ZDC status

Shima Shimizu
(JSPS RPD/RIKEN　→　KEK, moving to the ATLAS exp.)

1/Dec./2022 EIC-J meeting
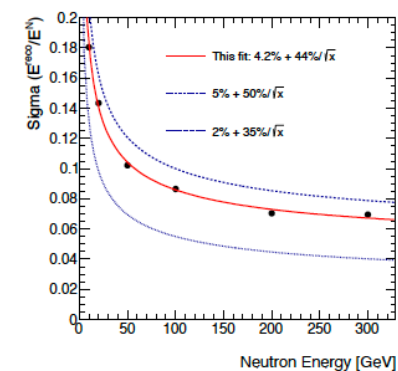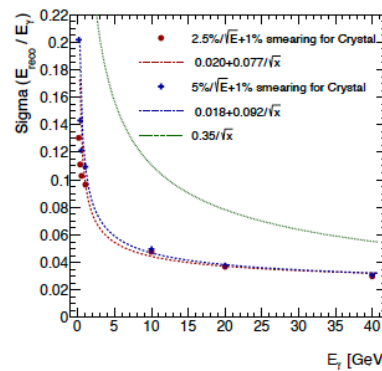
Reminder: ZDC design

- Design = complex of calorimeters
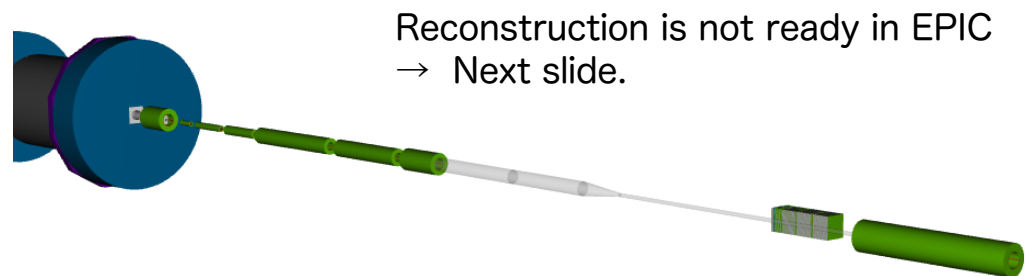 Targets: O(100) MeV photons, GeV photons, and neutrons up to 275 GeV.
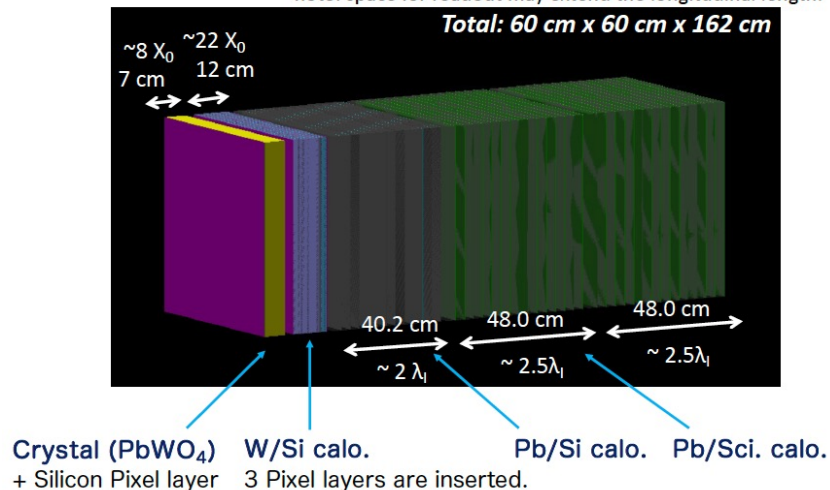   → a crystal calorimeter and 3 types of sampling calorimeter.

- Single particle simulation
    Required resolution is obtained.

- Implemented in ECCE and EPIC simulation software

Reconstruction is not ready in EPIC
→ Next slide.

ZDC simulation tasks for EPIC

- Current default ZDC in EPIC: ATHENA (big crystal + hadron cal.)
  - ← Lack of reconstruction codes for ECCE-style ZDC for October simulation campaign.

- One can switch to ECCE-style ZDC in simulation by:
  - modifying detector ID in an XML file,
  - using ZDC.xml file instead of ZDC_Athena.xml in far_forward.xml.

