

# *Crystal calorimeter discussion*

ePIC FF/FB cross-cutting WG meeting

Apr. 30, 2024

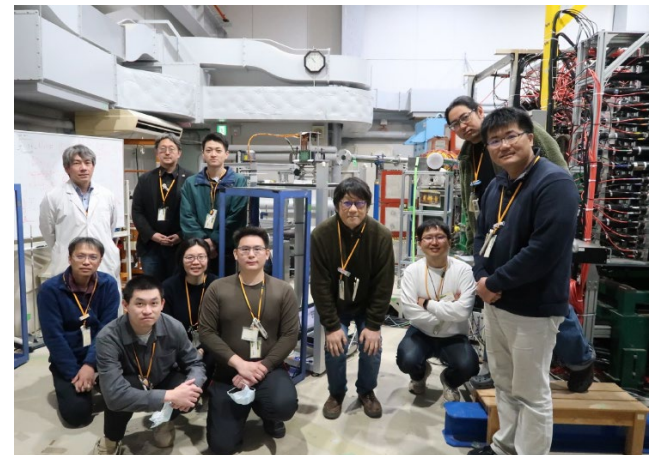
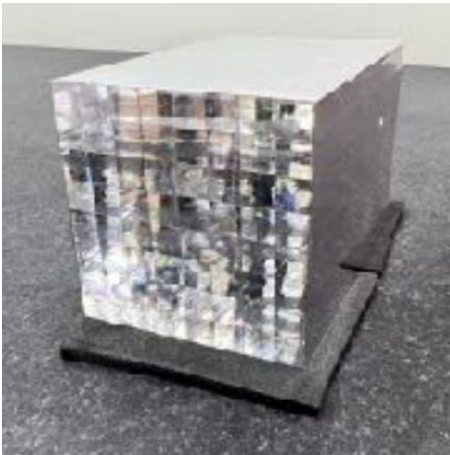
Yuji Goto (RIKEN)

# *ePIC-ZDC crystal calorimeter*

- Crystals
- Photosensors / Readout
- Integration / Assembly
- System test

# Crystals

- LYSO vs PWO
  - Taiwan company
    - LYSO crystal from company in Taiwan
    - PWO crystal from company in Czech republic
    - Plan to compare other companies in the future
  - Cost comparison
  - Energy resolution for low-energy (50MeV-1GeV) photon
  - Appropriate radiation length?
    - 20 r.l. or 8-10 r.l. to be studied by simulation for physics goals
  - Temperature dependence
    - PWO 2%/degree
    - LYSO 0.3%/degree
- Test beam for prototype module
- Taiwan group in charge
  - Academia Sinica and NCU



# *Photosensors / Readout*

- Electric engineering necessary
  - Academia Sinica and NCU
  - Chih-Hsun Lin (Academia Sinica)
    - In charge for AMS and satellite & muograph projects
- SiPM vs APD
  - Neutron irradiation test in RIKEN/RANS
- Frontend electronics
  - ASIC?
    - Preamplifier & ADC / TDC
    - Dynamic range?
    - Fast enough integration time
  - PCB design & production
  - Same one with ePIC backward ECAL?
- DAQ & clock distribution
  - Interface with ePIC DAQ system
- Power system, slow control, monitor and safety system
  - Possible bottleneck

# *Integration / Assembly*

- Mechanical engineering necessary
  - Taiwan group + US experts
- Module design
  - Design for prototype done by Taiwan group
  - Cooling & calibration system to be designed in the future
- Module integration and assembly
  - Discussing timeline
- Support
  - Mechanical structure
  - Will communicate with US experts

# *System test*

- System tests and validation
  - Beam test
- Simulations, software & calibration
  - Reconstruction software necessary
- Two simulation ongoing
  - Lambda identification by Alex
  - Low-E photon identification by Miguel
- Asian groups
  - Sejong Univ. group (Hanseul/Yongsun) students
  - Chia-Yu (postdoc/Academia Sinica) and Po-Ju (NCU) with NCU 2 students
    - Lambda identification
    - $\pi/K$  structure function by Sullivan process for  $\pi/K$  DIS
    - Mass/GPD by  $\pi/K$  DVCS/DVMP