

ePIC Far-Forward Meeting – Tuesday, February 7<sup>th</sup>, 2023

Present: Michael Murray, Yulia Furletova, Jan Strube, Wlodek Guryn, Sakib Rahman, David Ruth, Yuji Goto, Eden Mautner, Alex Jentsch, Lynn Wood, Jeetendra Gupta, Peter Steinberg, Zvi Citron, Nathaly Santiesteban, Po-Ju Lin, Deven Misra, Michael Pitt, Moshe Friedman

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- Discussion from Yulia on project.
  - There are two upcoming reviews – Director’s Review and DOE CD-3a review. The focus is LLP items, but our group should ensure the information is up-to-date and easily accessible in the case that we need to present an update, or a question is asked that requires information from our group.
  - Yulia will prepare an Overleaf (or we can use the Wiki) to start collecting up-to-date information to ensure we are on the same page (literally).
  - Parameter table for Menagerie needs to be checked for consistency with DD4HEP simulations.
  - ZDC has some major machine interference issues that need to be resolved. Detector needs to be moved, and studies need to be done to assess the impact of moving the detector and potentially re-sizing it. **This is of prime importance in the coming 2 weeks.**
  - ZDC services, transverse and longitudinal leakage need to be part of this discussion (used to understand performance for various changes).
  - Wlodek: “Can you explain more about the reviews?”
  - Yulia: “Details are still being discussed, but we need to be ahead of the curve so we don’t have to scramble at the last minute.”
- ZDC Validation & Reconstruction in DD4Hep: Devan Misra  
Devan has built on Shima’s work. Currently he is dealing with a bug in DD4Hep that causes some problems for transverse placement of detector elements. He is firing single neutrons with various energy. The transverse shower distribution show a narrow core, with width of about 4 cm and a longer tail with a decay constant of about 10cm. The shape varies only slowly with energy. Michael commented that these simulation results are very similar to CALICE results, the inner core is the EM part of the shower with the hadronic part is much wider. As expected the showers are narrower for W/Si than for Pb/Si. The distributions in the Pb/Scintillator part seem wider because the pads are 10cm square. A simple linear calibration gives a resolution of  $94\%/\sqrt{\text{Energy}} + .5\%$ 
  - **Action Item: Try to reproduce Shima’s results. Then try machine learning algorithms. Also it is important to see what effect reducing the width of the calibration can have on the resolution.**

- Far-Forward detector acceptance discussion: Michael Pitt:  
Michael has been testing the simulation setup with single particles with a view to vetoing incoherent events. About 50% of the neutrons with  $|\theta| < 5$  mrad reach the ZDC. Quite a few of these interact in the B0 ECal. He also looked at protons with energies up to 120 GeV when the detector was in the 18 GeV X 275 GeV setting. Some of these reach the ZDC.  
>>> Todo: It would be good to see event displays of these. Alex commented that most of these protons should miss the Roman Pots with they have only 40% of the beam energy.

Next meeting 14<sup>th</sup> February 9am Eastern Time

Minutes submitted by Alex and Michael