- Po-Ju Lin from Academia Sinica, Taiwan, is taking over the tasks.
  - Stayed in RIKEN 23-30/Nov. (4 working days)

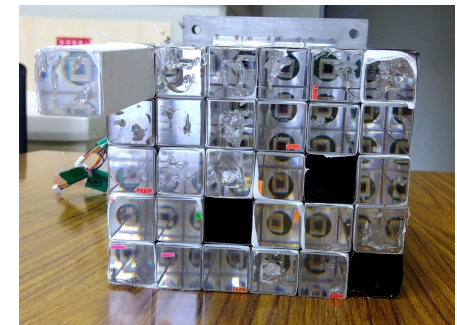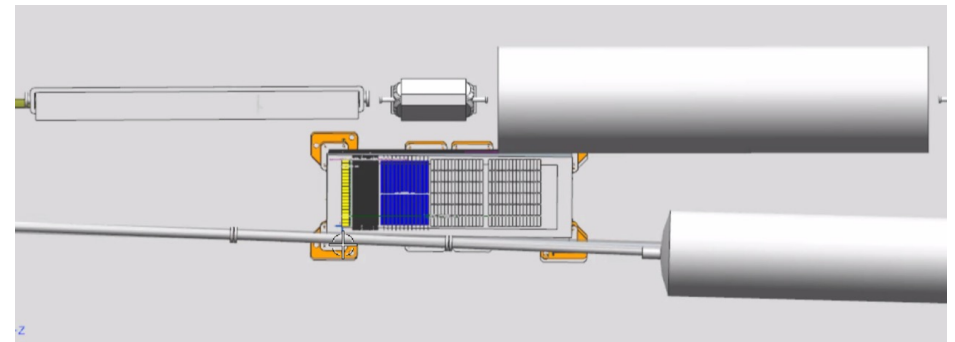# ZDC simulation tasks for EPIC

◆ Po-Ju and I had checked/discussed:

ECCE-style ZDC	git repository	status	command
Geometry	eic/epic*	checked OK	dd_web_display → geometry viewer
Simulation		checked OK	ddsim → root file
Reconstruction	eic/EICrecon	raw hits collection container can be included in the output file	eicrecon → root file

*There are still 2 issues in eic/epic.

    – Rotation angle needs artificial flip of its sign due to definition in ZDC source codes. (In both ATHENA and ECCE ZDCs.)

        ← cause of the ZDC misalignment recently reported.

        → will be updated by Po-Ju or me.

    – Issue in "Multisegmentation". Bug in DD4HEP itself?

Further (future? remaining?) ZDC-related tasks

◆ ZDC in EPIC simulation

→ Taking over to Po-Ju from Taiwan.

- Reconstruction codes
- Shower shape study, etc.

◆ ZDC for pre-TDR

- Discussed a lot about readout and their placement.

→ Should be continued.

→ CAD figures are prepared by JLab experts.

◆ Proto-type production of the crystal calorimeter

- ALICE PHOS remnants @ Hiroshima-U
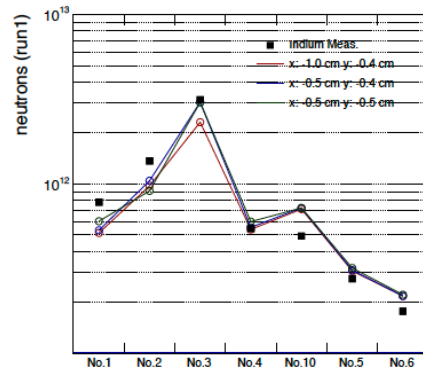
→ Will be sent to RIKEN → ??

Neutrons @ RANS in Mar./2022

- ◆ ZDC should resist 10^{14} neutrons.
- ◆ Silicon sensors (FoCal) and APDs are irradiated by neutrons at RANS, RIKEN.
- ◆ Estimation of the neutron flux:
  - Estimated from indium foil measurements
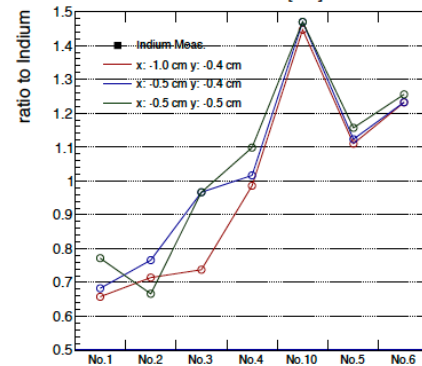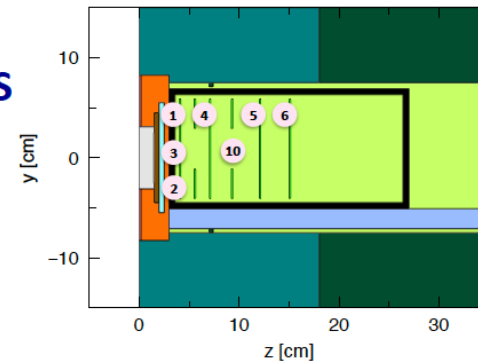 - PHITS calculation is also performed.

PHITS calculation for RANS

- ◆ y dependence is well reproduced with $\Delta(x, y) = (-1.0 \text{ cm}, -0.4 \text{ cm})$ shifts on the 1st plane.
- ◆ PHITS provides more neutrons than the indium estimation as z increases.

For future irradiation test: