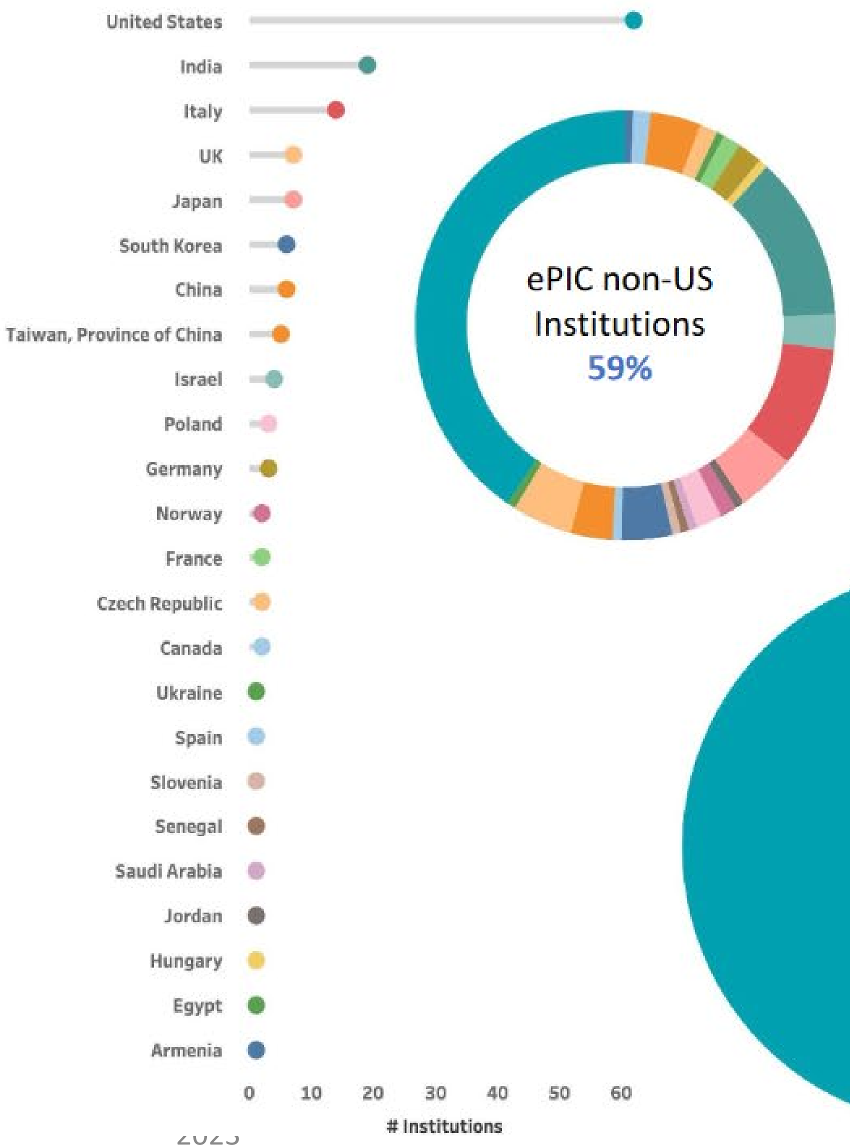


- # Today : the status of ePIC

OUTLOOK

- The ePIC Collaboration
- The scientific scope
- The ePIC detector moving towards the TDR

The ePIC Collaboration



171 institutions
24 countries

500+ participants

A truly global pursuit for a new experiment at the EIC!

The ePIC today

11 new entries in July 2023:

- Gangneung-Wonju National University
- Hanyang University
- Karlsruhe (ADL)
- NASA Goddard
- Oklahoma State
- Sungkyunkwan University
- The Ohio State
- University of Liverpool
- University of Seoul
- University of Tokyo (CNS)
- Yonsei University

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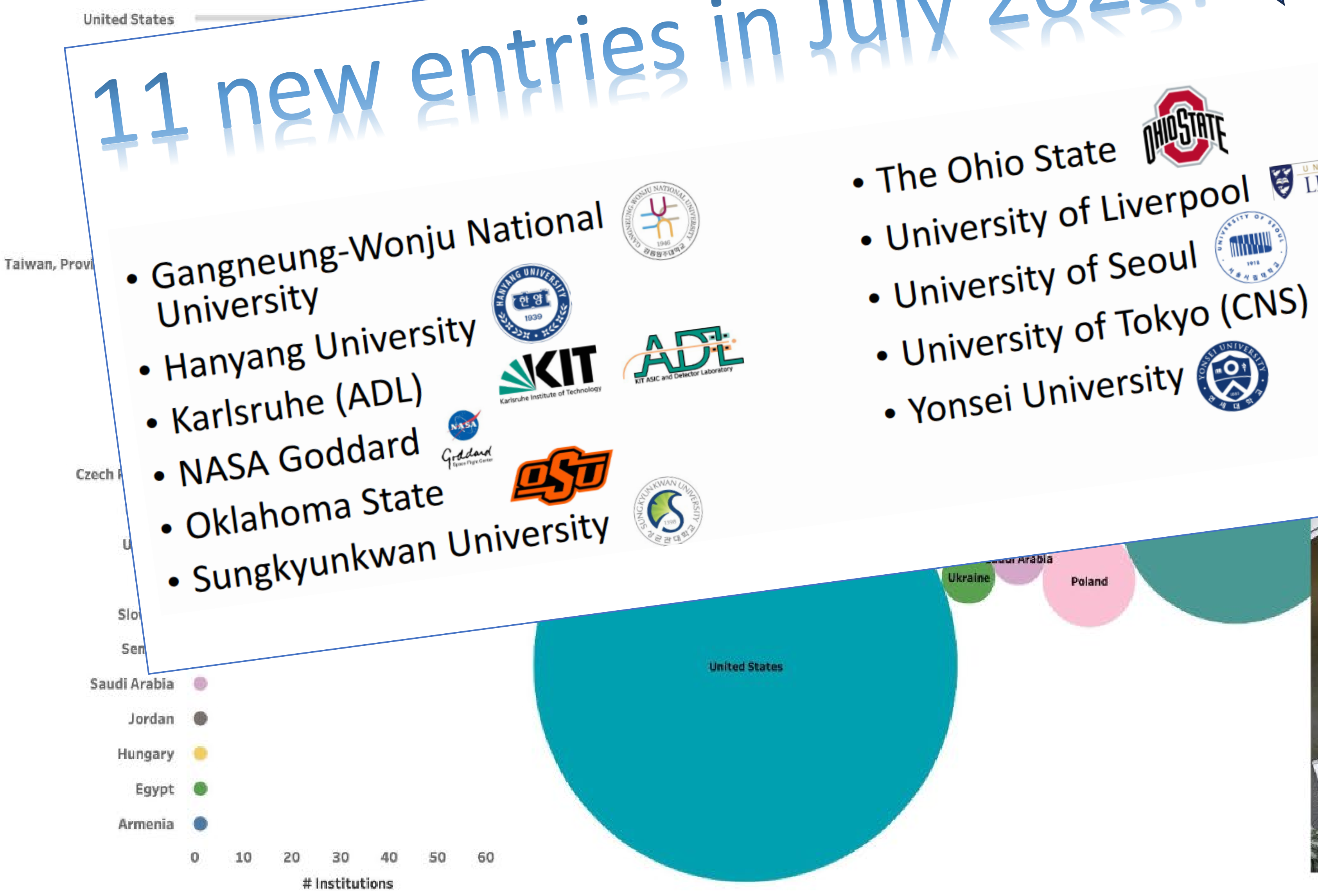
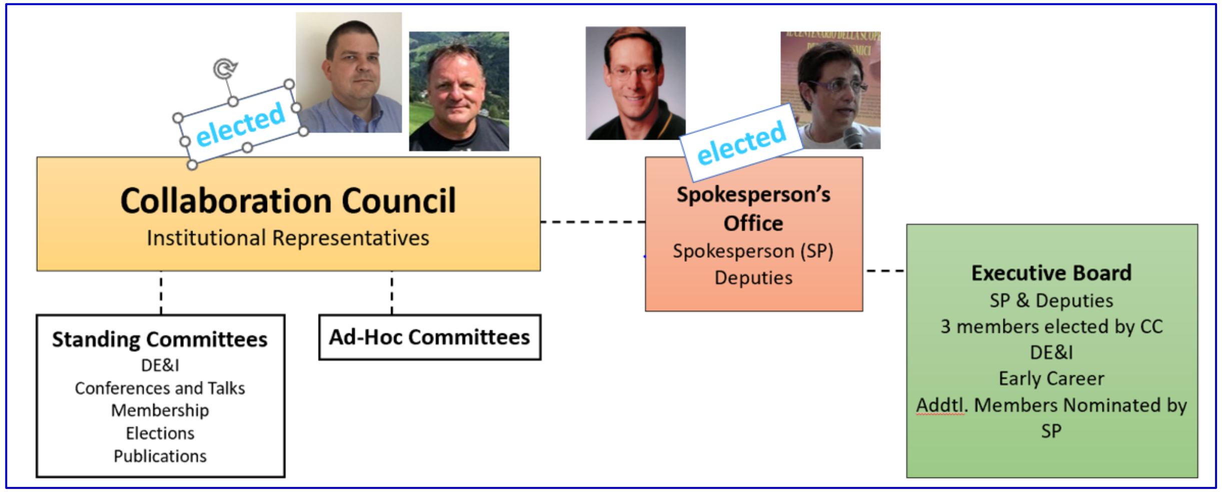
A truly global pursuit for a new experiment at the EIC!



COLLABORATION ORGANIZATION TIMELINE

Snapshot of collaboration activities towards structuring the COLLABORATION:

- July 26th-28th: Collaboration formation meeting @ Stony Brook University
- August-December 2022: Collaboration Charter
  - December 14: **adoption of charter**
- December 2022 - February 2023: Nomination process & Collaboration leadership election
  - Mid February: **announcement of election results**



Key aspects of the scientific structure : DSCs and CC WGs

Collaboration Council
Institutional Representatives

Spokesperson's Office
Spokesperson (SP)
Deputies

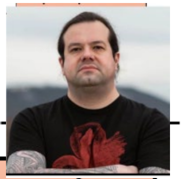
Executive Board
SP & Deputies
3 members elected by CC
DE&I
Early Career
Addtl. Members Nominated by SP
TC, SCC, AC
CC Chair & Vice (guests)

Standing Committees
DE&I
Conferences and Talks
Membership
Elections
Publications

Ad-Hoc Committees

Dashed lines indicate communication paths (bidirectional)

Technical Coordinator (TC)



Software and Computing Coordinator (SCC)

Analysis Coordinator (AC)

Technical and Integration Council
Members:
- TC, DSL's & DSTC's
- DAQ WG Conveners
- CC WG Conveners
- PTR (ex-officio)

Electronics, Readout & DAQ WG

Computing WG's/Task Forces
(as needed)

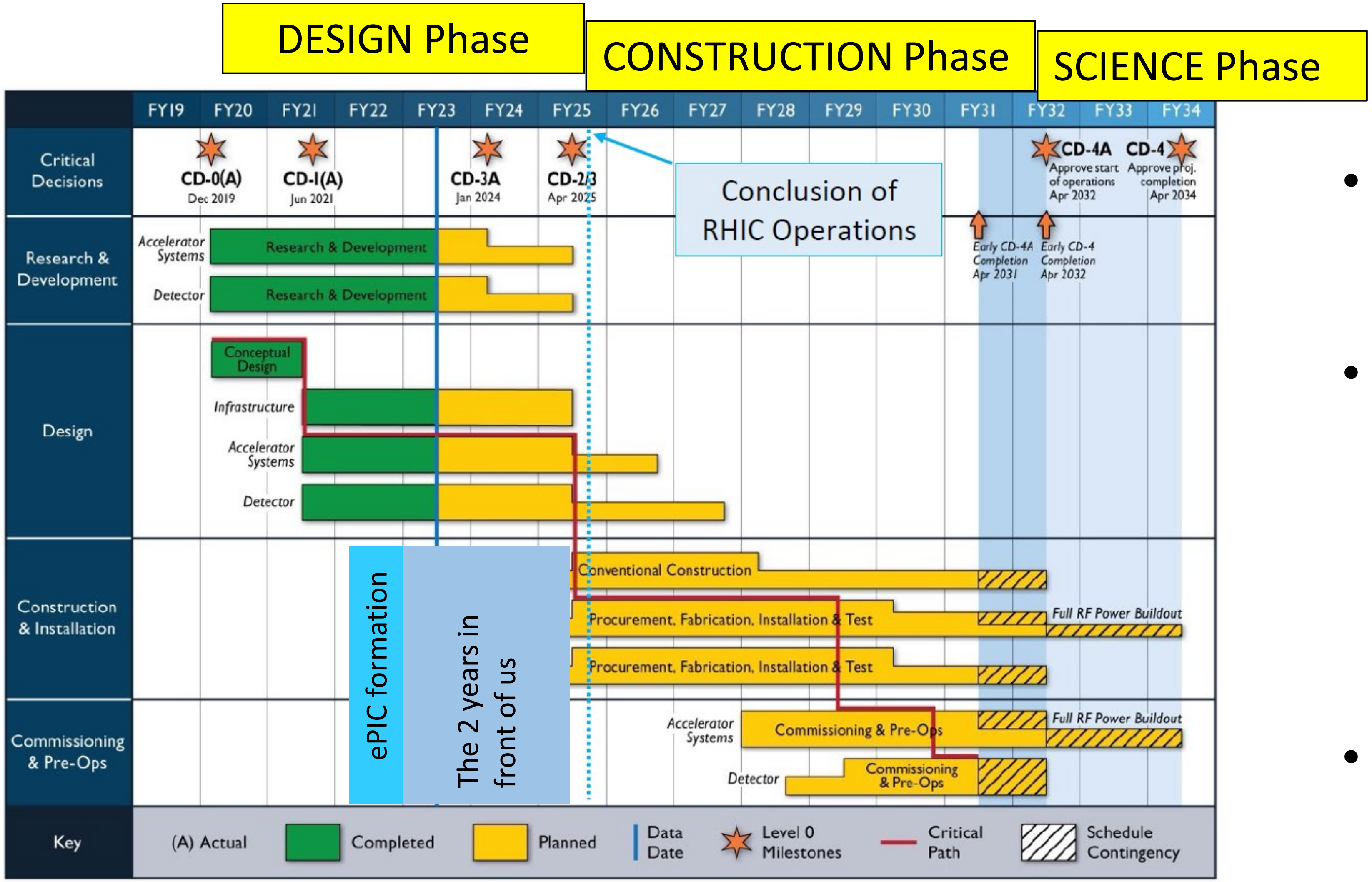
Physics WG's
PWG Conveners

Detector Subsystem Collaborations (DSC's)
Detector Subsystem Leads (DSL) and Detector Subsystem Technical Contacts (DSTC)

Cross-Cutting (CC) WG's
Tracking, PID, Calorimetry

Responsibility roles in DSCs integrated in the Project at L4/L5 level

PROJECT TIMELINES and COLLABORATION TIMELINES



The ePIC goals for the current and next year:

- to prepare the Technical Design Report (TDR) to get CD3 approval
- To organize the Collaboration so to be ready for the construction phase at the beginning of 2025

- The ePIC management plan by the SP–office is focused on the next two-years

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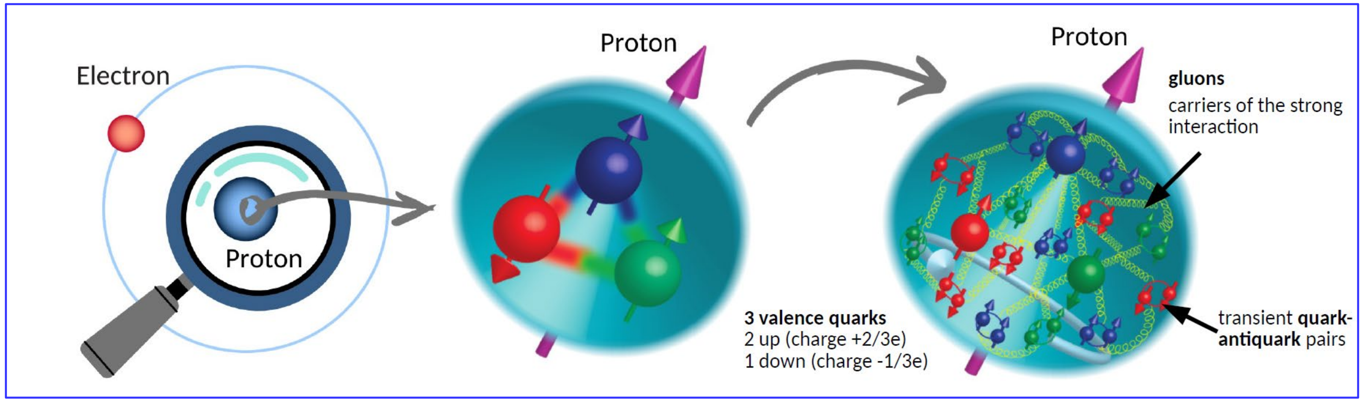
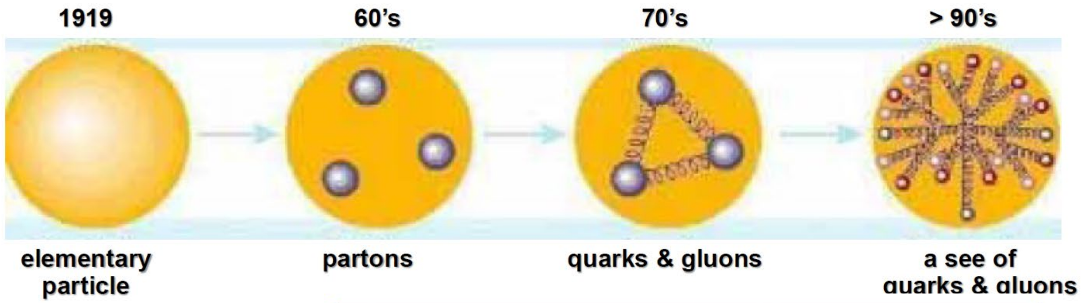
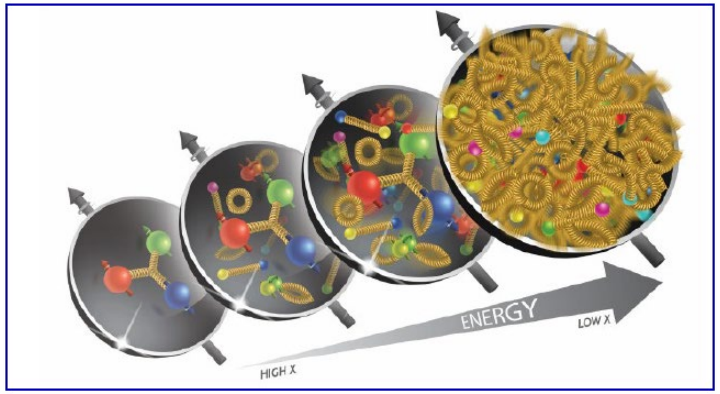
THE EIC SCIENCE SCOPE





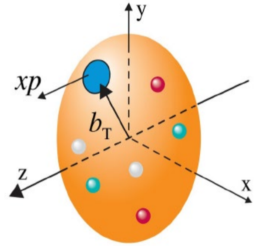
An evolution that has required
time and increasing "microscope" energies
The golden microscope is DIS:

$$e + p \rightarrow e' + X$$



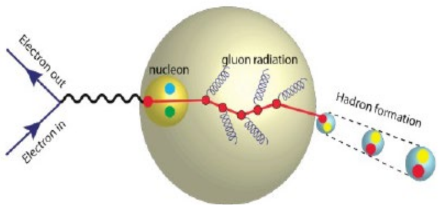
THE EIC SCIENCE SCOPE

The physics quest for the EIC ↔ the QCD open questions



- How do the nucleon properties like mass and spin emerge from them and their interactions?

- How are the quarks and gluons, and their spins, distributed in space and momentum inside the nucleon?

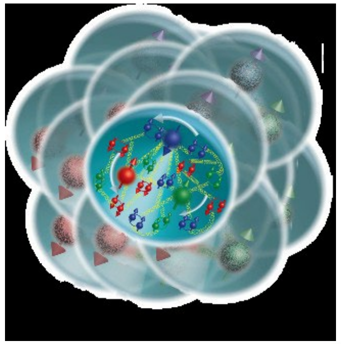


- In what manner do color-charged quarks and gluons, along with colorless jets, interact with the nuclear medium? And how do the confined hadronic states emerge from these quarks and gluons?

- What is the mechanism through which quark-gluon interactions give rise to nuclear binding?

- What impact does a high-density nuclear environment have on the interactions, correlations, and behaviors of quarks and gluons?

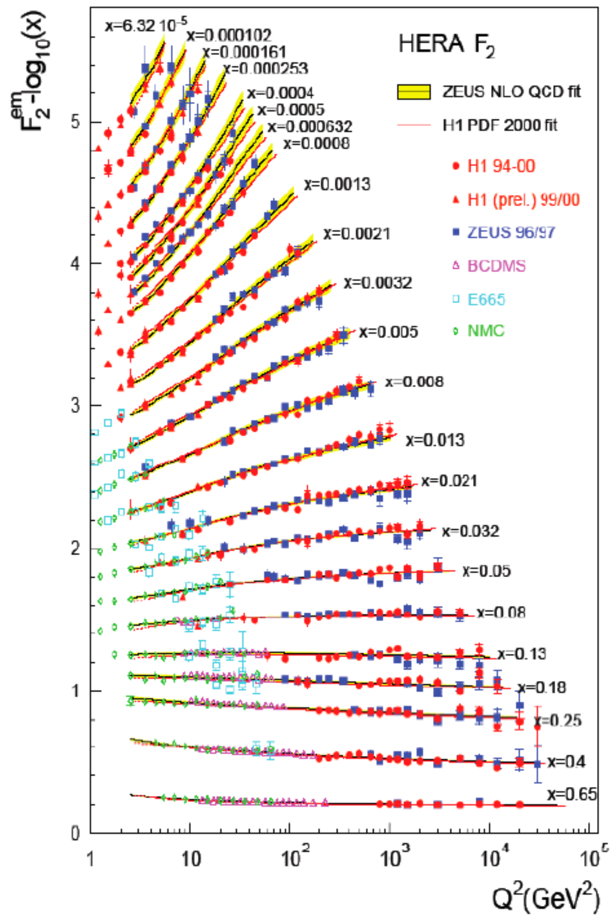
- Is there a saturation point for the density of gluons in nuclei at high energies, and does this lead to the **formation of gluonic matter** with universal properties across all nuclei, including the proton?



THE EIC SCIENCE SCOPE

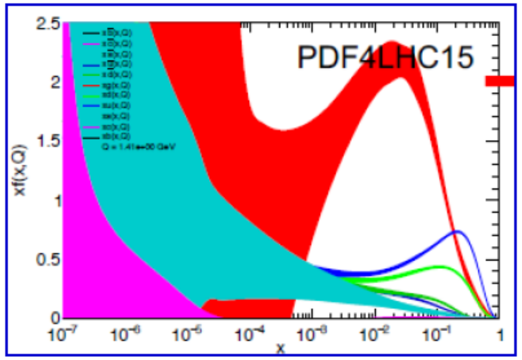
Exploring new territories

$F_2(x, Q^2)$ **largely studied**

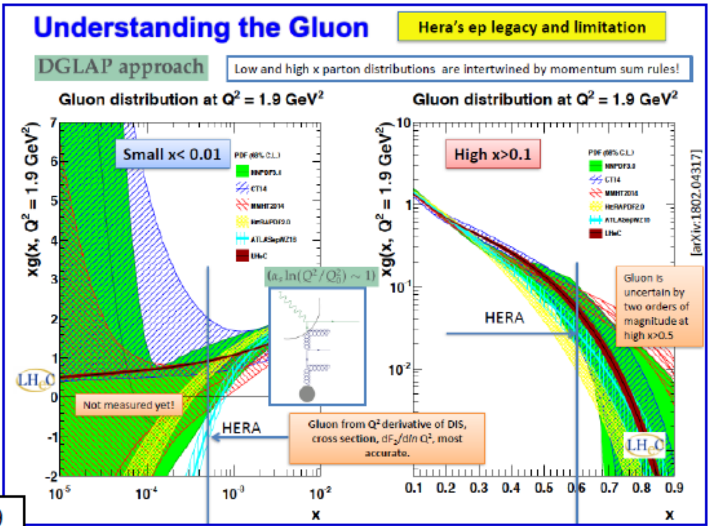


Nevertheless,
specific kinematic regions not deeply explored

Quark distribution functions
functions poorly known at very small x



Gluon distribution Functions need further exploration at small and large x



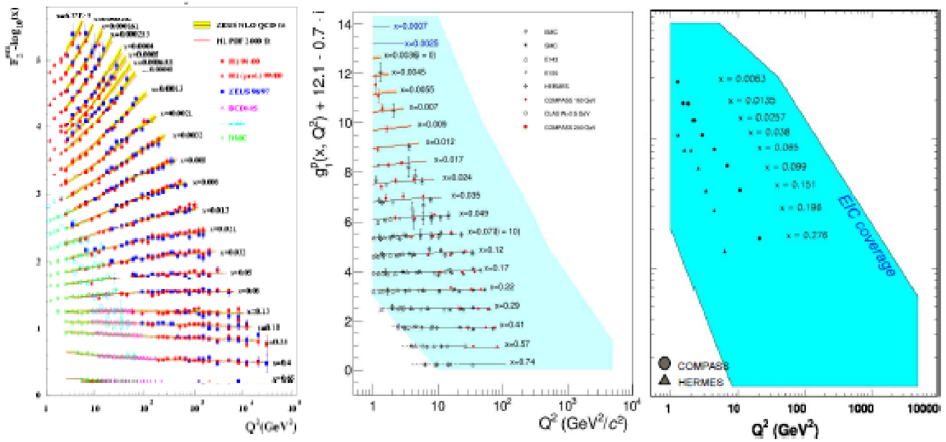
C. Gwenlan, DIS2019

THE EIC SCIENCE SCOPE

TMDs and SPIN

The 8 leading-twist quark TMD PDF
TMD - Transverse-Momentum–Dependent

N/q	U	L	T
U	f_1		$h_1^\perp$
L		g_1	$h_{1L}^\perp$
T	$f_{1T}^\perp$	$g_{1T}^\perp$	$h_1 \;\; h_{1T}^\perp$

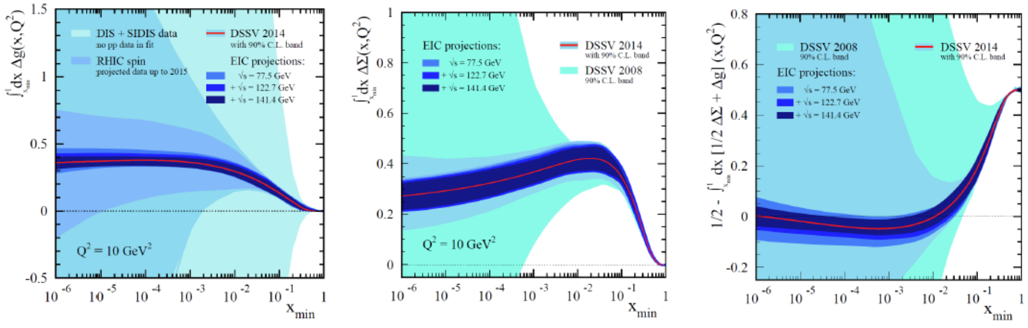


momentum   spin   transverse spin ~ angular momentum

A. Bressan, "Prospettive per fisica adronica e collisionatori adronici"

What do we know:

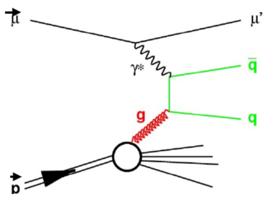
$$\frac{1}{2}\hbar = \left\langle P,\frac{1}{2}\left| J^z_{QCD} \right| P,\frac{1}{2}\right\rangle = \underbrace{\frac{1}{2}\int_0^1 dx \Delta\Sigma(x,Q^2)}_{\text{total quark spin}} + \underbrace{\int_0^1 dx \Delta G(x,Q^2)}_{\text{gluon spin}} + \underbrace{\int_0^1 dx \left(\sum_q L_q^z + L_g^z\right)}_{\text{angular momentum}}$$



