

### EIC week @ Warsaw Summary from BGU

17 August 2023

Michael Pitt (BGU&Kansas)



#### EICUG week was divided into 4 parts – Early Career, User Group, ePIC, Second detector

SUNDAY 23 JUL	MONDAY 24 JUL	TUESDAY 25 JUL	WEDNESDAY 26 JUL	THURSDAY 27 JUL	FRIDAY 28 JUL	SATURDAY 29 JUL	SUNDAY 30 JUL	MONDAY 31 JUL
Early Career Workshop	Early Career Workshop	EIC	EIC	ePIC	ePIC	ePIC	Trip 3	Det II / IP8
Early Career Workshop	Early Career Workshop	EIC	ePIC evening: Conference Dinner	ePIC evening: Trip 1	ePIC	Trip 2	Det II / IP8	Det II / IP8

https://indico.cern.ch/event/1238718



### Electron-Ion Collider User Group Meeting 2023

EICUG week was divided into 4 parts – Early Career, User Group, ePIC, Second detector

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Early Career Workshop	Early Career Workshop	EIC	ePIC evening: Conference Dinner	ePIC evening: Trip 1	ePIC	Trip 2	Det II / IP8	Det II / IP8

Probing the exclusive vector meson production at the EIC

Warsaw, Poland

Mr Eden Maunter

Warsaw, Poland

Mr Eden Maunter

Warsaw, Poland

Warsaw, Poland

16:40 - 17:00

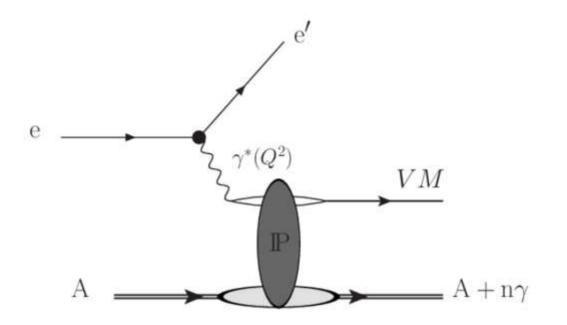
DSC-FFWD

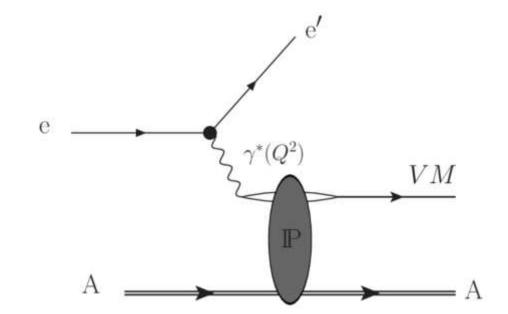
0.03, Faculty of Physics, University of Warsaw

12:45 - 13:00

## Early Career Workshop

- Early Career Workshop was dedicated for presentation of ongoing work from students and postdocs
  - Eden: study on "quasi-coherent" VM production (through the ion de-excitations)
  - Michael: study on coherent VM production at low Q

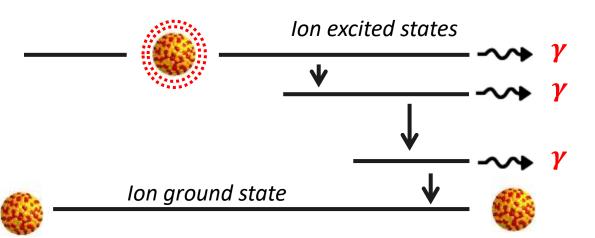


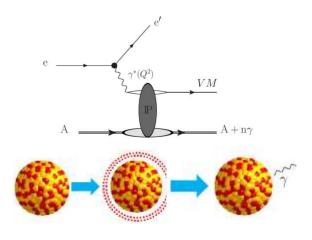


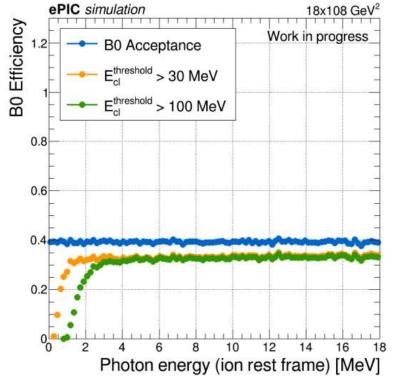
# Early Career Workshop

### "quasi-coherent" VM production

- Excitation energy (w/o ion break up) is up to ~10 MeV
- Due to Ion boost  $(\frac{E_{beam}}{m_p} \times \frac{Z_{ION}}{A_{ION}})$  photons gain energy
- Far-Forward Detectors → <u>rare isotope decays</u>
  - B0 → detect ion de-excitations







