

TIC meeting 12/18 , 2023 (ZDC) - main findings and TIC recommendation



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Dear Colleagues,

The TIC meeting on 12/18, 2023 focused on the ZDC, following two previous recent TIC meetings where this subsystem had been discussed (10/9, 11/20).

We thank the four speakers for the rich information presented.

Updated radiation simulation studies have been provided. They continue to indicate that neutron fluences are a not significant concern for any of the two designs considered for ZDC. Ongoing efforts will move the simulation framework into the ePIC simulation framework DD4HEP/G4.

Updates about the performance of a combined configuration including a short section of LYSO crystals as an e.m. calorimeter followed by a Fe + SiPM-on-tile hadron calorimeter section indicate that energy and angular resolutions are compliant with ZDC physics requirements and the rejection capability for gammas by pion decay at the 97-98% level. Cost information related to material for the hadronic section was also presented (\$0.1M), thanks to the reuse of ion absorbers from STAR.

The model of the ePIC-ZDC W-Si EMCAL has been presented, largely taking advantages from the ALICE FOCAL design and the results of the dedicated test beams. The status of the dedicated simulation studies has been shown; these simulations indicate fine energy and space resolutions. It has been remarked that the detector modeling in the simulation is still in a preliminary status. Cost estimates of the e.m. section derived from ALICE FOCAL costs and including material only amount to 2.7 million dollars.

Recommendation:

On the basis of the information provided at the three TIC meetings dedicated to the ZDC, the TIC recommends as the baseline configuration for the upcoming Preliminary Design Review (scheduled for 12 Feb 2024) a short section of LYSO crystals as an e.m. calorimeter followed by a Fe + SiPM-on-tile hadron calorimeter section. The mechanical design should allow the possibility to include FOCAL-like Si pixel layers between the LYSO and hadronic section as a potential future addition.

This option meets the physics requirements with a lower anticipated cost than the FOCAL-like design. It takes advantage of existing developments within with other ePIC subsystems: the SiPM-on-tile technology adopted in the forward HCAL (in particular with similar granularity in the insert), and the LYSO crystals foreseen for the B0 calorimeter.

Best greetings,
Silvia

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