1/2 - Gluon $_{40\%}$ - Quarks $_{30\%}$ = orbital angular momentum

- **Gluon contribution needs a deeper exploration**

Photon Gluon Fusion: $\gamma g \to q\bar{q}$



High p_T hadron pair $q\bar{q} \to hh$

of course, by a SI-DIS measurement

- **Orbital** momentum to be extracted from TMDs

THE EIC SCIENCE SCOPE

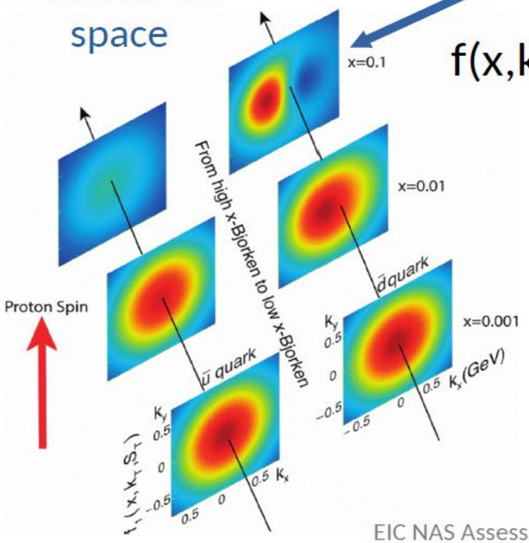
Spatial and Momentun structure of the N in 3D

Wigner functions $W(x,b_T,k_T)$

$\int d^2b_T$ → $f(x,k_T)$

$\int d^2k_T$ → $f(x,b_T)$

Momentum space



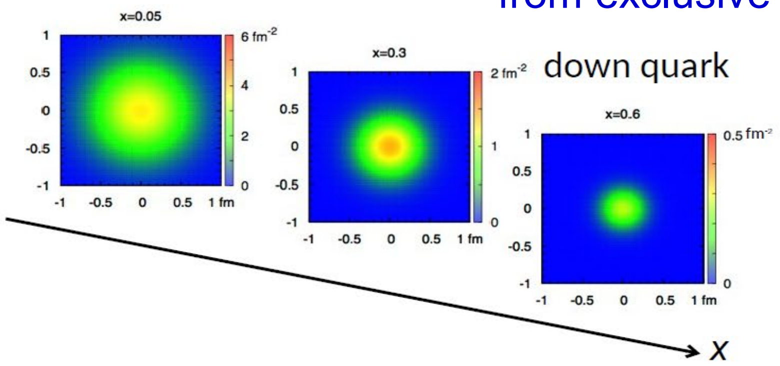
EIC NAS Assessment

MOMENTUM SPACE

Access to spin-orbit correlation (TMDs) via SIDIS

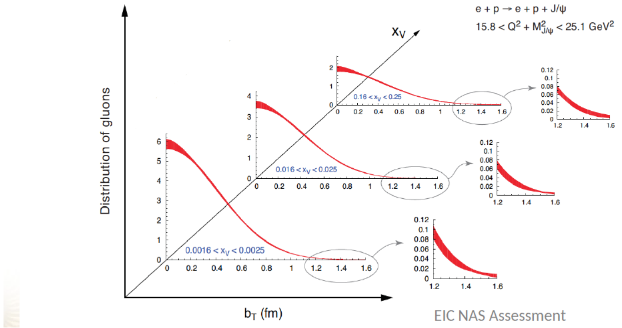
COORDINATE SPACE

Spin-dependent 2+1D coordinates space images from exclusive scattering



Nucleon tomography

- Deeply Virtual Photon scattering – real photon is produced
- Deeply Virtual Meson production – quark-antiquark bound state is produced

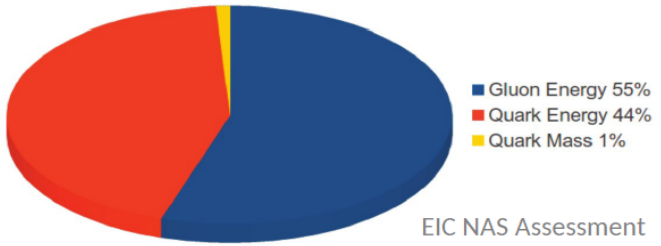


EIC NAS Assessment

THE EIC SCIENCE SCOPE

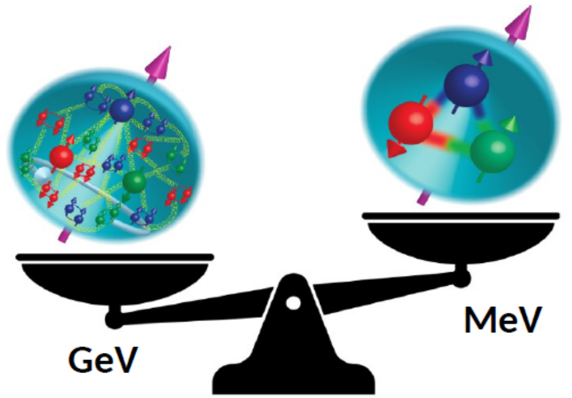
HOW DO NUCLEONS ACQUIRE MASS ?

Contributions to the total mass of the nucleon



- **Gluons have no mass** and **quarks are nearly massless**, but nucleons and nuclei are heavy, making up most of the visible mass of the universe
- Visible world mostly made out of light quarks: **masses emerge form quark-gluon interactions**

Proton (valence content *uud*) - mass ~940 MeV
- The mass is dominated by the energy of the highly relativistic gluonic fields
- EIC will allow determination of an important term contributing to the proton mass, the so-called "QCD trace anomaly" → accessible in exclusive reactions



What about the mass of light mesons?

Pions (valence content *ud*) mass ~140 MeV
- Cleanest expression of the emergent mechanism
- Empty or full of gluons?

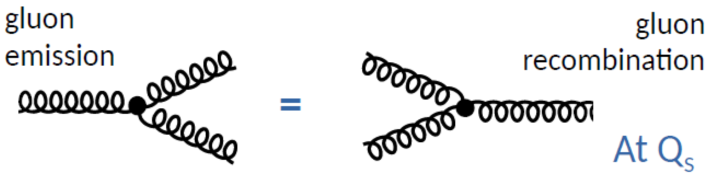
Kaons (valence content *us* – strange content!) mass ~ 490 MeV
- Probing boundary between emergent and Higgs-mass mechanisms
- More or less gluons than in pion?

THE EIC SCIENCE SCOPE

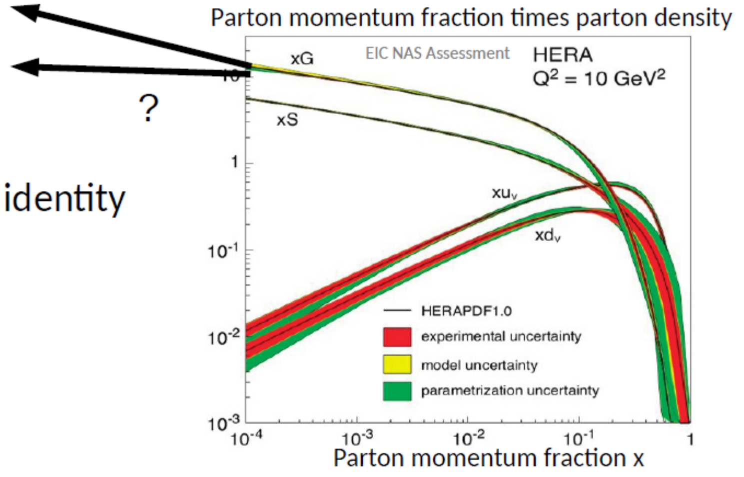
ACCESS TO A NEW STATE OF THE GLUONIC MATTER

What happens to the gluon density in nuclei?

- Number of gluon **grows in the low-x limit**
- At some point the **density becomes so large** that gluons lose their individual identity and are **strongly overlapping**

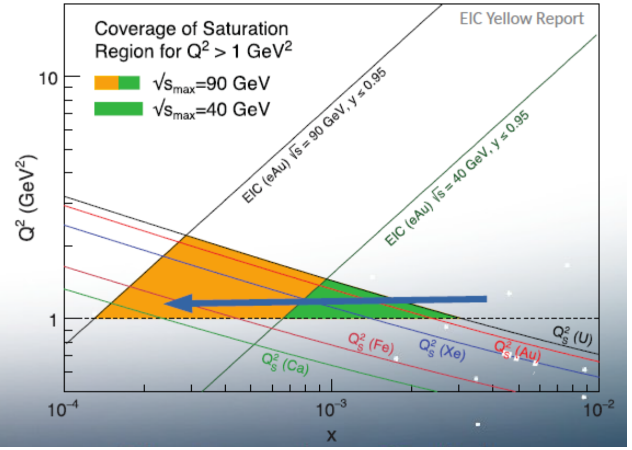


At Q_s



Q_s - resolution scale at which the number density so large that gluons are no longer independent → **saturated gluon matter**

EIC provides a unique opportunity to have very high gluon densities
electron – heavy nuclei (e.g., Pb) collisions
Combined with an unambiguous observables, e.g., **di-jets in ep and eA, diffractive processes**



EIC will allow to unambiguously map the transition from a non-saturated to saturated regime

OUTLOOK

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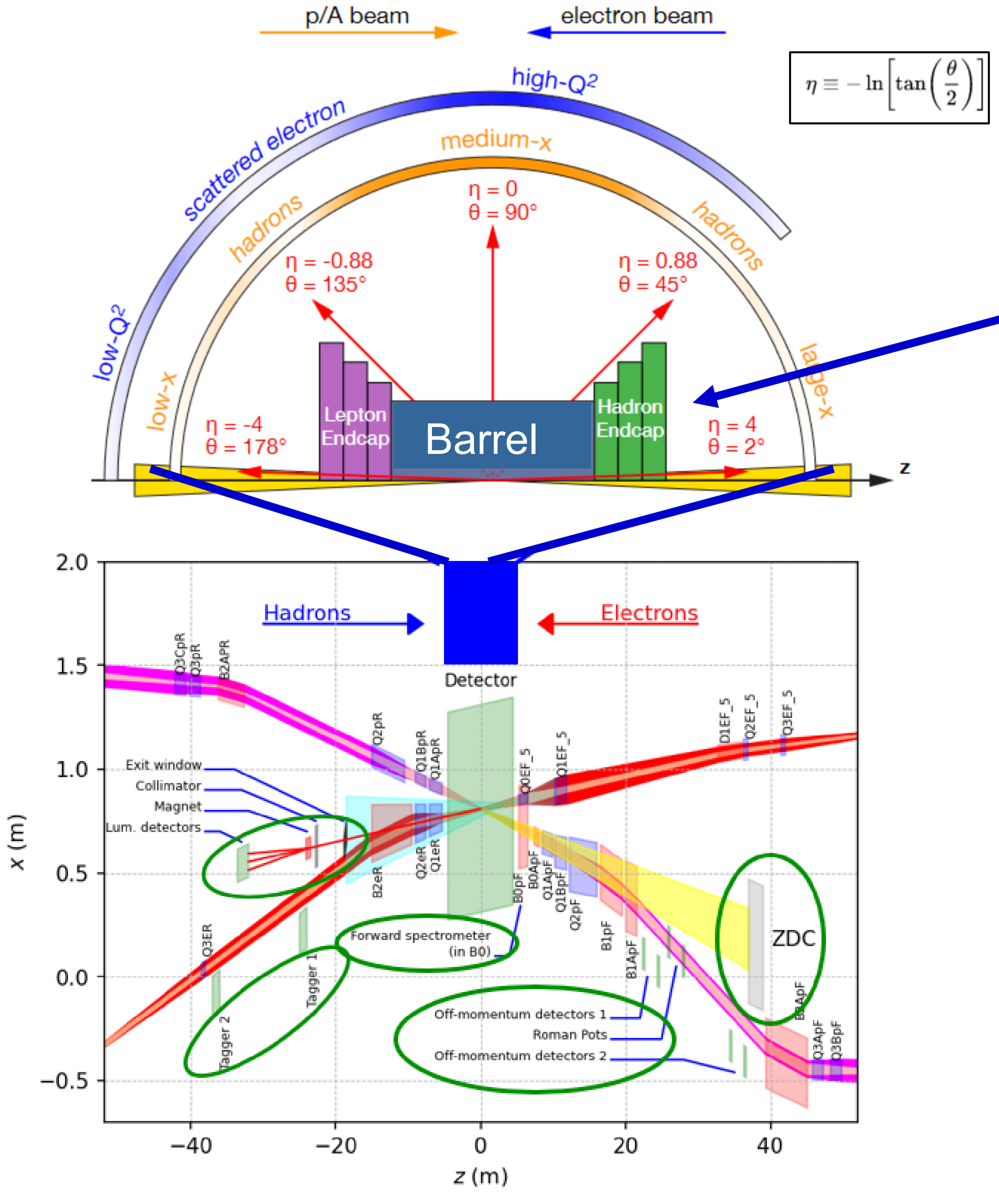
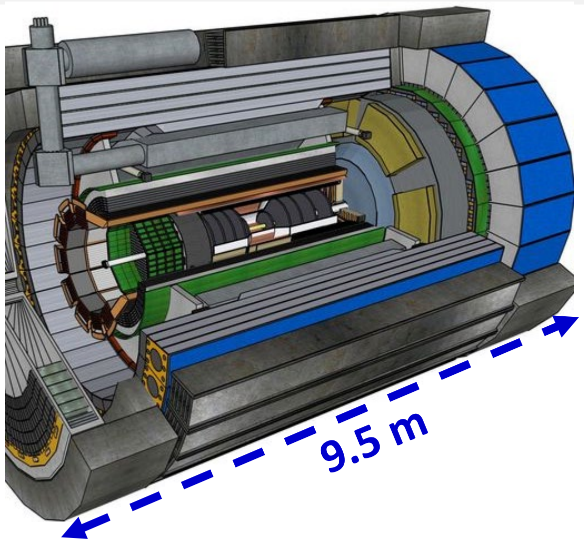
ePIC, an extended detector





Central Detector (CD)

Total size detector: ~75m

Central detector: ~10m

Far Backward electron detection: ~35m

Far Forward hadron spectrometer: ~40m

Auxiliary detectors needed to tag particles with very small scattering angles both in the outgoing lepton and hadron beam direction (B0-Taggers, Off-momentum taggers, Roman Pots, Zero-degree Calorimeter and low Q2-tagger).

ePIC detector, the challenges

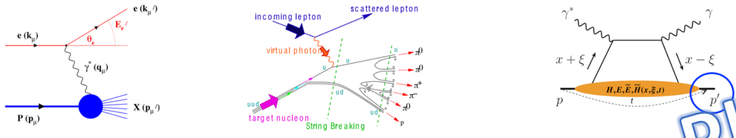
Background

E.C. Aschenauer, EIC Asia workshop, 2023

What is needed experimentally?

experimental measurements categories to address EIC physics:

Parton Distributions in nucleons and nuclei | QCD at Extreme Parton Densities - Saturation | Spin and Flavor structure of nucleons and nuclei | Tomography Transverse Momentum Dist. | QCD at Extreme Parton Densities - Saturation | Tomography Spatial Imaging



Physics

inclusive DIS
- measure scattered lepton
→ event kinematics
  → e-ID: e/h separation
  → reach to lowest x, Q^2 impacts Interaction Region design

semi-inclusive DIS
- measure scattered lepton and hadrons in coincidence
- multi-dimensional binning: x, Q^2, z, p_T, Θ
  → particle identification over entire kinematic region is critical
  → Jets: excellent E_T, jet-energy scale

exclusive processes
- measure all particles in event
- multi-dimensional binning: x, Q^2, t, Θ
- proton p_T: 0.2 - 1.3 GeV
  → cannot be detected in main detector
  → strong impact on Interaction Region design

$\int Ldt$: 1 fb^{-1} | 10 fb^{-1} | 10 - 100 fb^{-1}

machine & detector requirements

2

- spanning a wide kinematical range
  - ECM: 20 – 141 GeV

Background sources

- **Beam-gas induced**
  - Hadron-gas interaction
  - Electron-gas interaction

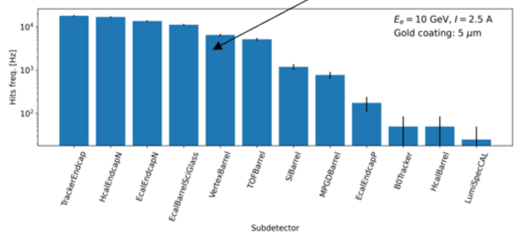
rates in kHz	5x41 GeV	5x100 GeV	10x100 GeV	10x275 GeV	18x275 GeV	Vacuum
DIS ep	12.5 kHz	129 kHz	184 kHz	500 kHz	83 kHz	
hadron beam gas	12.2kHz	22.0kHz	31.9kHz	32.6kHz	22.5kHz	10000Ahr
	131.1kHz	236.4kHz	342.8kHz	350.3kHz	241.8kHz	100Ahr
electron beam gas	2181.97 kHz	2826.38 kHz	3177.25 kHz	3177.25 kHz	316.94 kHz	

Main contribution to detector background are from Bethe-Heitler process:

$e_{beam} + H^2_{rest\ gas} \rightarrow e' + \gamma + H^2_{rest\ gas}$

10^{-3} hits per (100 ns wide) event

- **Synchrotron radiation**



Data from the ePIC wiki page

Bunches and beam crossing rates

Species	p	e	p	e	p	e	p	e	p	e
Beam energy [GeV]	275	18	275	10	100	10	100	5	41	5
$\sqrt{s}$ [GeV]	140.7		104.9		63.2		44.7		28.6	
No. of bunches	290		1160		1160		1160		1160	

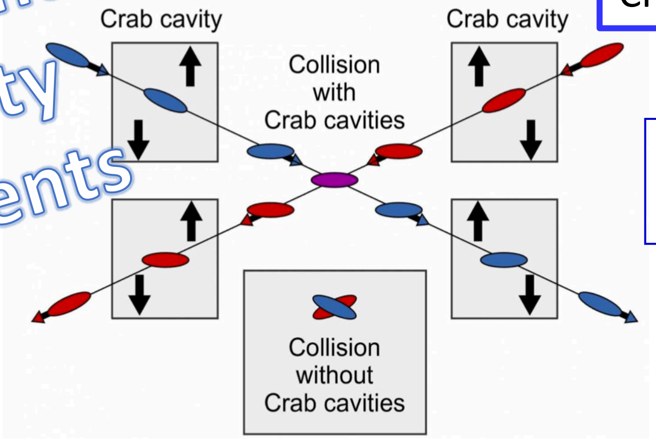
Species	Au	e	Au	e	Au	e	Au	e
Beam energy [GeV]	110	18	110	10	110	5	41	5
$\sqrt{s}$ [GeV]	89.0		66.3		46.9		28.6	
No. of bunches	290		1160		1160		1160	

Data from EIC CDR, 2020

Up to a beam crossing rate at the IP every 10ns, with a max collision rate of ~0.5 MHz (1 event every ~200 bunch crossing)

Machine and luminosity requirements

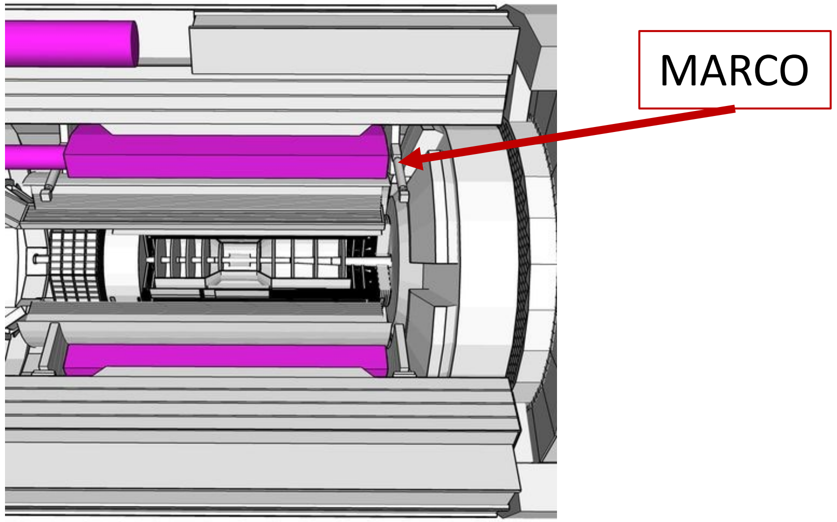
CRAB CROSSING ANGLE (25 mrad)



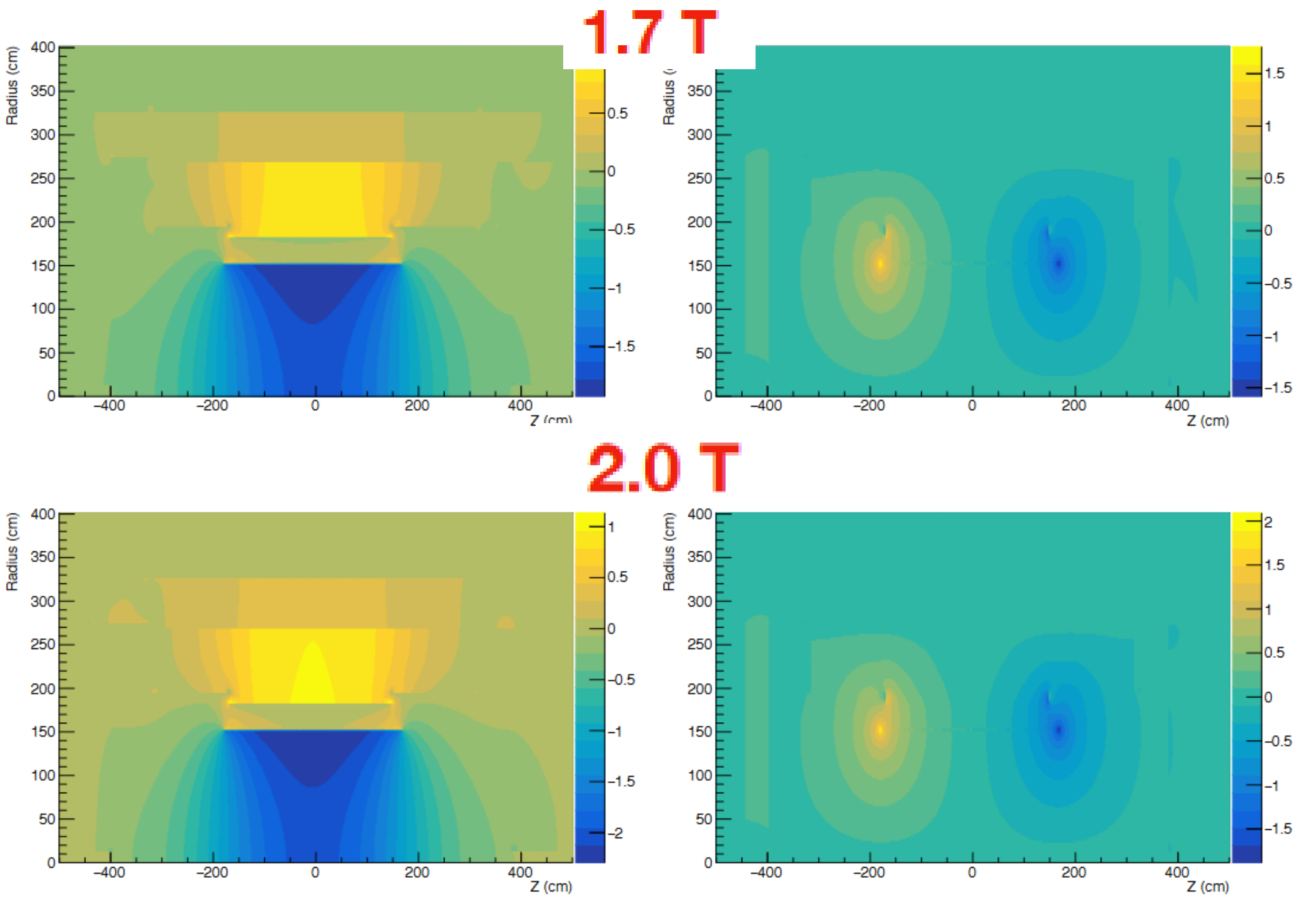
Head-on collision is restored by rotating the bunches before colliding and, then, back ("crab crossing")

ePIC detector, the CD solenoid

The choice of a new in Spring 2022



magnetic field (Tesla) in **Z direction** magnetic field (Tesla) in **radial direction**;



- Design to operate at 1.7 T
- It can provide up to 2 T

Review in October 2022: 60% design readiness confirmed!

ePIC detector, tracking

ePIC

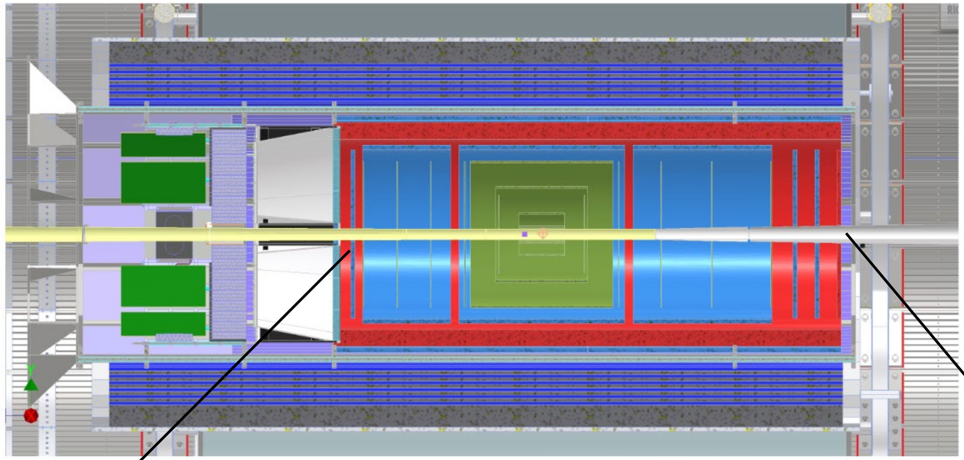
CHALLENGES		STATEGIES
• Efficient pattern recognition	→	• Redundancy of the measured space point coordinates
• Very low material budget for the central tracking region not exceeding 5% X/X_0 (p resolution!)	→	• Monolithic Active Pixel Silicon (MAPS) • Guiding example: the inner tracking in ALICE (ALPIDE chip, also used in sPHENIX)
• Solenoidal magnetic field • Fine ∫ B· dl in the barrel • Limited ∫ B· dl in the endcaps • Limited lever arm • Solenoid and overall detector design constrains in the barrel • IR design in the endcaps	} →	• Fine space resolution – fine granularity Si sensors • Synergies among detector components (backward ECal, barrel ECal, RICH counters, …)
• “low” interaction rate (< 0.5 GHz), but background !	→	• Good time resolution to disentangle signal and background: this cannot be provided by MAPS, use additional MicroPattern Gaseous Detector layers

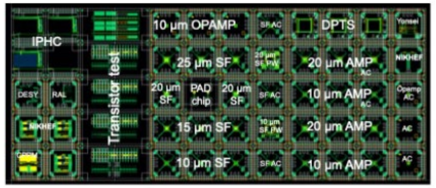
ePIC detector, tracking

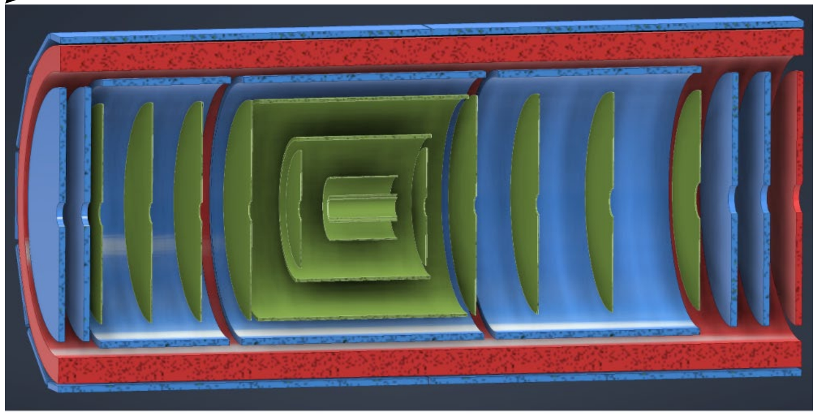
Ongoing layout optimization

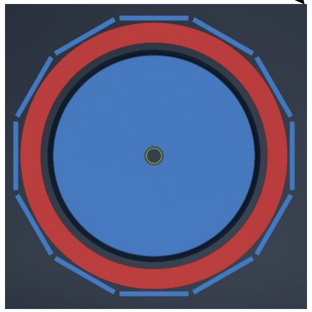
Monolithic Active Pixel Silicon (MAPS) Tracker:

- 1 single technology: 65-nm MAPS
  - O(20 μm) pitch, <20 mW/cm^2
  - No fine time resolution: signal length O(~5 μs)
  - Developed for ALICE ITS3
- Silicon VERTEX (3 layers)
  - First layer @ R ~ 4 cm
  - Material: 0.05% X/X_0 / layer
- Silicon BARREL (2 layers)
  - Material: 0.55% X/X_0 / layer
- F & B Silicon DISKs (5 in Front and Back)
  - Material: 0.24% X/X_0 / layer









SVT MPGDs ToF (fiducial volume)

Multi Pattern Gas DetectorS (MPGD):

2 technologies being considered

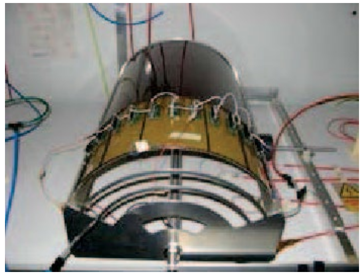
- MicroMEGAS
- μRWELL
- Time resolution < 10 ns

2 geometrical implementations

→ cylindrical (established for MM, R&D for μRWELL)
→ planar

Role of the MPGDs

→ Additional space points for pattern recognition / redundancy
→ time information

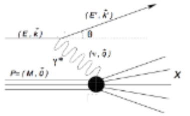


ePIC detector, electromagnetic calorimetry

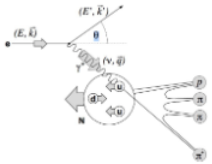
Electron/photon PID, energy, angle/position:

Coverage (in rapidity and energy), resolution, e/π, granularity, projectivity

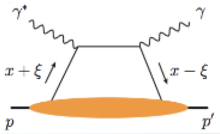
Inclusive DIS: scattered electron



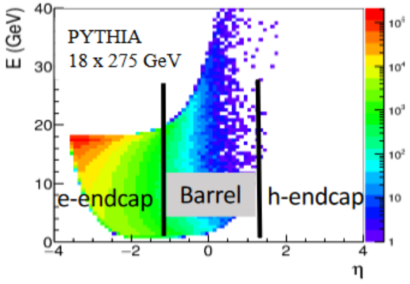
Semi-Inclusive DIS: $\pi0 \rightarrow \gamma\gamma$, HF $\rightarrow$ e



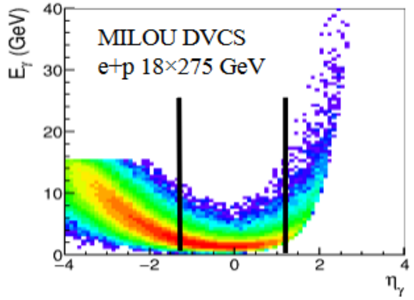
Exclusive DIS: DVCS photons, J/ψ→ee etc.



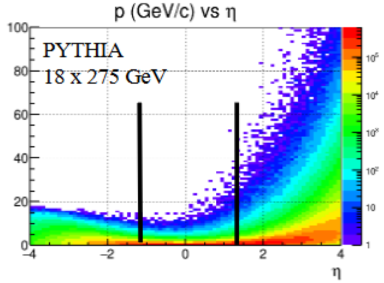
DIS e



DVCS photons

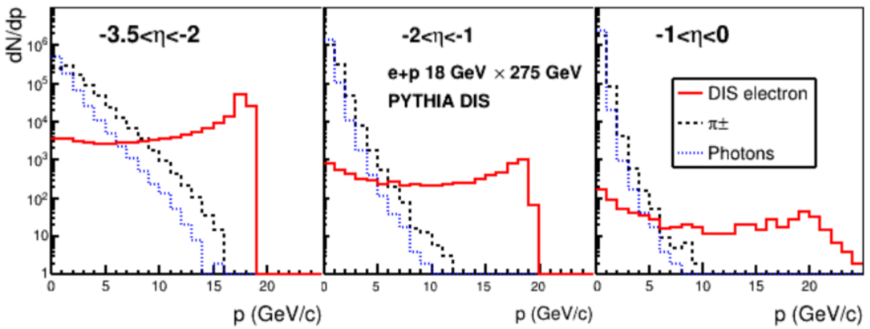


SIDIS π0



Alexander Bazilevsky,
Calorimetry Review, 2022

DIS kinematics: ePID

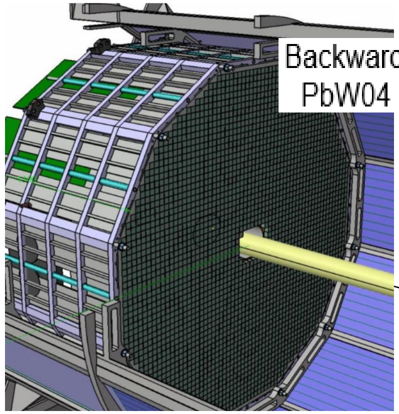


Detector Requirements: Summary

	σ_E/E	E range, GeV	$\pi^{\pm}$ suppression (In combination with other subsystems)	$\pi0/\gamma$ discr.
e-endcap	$\frac{(2-3)\%}{\sqrt{E}} \oplus (1-2)\%$	0.05–18 GeV	Up to 10^4	Up to 7 GeV/c
Barrel	$\frac{(7-10)\%}{\sqrt{E}} \oplus (1-3)\%$	0.05–50 GeV	Up to 10^4	Up to 10 GeV/c
h-endcap	$\frac{(10-12)\%}{\sqrt{E}} \oplus (1-3)\%$	0.1–100 GeV	Up to 10^4	Up to 50 GeV/c

- Continuous acceptance (particularly from e-endcap to barrel)
- Photosensors and FEE tolerate magnetic field
- Operate at full luminosity and expected background conditions (rad. dose, neutron flux)
- Minimal material budget on the way from the vertex (particularly for e-endcap to barrel)

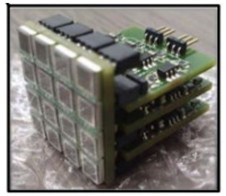
ePIC detector, electromagnetic calorimetry



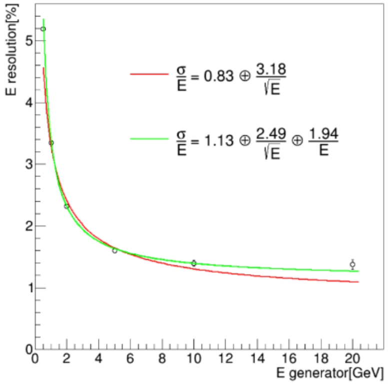
Backwards EMCal
PbW04 crystals

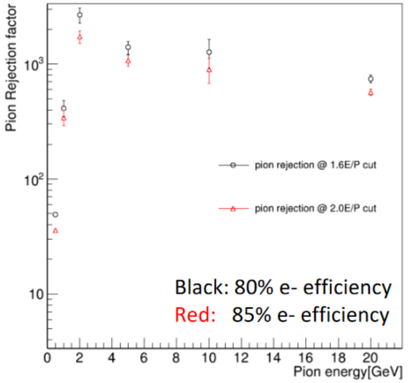
Concept based on a recent PWO calorimeter at JLab

SiPM 4x4 per crystal



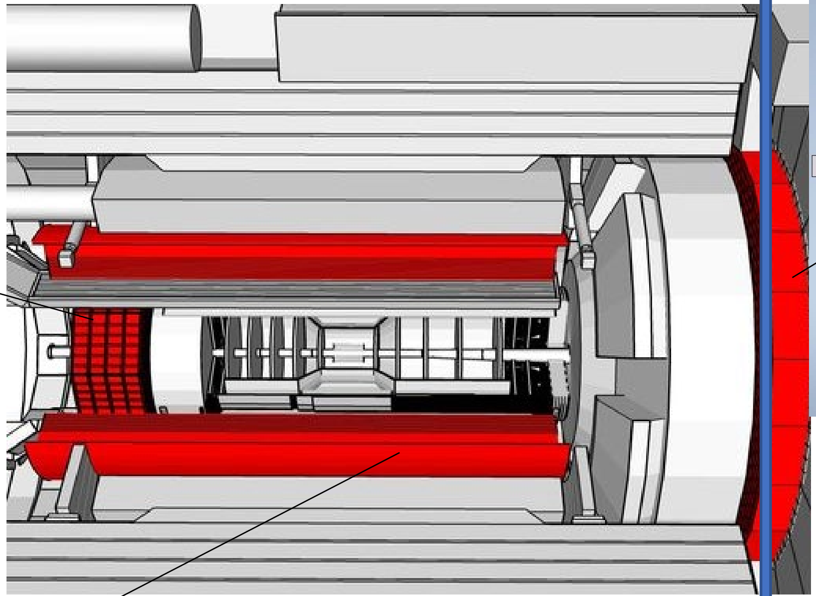
Carlos Muñoz Camacho, Calorimetry Review, 2022

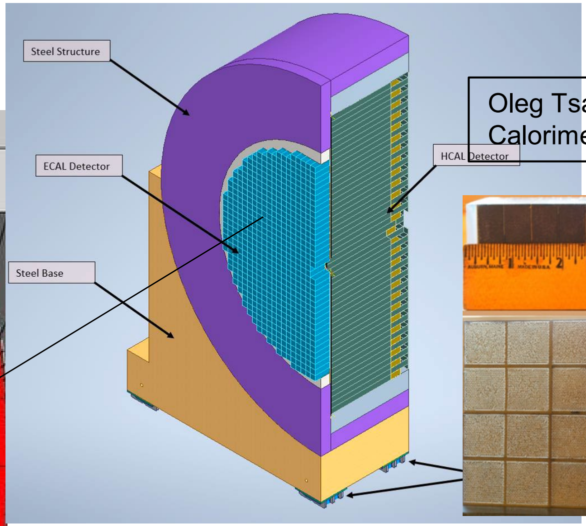




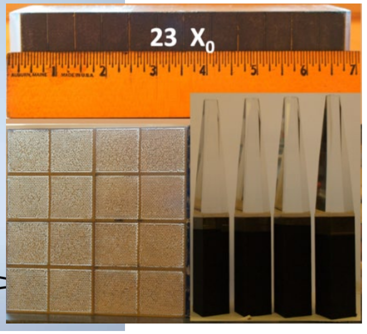
2023

SiPMs of all Calorimeters





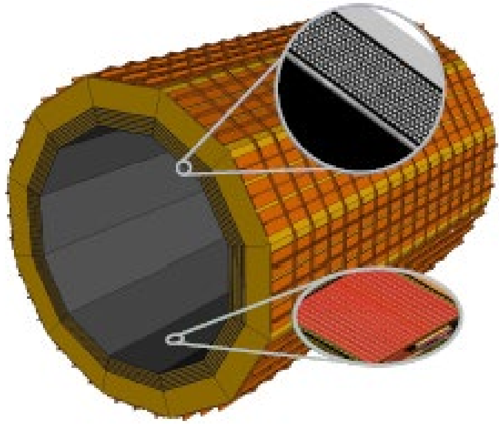
Oleg Tsai, Calorimetry Review, 2022

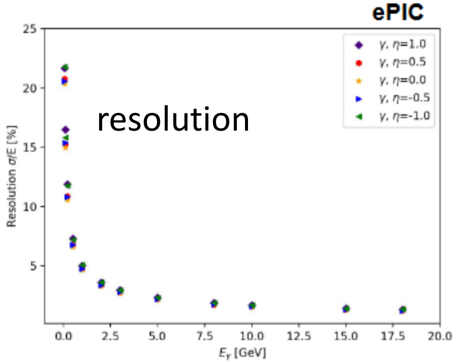


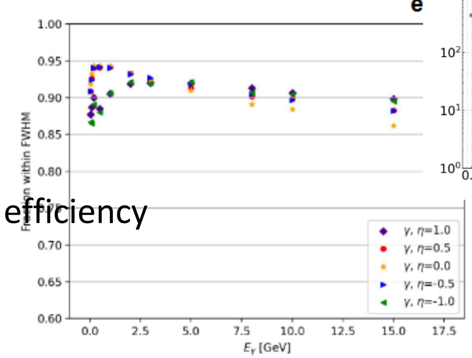
WScFi is a unique technology allowing to achieve e/h ~1 (response to hadrons) and at the same time keep em energy resolution at ~10%/√ E + 2%

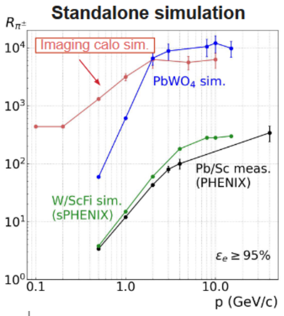
4 (6) layers of imaging calorimetry by Astropix MAPS, and sampling calorimetry by Pb/SciFi

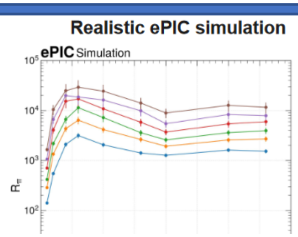
Maria Zurek, GD/I Review, 2023



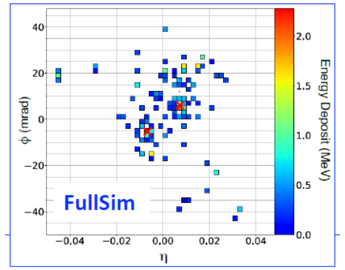






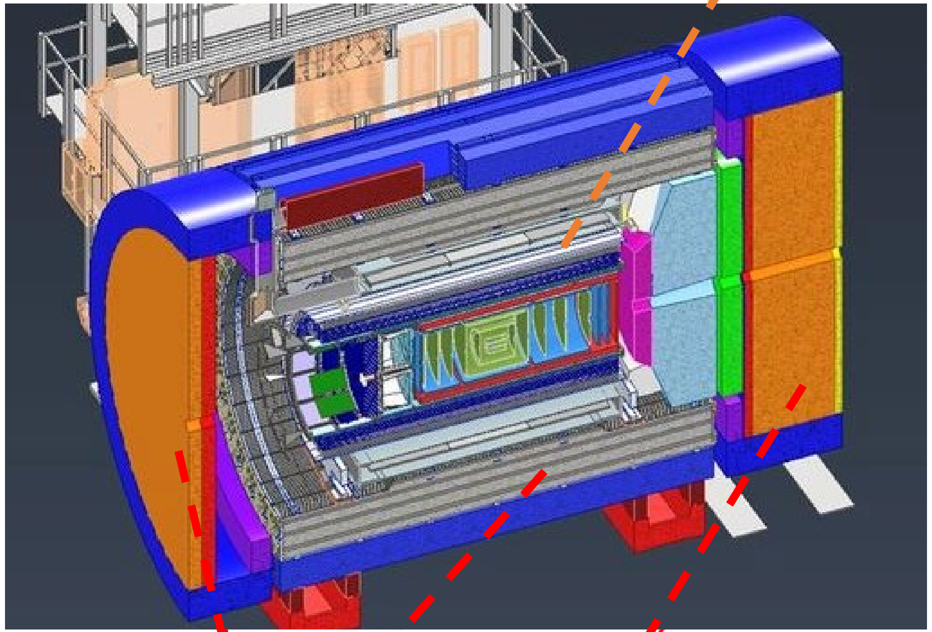


γ's from 15 GeV/c π^0 decay



S. Dalla Torre

ePIC detector, the hadron calorimetry



- Jet energy measurement
  - Tag jets with a neutral component
- DIS kinematics reconstruction
  - Hadronic method
- Solenoid flux return
- Additional capability: muon ID