Pb ions at the highest EIC energy

## Early Career Workshop

### **Coherent VM production**

Utilized the usage of the low-Q taggers

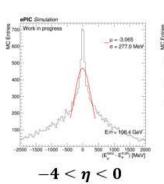
#### **Event categorization**

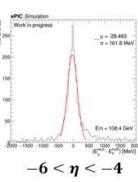
· Depends on the electron reconstructed eta

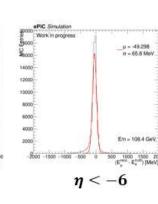
Central detector: ~10%

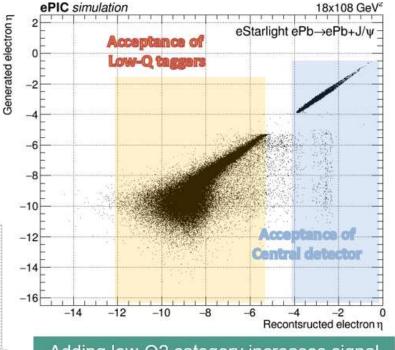
Low-Q2 taggers: ~40%

· Energy resolution - larger in the central region

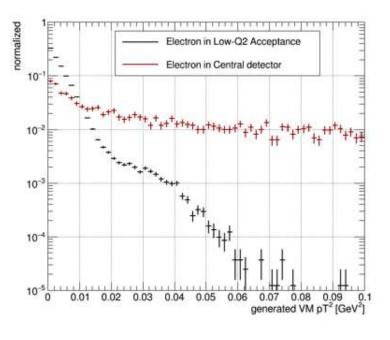






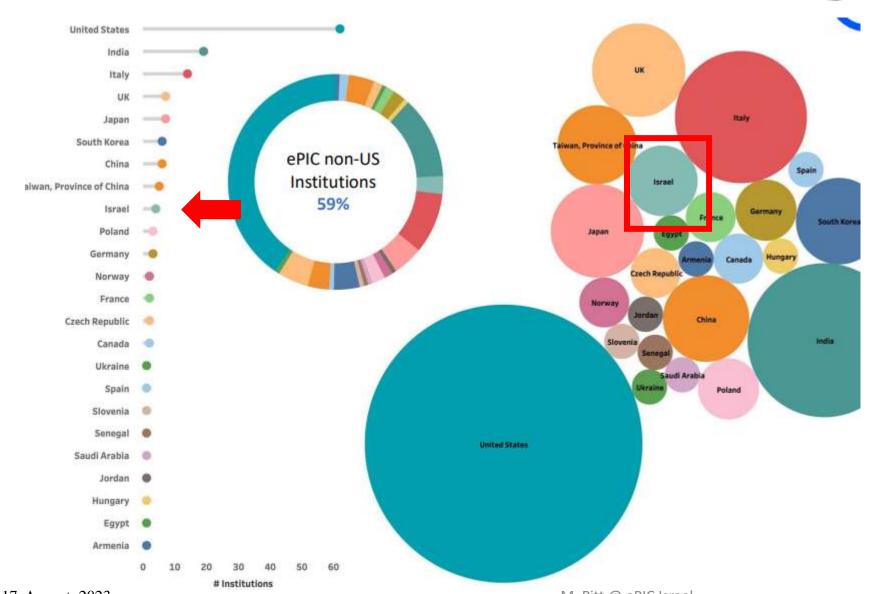


Adding low-Q2 category increases signal acceptance by x5



#### Work in progress

- Improving t reconstruction
  - > Adding the electron reconstruction information
  - lon mass constrain