Requirements

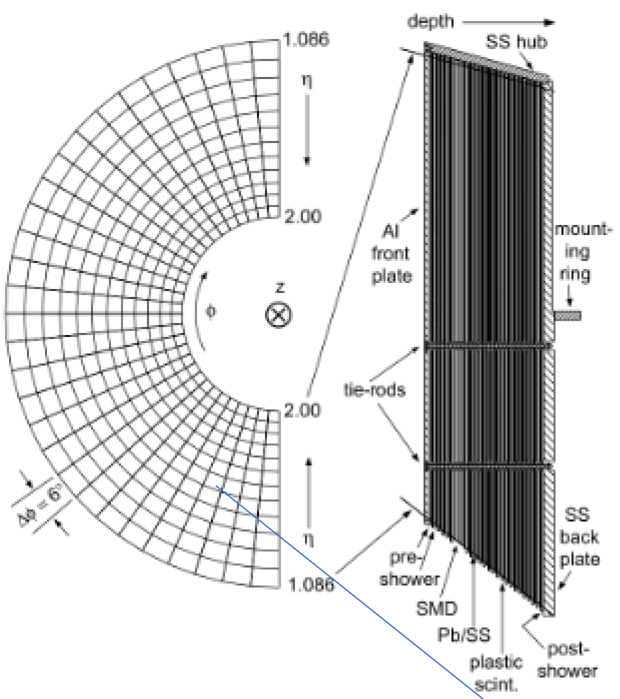
η	σ_E/E, %	E_{min}, MeV
-3.5 to -1.0	$50/\sqrt{E}+10$	500
-1.0 to +1.0	$100/\sqrt{E}+10$	500
+1.0 to +3.5	$50/\sqrt{E}+10$	500

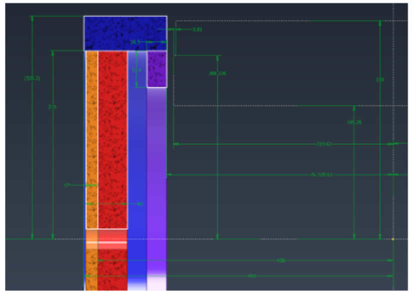
Barrel HCal	Refurbished sPHENIX barrel calorimeter
Backward HCal	Scintillator recycled from STAR endcap EmCal
Forward HCal	Brand new design

All: sampling sandwich design with WLS fibers & SiPM readout

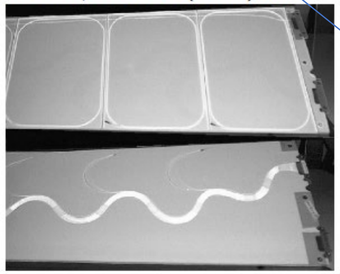
Alexander Kiselev, Calorimetry Review, 2022

ePIC detector, the hadron calorimetry

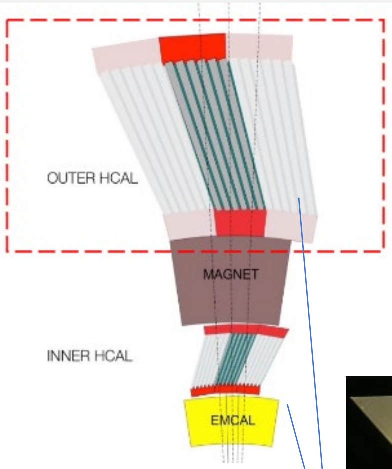


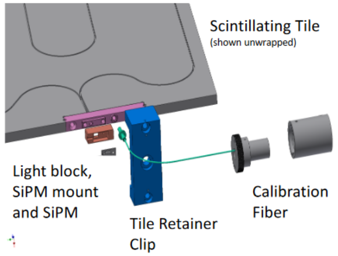


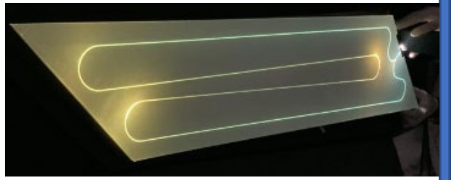
STAR EEMC 6° megatile - 12 tiles in η direction (radial) each

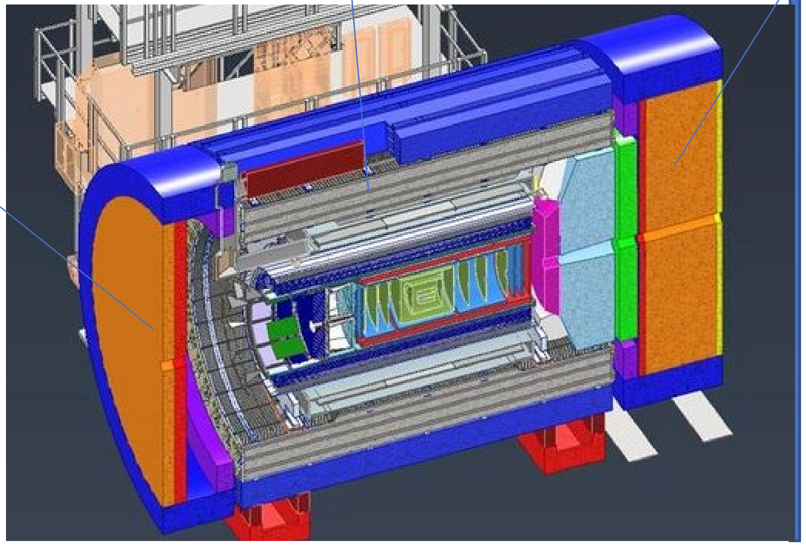


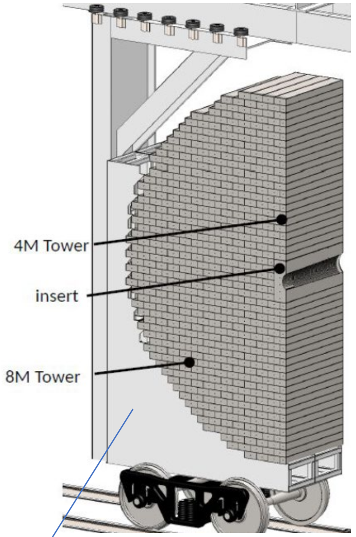
- nHCal decoupled from the magnetic steel ⇒ ...



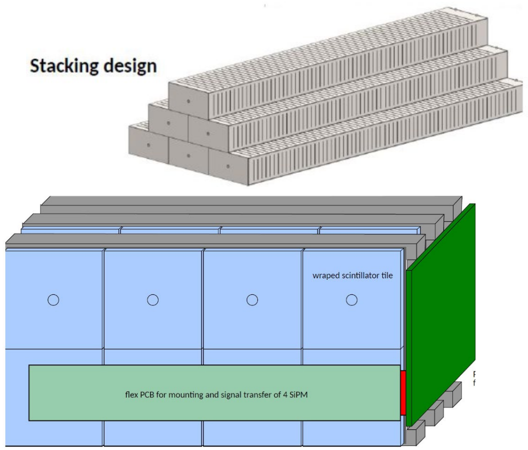


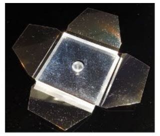


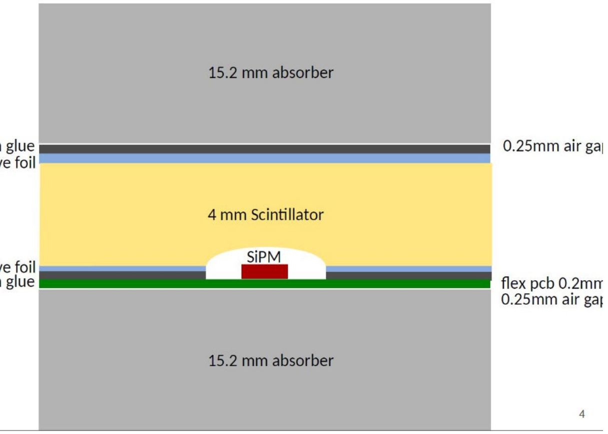




DSC-forward HCal and Insert
Miguel Arratia, ePIC mtg, July 2023

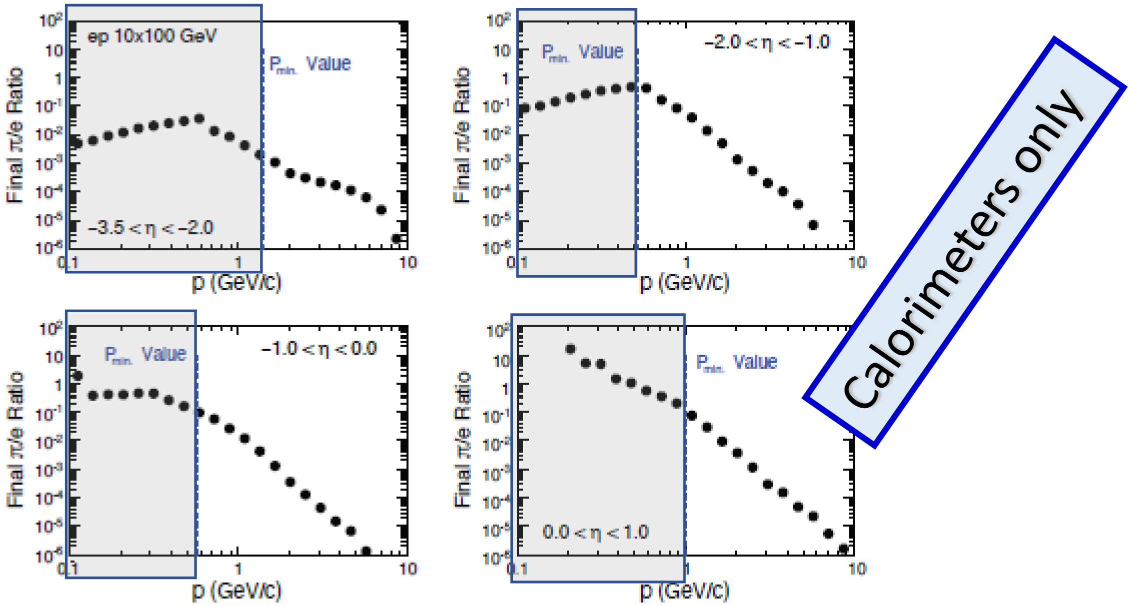




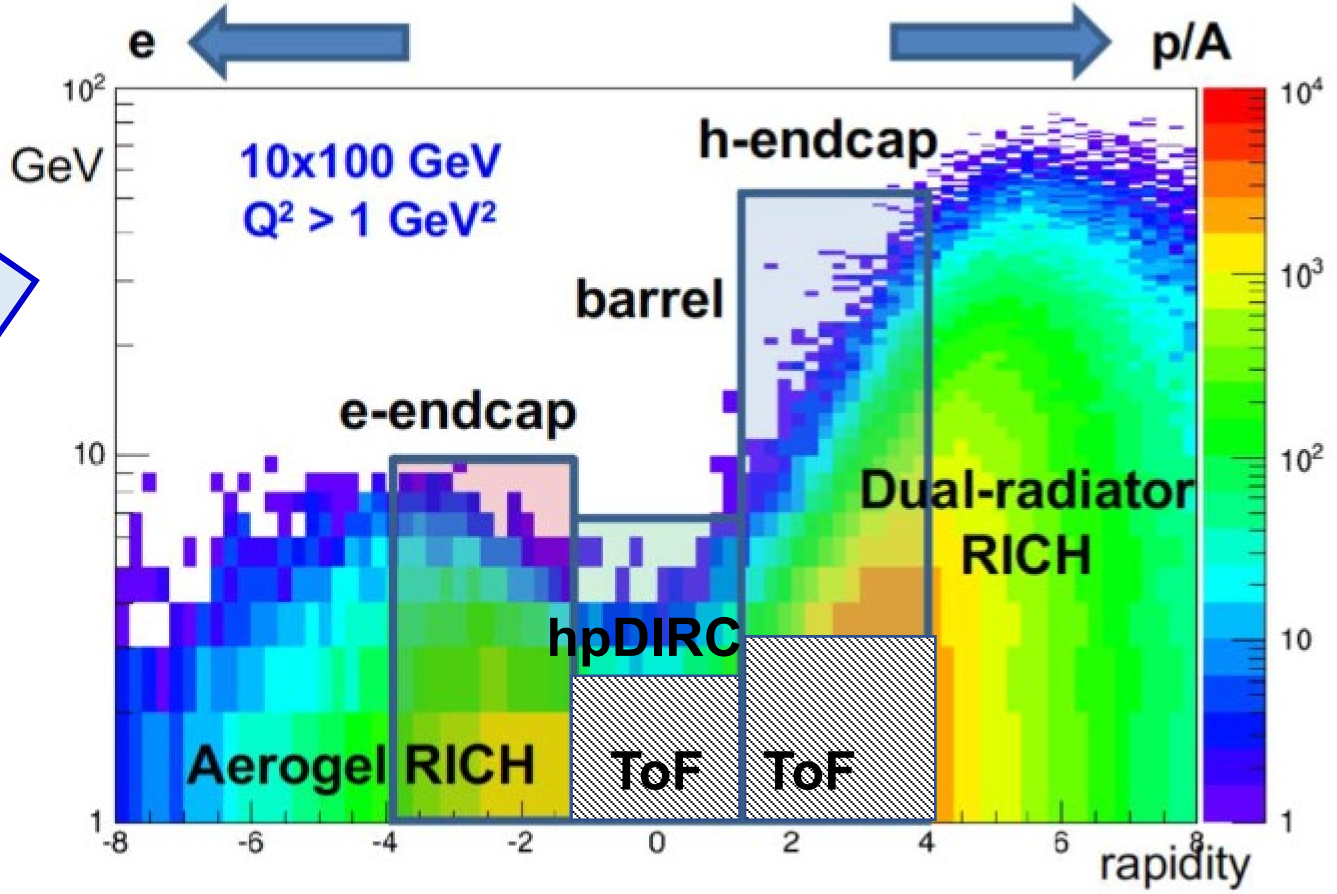


ePIC detector, PID subsystems : double mission

e-π separation:
Cherenkov imaging <u>support</u> the Ecal effort, in particular needed at low momenta
(the whole EIC physics scope)

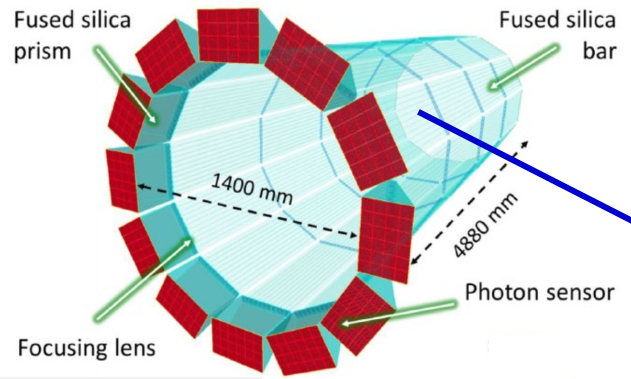


h-PID: **Cherenkov imaging complemented with ToF**
(SIDIS, heavy flavour, …)



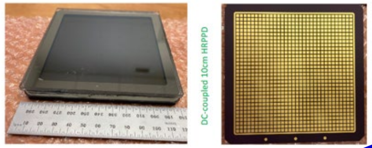
ePIC detector, PID subsystems

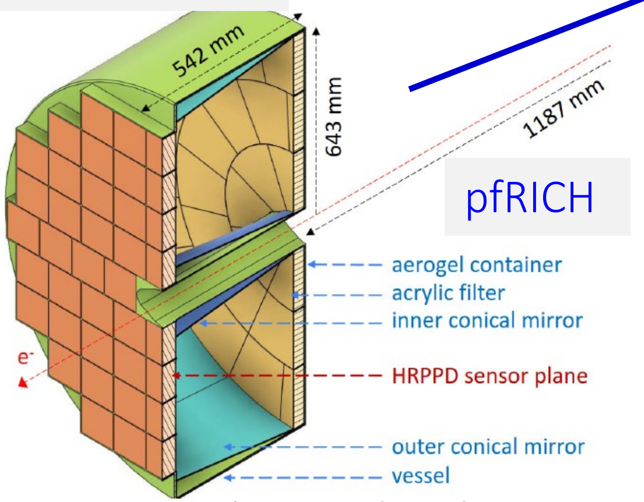
hpDIRC



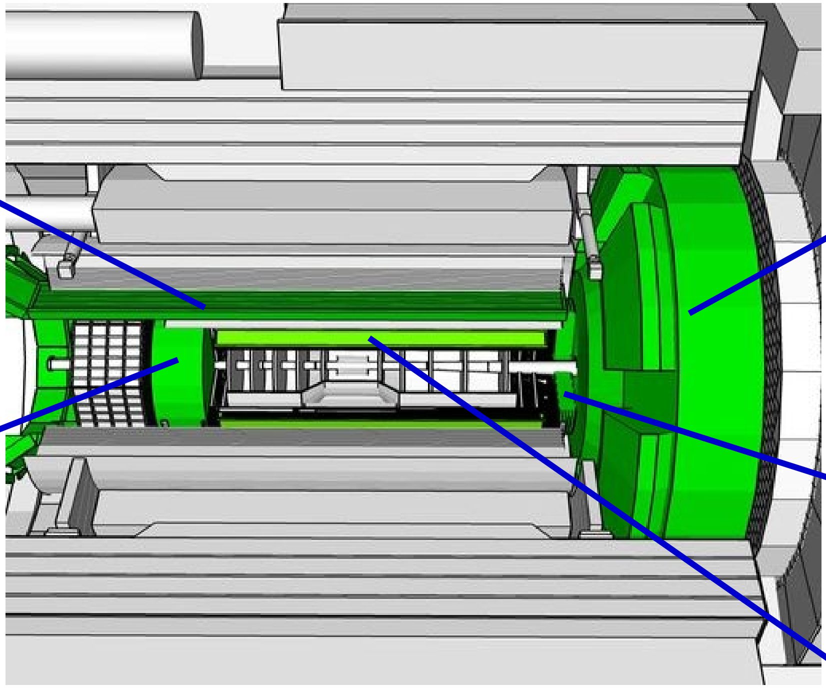
HRPPD photosensors (hpDIRC, pfRICH) Also providing timing in pfRICH

HRPPD (10 x 10 cm², 10 µm pore)

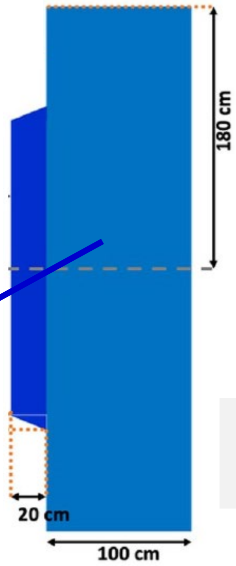


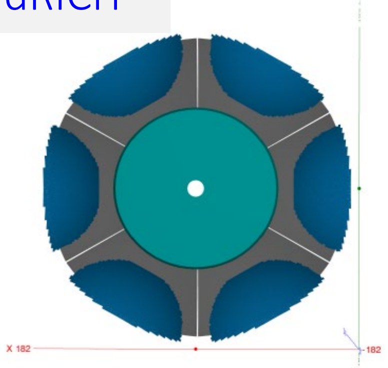


pfRICH

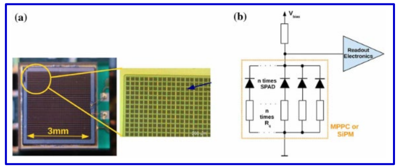


dRICH

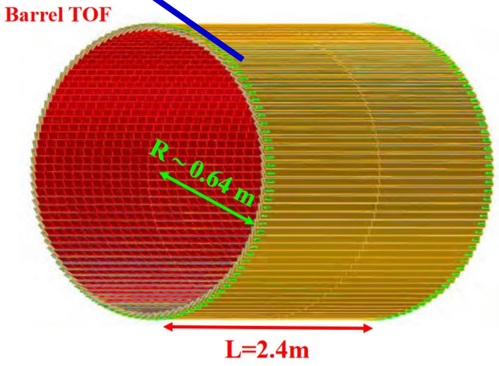


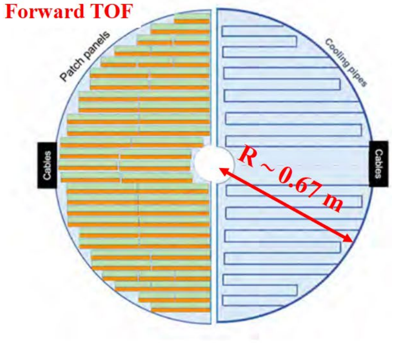


SiPMs as single photon detectors

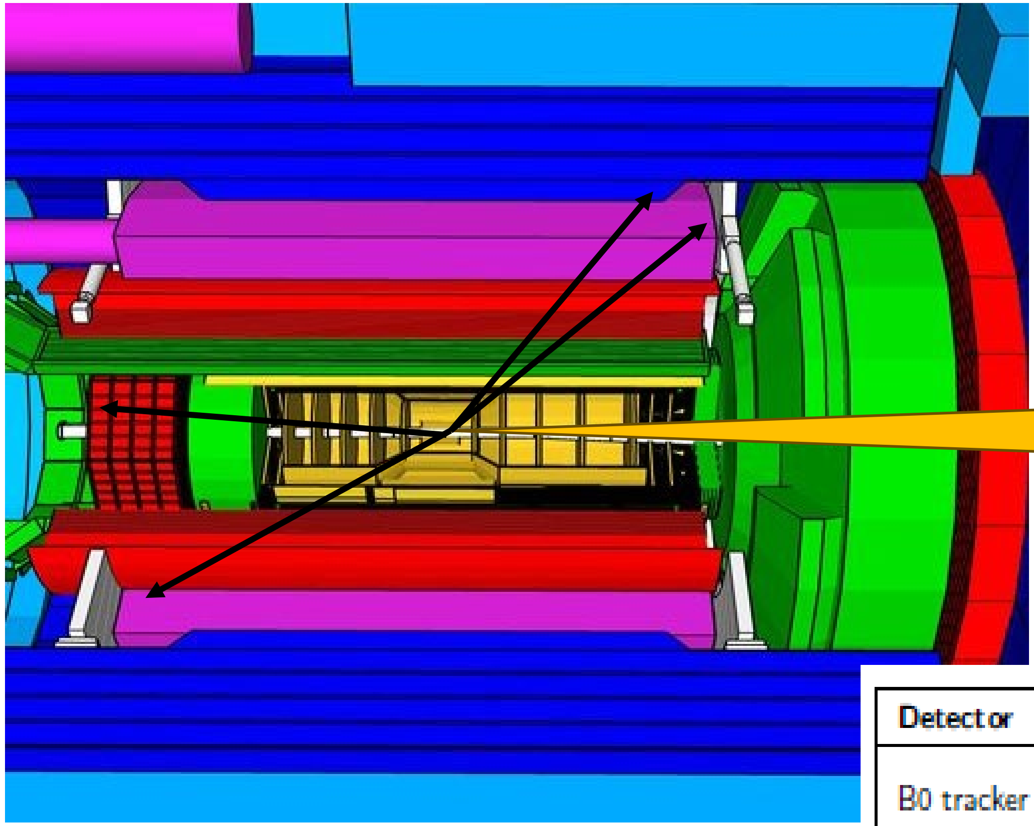


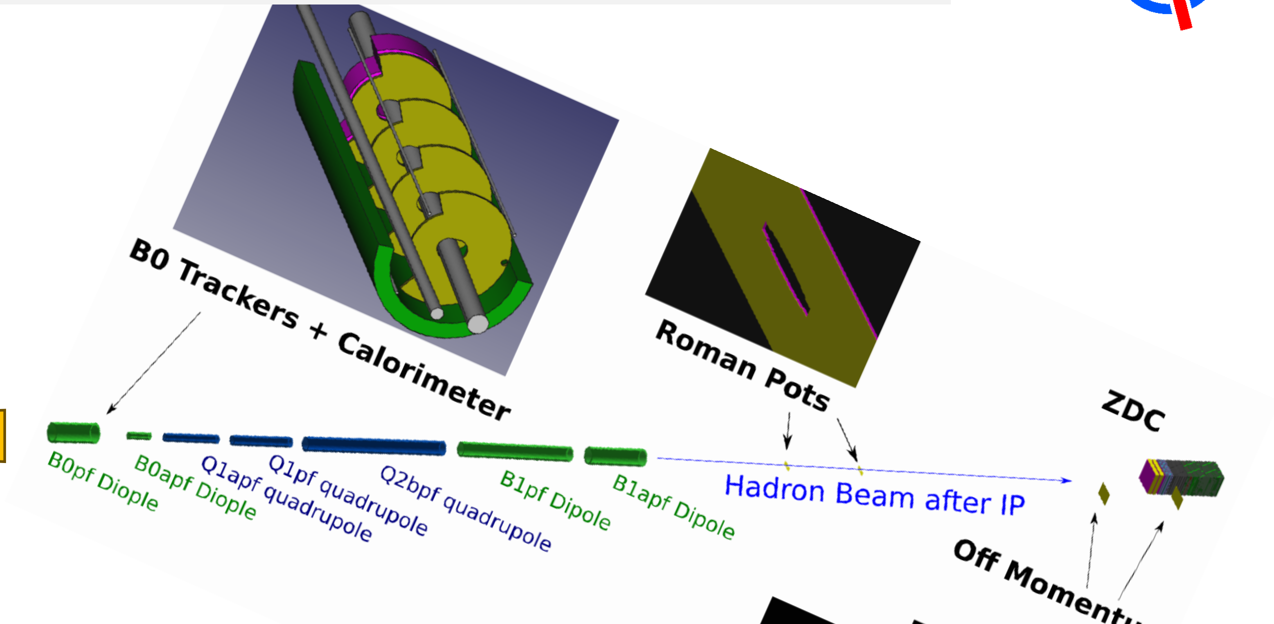
ToF layers by AC-LGADs

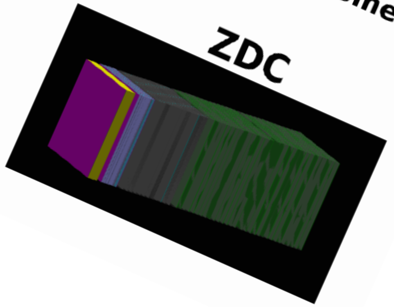




ePIC detector, the far forward region







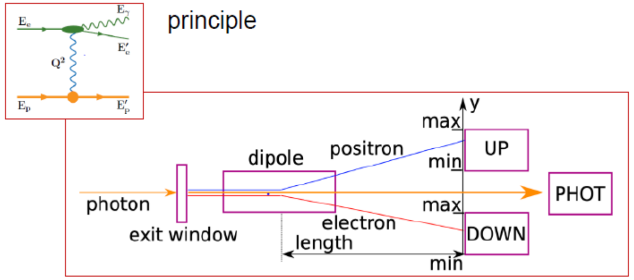
Physics channels require tagging of **charged hadrons** (protons, pions) or **neutral particles** (neutrons, photons) at **very-forward rapidities** **($\eta > 4.5$).**

Detector	θ accep. [mrad	Particles
B0 tracker	5.5–20.0	Charged particles Tagged photons
Off-Momentum	0.0–5.0	Charged particles
Roman Pots	0.0–5.0	Protons Light nuclei
Zero-Degree Calorimeter	0.0–4.0	Neutrons Photons

ePIC detector, the far backward region

Luminosity measurement

- measure IP6 luminosity with **an absolute precision better than 1% absolute and a relative precision better than 0.01%** using the electron-ion bremsstrahlung by three largely independent and complementary measurements
- electron detectors will also be used to tag low-Q^2 Events (photoproduction)



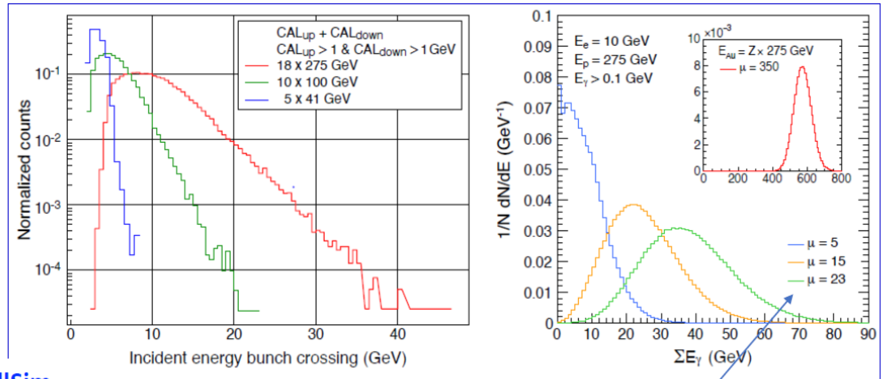
Technologies for the calorimetry:

- Spaghetti W-calorimeter with radiation-hard scintillating fiber, read out with fast PMTs
- Cherenkov-radiating quartz fibers read out by SiPMs

different CM energy

PHOT

different Luminosity



FullSim

L = 2.2, 6.5 and 10 × 10^{33} cm^{-2}s^{-1}, corresponding to the average photon multiplicity μ

27

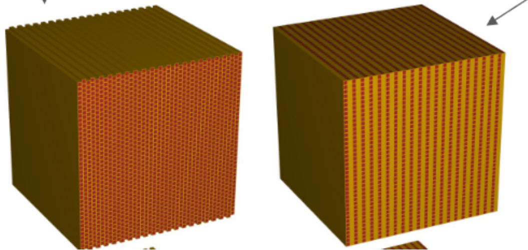
Similar to forward ECAL

Performance and practicality of construction being studied

CAL designs

X fibers

XY fibers

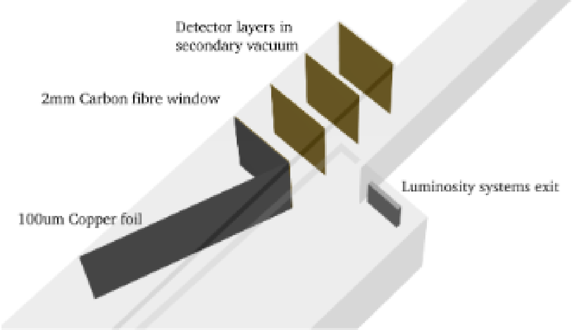


D. Gangadharan,
TIC meeting , 6/26/2023

Low Q^2 taggers

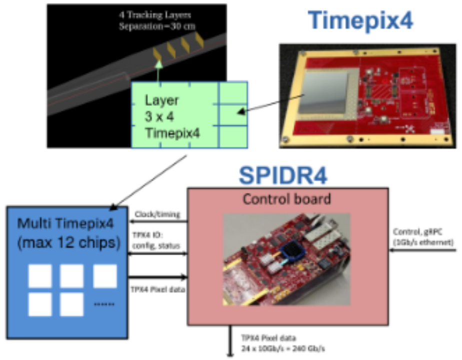
Updated default configuration

Including some integration considerations.
Detectors in secondary vacuum.
2 mm Carbon fibre exit window @ 90 degrees to beam.
100 foil @ 30 degrees to beam.
Lots of optimisation studies still required.
Beam impedance not yet studied just given guidance.