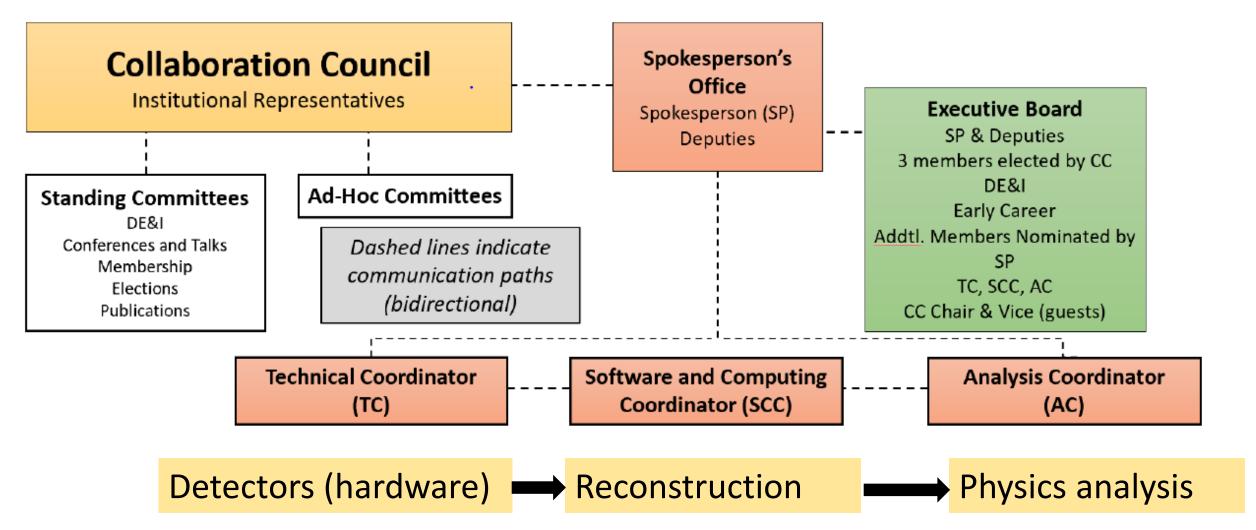


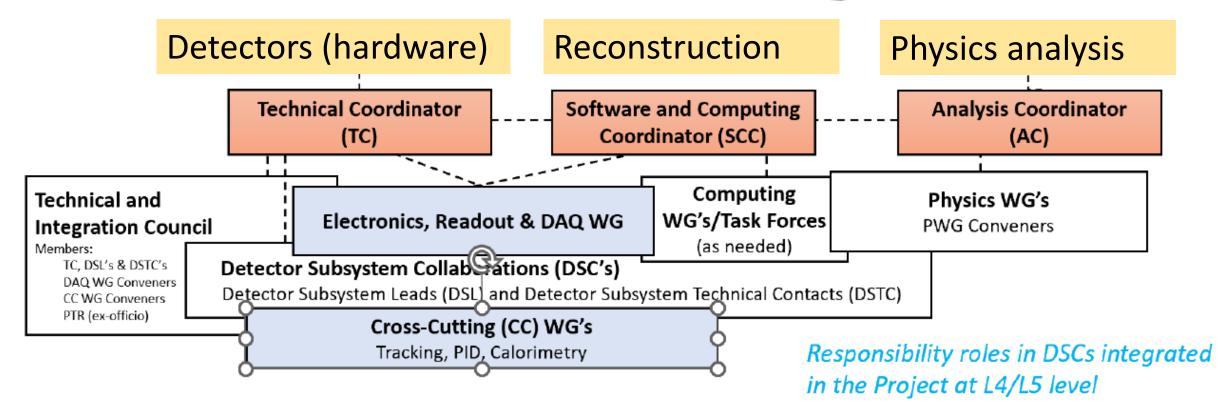
171 institutions
24 countries

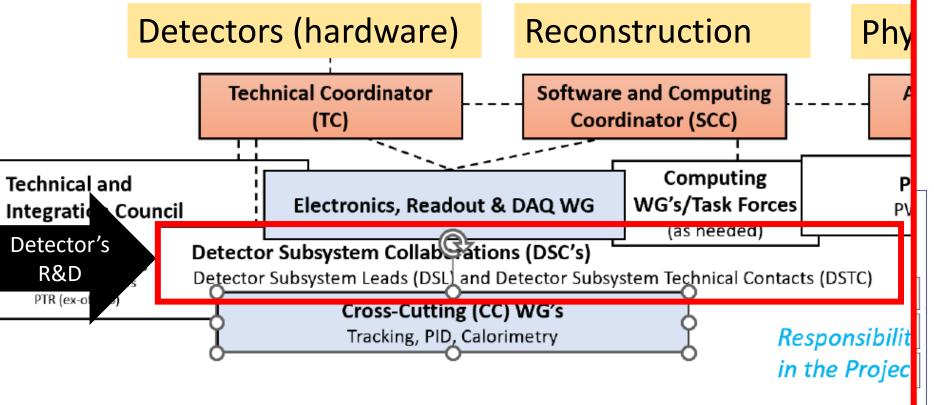
500+ participants

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

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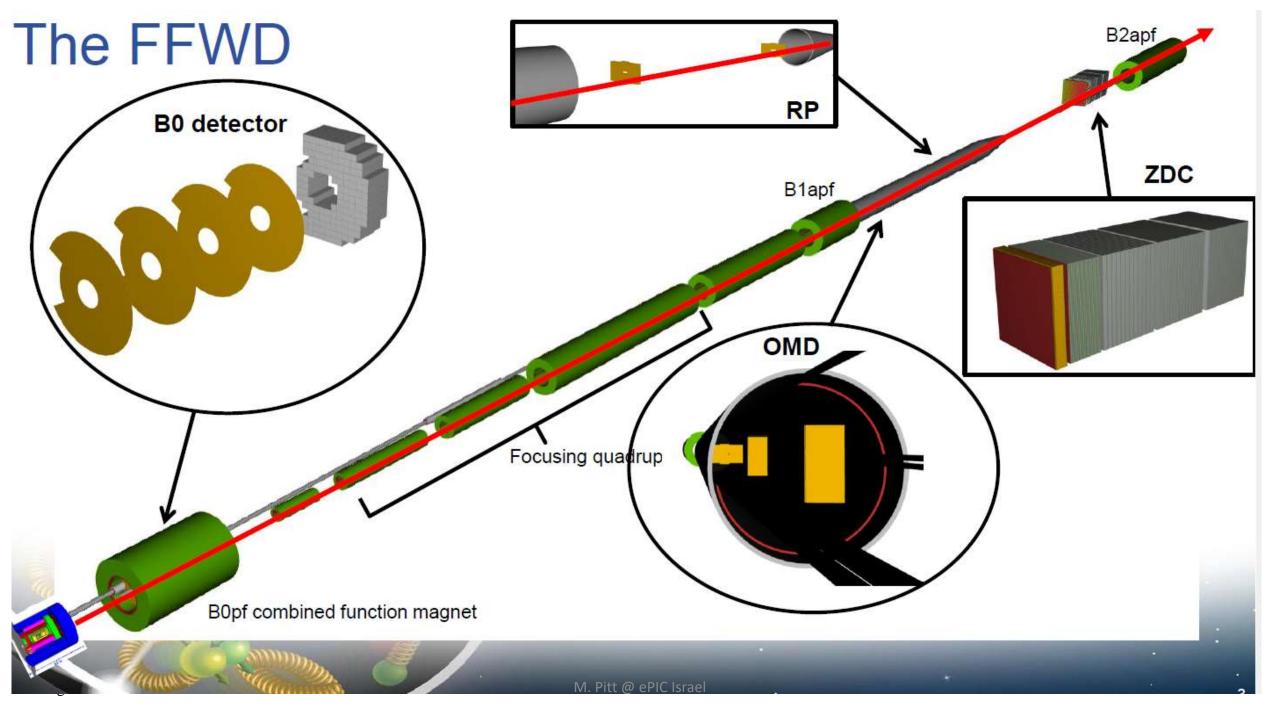
- J. Lajoie (ISU), Spokesperson Dalla Torre (INFN), Deputy Spokespersor TECHNICAL COORDINATOR Klaus Dehmelt (SBU) BACKWARDS HCAL Marco Contalbrigo (INFN) Leszek Kosarzewski (CTU) BARREL ECAL hpDIRC Sylvester Joosten (ANL) Greg Kalicy (CUA) Hwidong Yoo (Yonsel) BACKWARD RICH BARREL HCAL Alexander Kislev (BNL) John Lajoje (ISU) FORWARD ECAL FAR FORWARD Oleg Tsai (UCLA) Alex Jentsch (BNL) uan Huang (UCLA) FAR BACKWARL WARD HCAL PAIR SPECTROMETE rniederike Bock (ORNL) Nick Zacharinu (York) FORWARD HCAL INSERT FAR BACKWARD Miguel Arratia (UCR) HIGH RATE CALORIMETRY Krzysztof Piotrzkowski (AGH) AC-LGAD TOF Zhenyu Ye (UIC) Satoshi Yano (Hiroshima) FAR BACKWARD HIGH RATE TRACKER Jaroslav Adam (CTU) SI TRACKERS Ernst Sichtermann (LBL) **GASEOUS TRACKERS** Kondo Gnanvo (LBL) Subsystem Collaborations BACKWARDS ECAL Tanja Horn (CUA)
- A full review of the sub-group activities was done during the collaboration meeting
- · I will not go through all the reports, but just highlight relevant topic for us