Timepix4

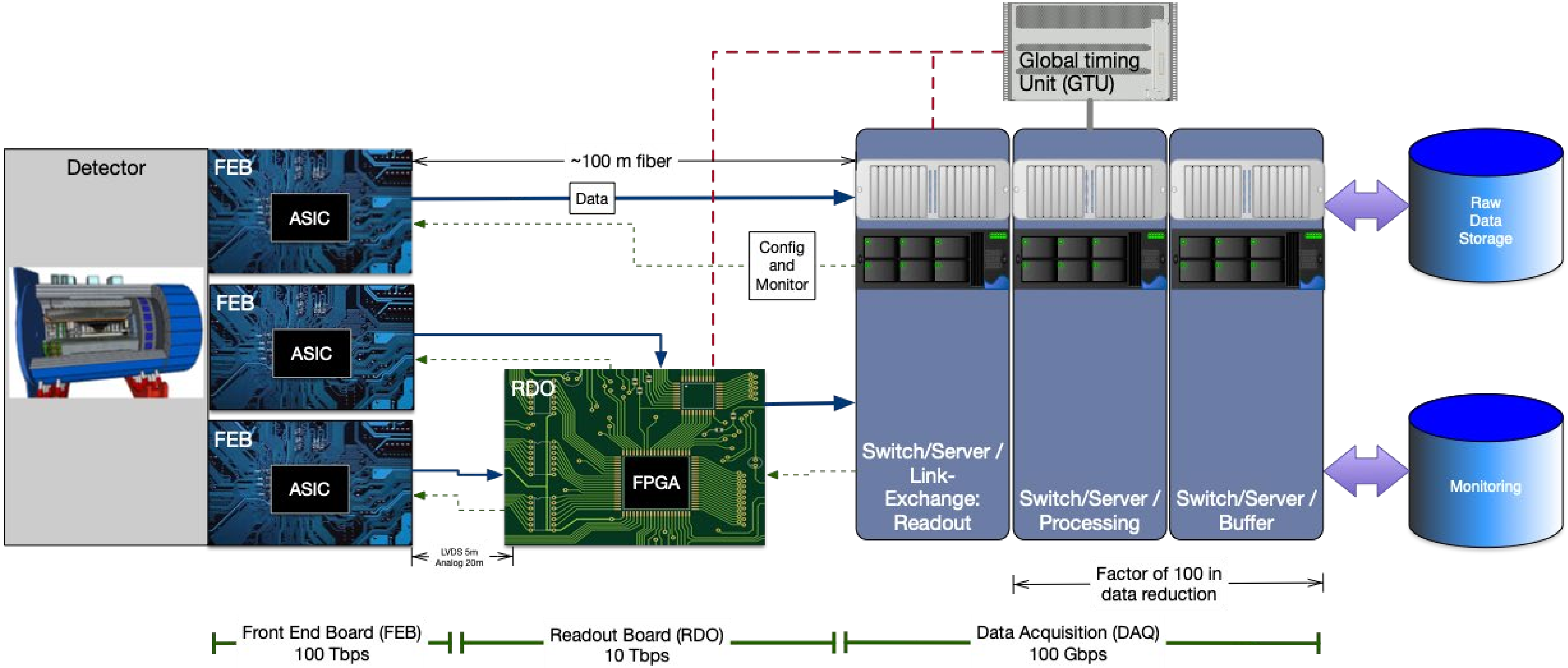
Timepix4 ASIC.
Thin silicon sensor ~ 50μm.
Appropriate rate capabilities.
Good spatial resolution 55μm pixel.
Sub beam bunch timing resolution (~ 2ns currently limited by sensor).
Rates from synchrotron and separation technique unknown.
Need to determine radiation load and tolerance.



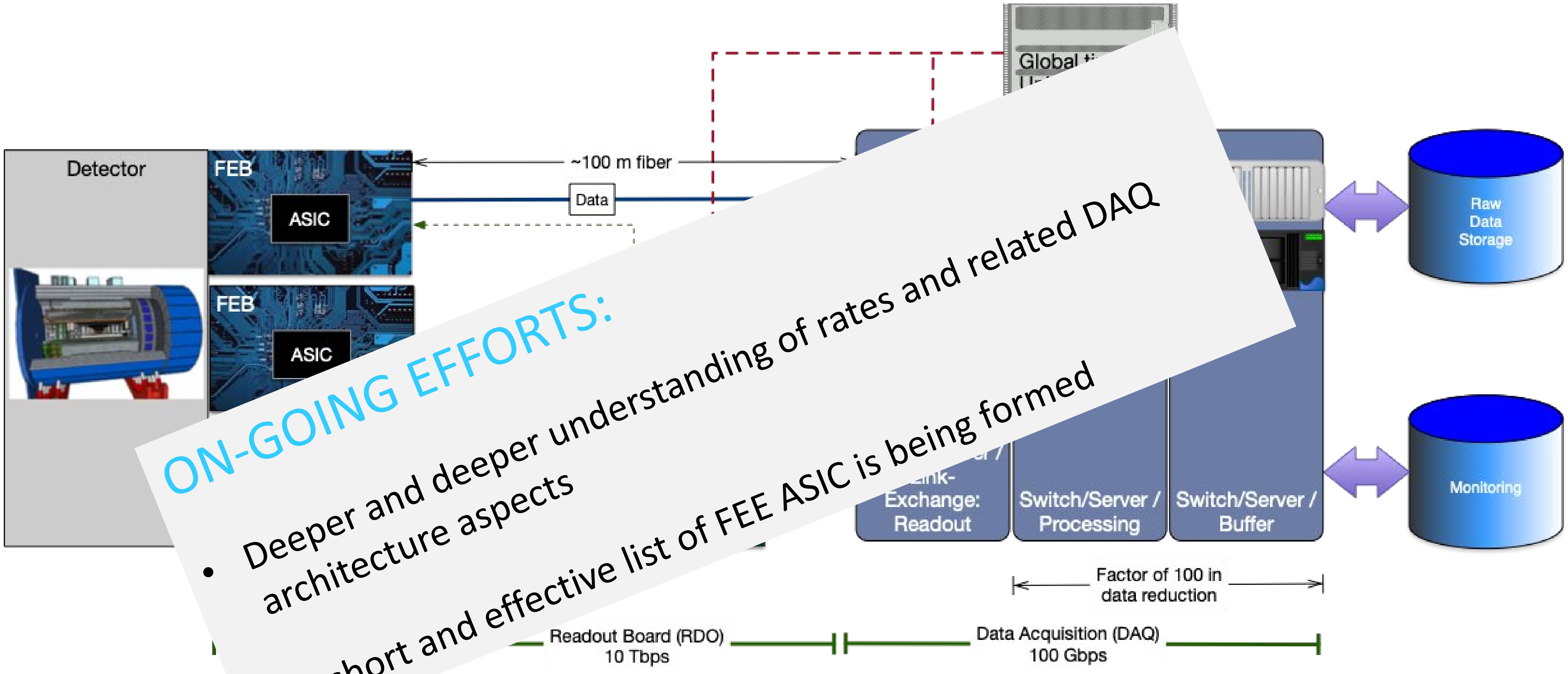
S. Gardner,
TIC meeting , 6/26/2023

ePIC detector, R-O & electronics & DAQ

A R-O and DAQ architecture with built-in streaming read-out concept



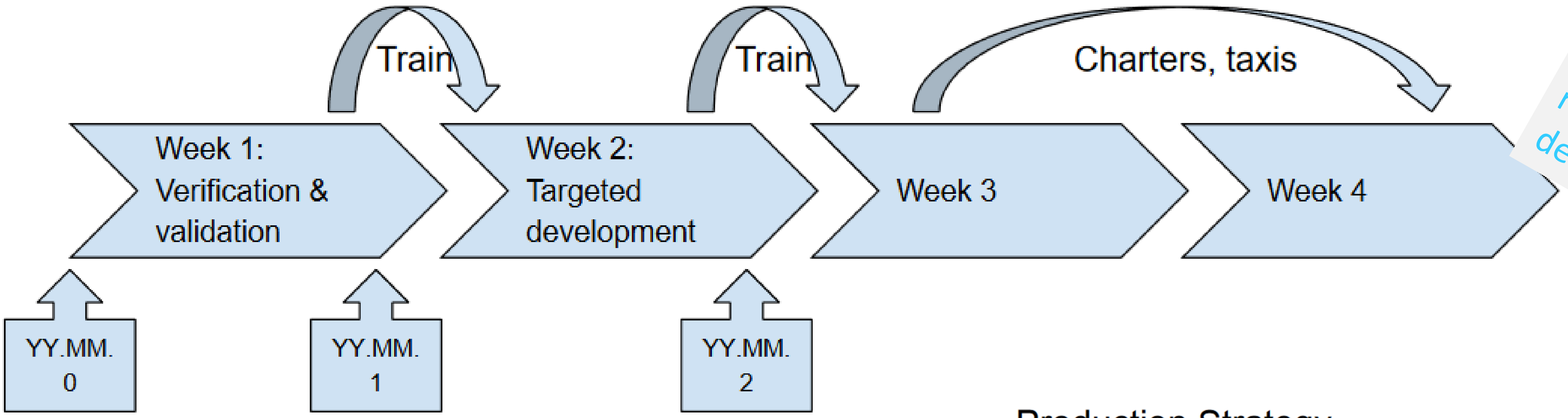
ePIC detector, R-O & electronics & DAQ



ON-GOING EFFORTS:

- Deeper and deeper understanding of rates and related DAQ architecture aspects
- A short and effective list of FEE ASIC is being formed

ePIC detector, a new strategy for the simulation campaign



Continuous production of data according to needs with every month improved reconstruction code and detector implementation

Strategy

We use three types of simulation productions:

- *Train:* a simulation production for validation and verification that is submitted on a fixed time schedule, with whichever features are available at that time. The *train* leaves the station at a fixed time.
- *Charter:* a simulation production that is requested by the Technical and Physics Coordinators, with larger standard data sets that are already benchmarked. *Charter* simulation productions can be run after the validation and verification, in the third and fourth week of a month only. The Production WG determines when the *charter* starts (within a launch window).
- *Taxi:* a simulation production that is requested on a one-off basis, for individual datasets. A *taxi* is only available when no *train* or *charter* is available. *Taxi* simulation productions can be run in the third and fourth week of a month only. Due to the overhead required for a *taxi* simulation production, no *taxi* can be guaranteed.

Production Strategy

Simulation Production Strategy Document

Critical Dates:

Cut-off Date for Inclusion in Train Campaigns: Last working day before first Monday of the month- **June 2 and June 30** for next two months.

Discussion of summary of changes, identification of missed targets, and prioritization of sprint goals in compSW meeting: First wednesday of the first working week- **June 7 and July 5** for next two months.

Discussion of validation studies in compSW meeting: Second wednesday of second working week- **June 14 and July 12** for next two months

Week 1: YY.MM.0
Verification and Validation

Last working day of first week: Train 1

Week 2: YY.MM.1
Targeted development

Last working day of the second week: Train 2

Week 3+4: YY.MM.2

Charters and taxis - Requests for charters by DSSs, DSCs, and PWGs, need to be filtered through Technical and Analysis Coordinators

Short-form summary

Last year: **1 year of great progress for ePIC**

- **Structuring the collaboration**
  - SP-office, CC, Coordinators, new scientific bodies, the DSCs
  - Welcoming new collaborators world-wide
- **Consolidating and optimizing the detector layout**
  - Tracking, calorimetry, PID, FF/FB, r-o & electronics & DAQ
- **A new strategy for continuous work and progress in the simulation studies**
  - The monthly simulation cycle
- **And much, much more**
  - Also illustrated in the dedicated talks at this meeting

ePIC related talks at this meeting

ePIC ToF detectors
Speaker: Satoshi Yano (Hiroshima University)

ePIC Cherenkov Detectors
Speaker: Chandradoy Chatterjee (INFN Trieste)

ePIC Far Forward and Far Backward Detectors
Speaker: Alexander Jentsch (Brookhaven National Laboratory)

ePIC Hadronic Calorimetry
Speaker: Nicolas Schmidt (Oak Ridge National Laboratory - (US))

ePIC Electromagnetic Calorimetry
Speaker: Zhongling Ji (UCLA)

ePIC Tracking
Speaker: Shujie Li (Lawrence Berkeley National Laboratory)

ePIC Readout Electronics
Speaker: Fernando Barbosa (JLab)

EIC Polarimetry
Speaker: Zhengqiao Zhang

ePIC talk
Speaker: Daniel Brandenburg (Ohio State University)

Thank you