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### The Far-Forward Detectors collaboration

**Control Account Manager** Detector Subsystem Lead (DSSL): Alex Jentsch Yulia Furletova ZDC DSSTC: Yuji Goto OMD/RP DSSTC: **B0 DSSTC: Alex Jentsch** RIKEN, Japan **Zvi Citron** Kobe University, Japan **BNL, USA** Tel Aviv University, Israel University of Kansas, USA IJCLab, Orsay, France **Pacific Northwest Hebrew University** National Lab, USA of Jerusalem, Israel **OMEGA**, France NCU and Academia Sinica, Taiwan IRFU/CEA-Saclay, **Ben Gurion University** of the Negev, Israel France Sejong, South Korea

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### Botelectors - What's New

CAD Look credit: Jonathan Smith

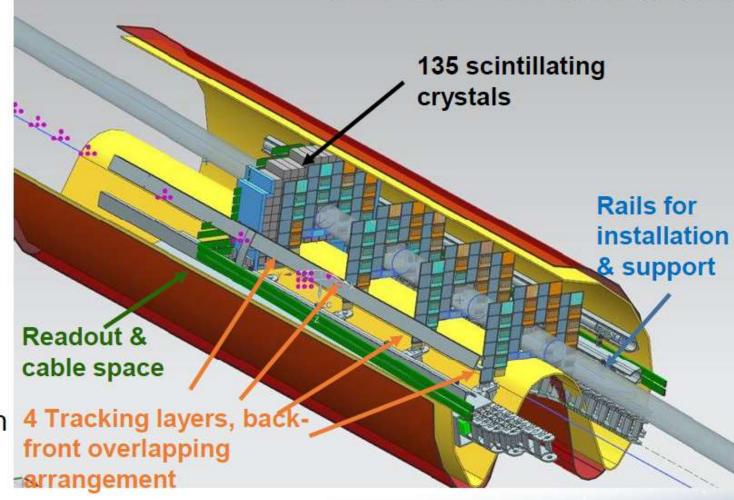
Design for two detectors is converging:

#### Si Tracker:

- 4 Layers of AC-LGAD
- Great timing capabilities
- Sufficient position resolution by utilizing charge sharing
- Technology overlap w/ Roman pots

#### **EM Calorimeter:**

- 135 2x2x7\*cm3 LYSO crystals
- Good timing and position resolution
- Technology overlap with ZDC



\* ZDC wants slightly longer crystals, ideally, we will use the same length in both detectors

- Acceptance  $5.5 < \theta < 20 \text{ mrad}$
- Very low material budget in 5 < η < 5.5</li>

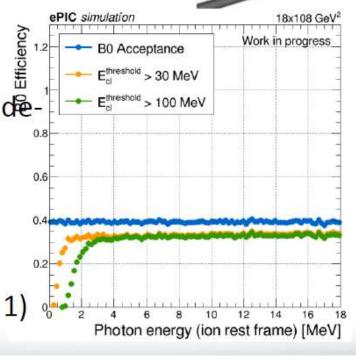
Particles within 5.5 <  $\theta$  < 15 mrad don't cross the beampipe

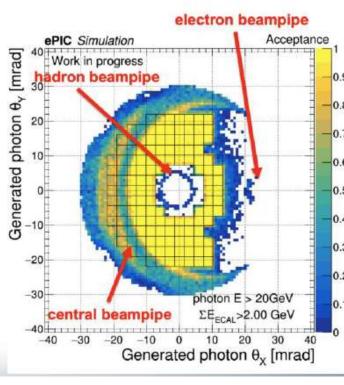
#### **Photons:**

- ➤ High acceptance in a broad energy range (> 100s MeV), including ~MeV deexcitation photons
- ➤ Energy resolution of 6-7%
- Position resolution of ~3 mm

#### **Neutrons:**

> 50% detection efficiency (λ is almost 1)





### Summary

#### **B0** Detector related

- Good feedback received during the meeting about the progress of the FF detectors in particularly about the B0 detector.
- Already well-established communication between detector and physics parties.
- Far-Forward Detector review is planned for ~December 2023, ideal technology choices are identified, along with suitable alternate designs for risk mitigation.

#### Physics related

- In BGU we plan to focus on several topics:
  - Coherent VM production with ePIC (paper soon before CD-3A)
  - Excited ions with B0 detector (Master project)
  - Isotope tagging / rare isotopes with forward detector