

BIC ESB Mechanical Session

BIC Workshop, ANL, June 16, 2026

Zisis talk

Talked about inner-radius 5mm plate:

- Elke: is 1st Astropix layer really needed? Show with simulations. If not, get rid of it and solves the 5mm inner plate. Wouter said that Astro-1 has been in the tracking for 6 months, so it can be simulated.
 - Elke: are 6 astropix needed? Zisis: simulations have been done. Elke, but has it been demonstrated that we need 6. If only 5, this solves the 5mm inner plate

MIPs:

- Elke: what has been demonstrated on needed 7 C? Zisis: we have simulations based on what we know from Bologna/UCLA.
- Elke: can we even see MIPs at all when all electronic noise is realistic? How about you irradiate SiPMs in Hall A or C (equivalent to 1 year dose) and measure cosmics with them to see MIP and pedestal?

Shefali/Wouter talk

- Gaps form between PCB and aluminum and thermal pads; U pipe moves things around; need to accommodate for this and component height off PCB surface.
- Manitoba; Machine cold plate out of 1 piece - large machining job; drill hole for water, with caps.
- Diode Manitoba; thermocouple at KNU
- Idea: use 20 C water and + thermo-electric coolers (TECs). TECs between cooling plate and SiPM board not possible; reverse heat leakage in the bad directions; 50% more heat removal needed; fine control of which to cool more than others
- We are not cooling on the SiPM side (just on the back side the amp/sum board); how to stabilize temps at SiPMs?
- Elke: Barrel TOF heat load was under estimated: main reason was DC/DC converters - it was a killer! Zisis: CALOROC has 1 maybe 2 DC/DC converters.
- Elke/Wouter: Calculate total heat source and where it is located?
- Dan: test #2 assembly; Aluminum is problematic because of corrosion issues; use copper instead? Or, press fit-on a Cooper tube; slots in

aluminum plate (cut out face and press fit tube); Dan's techs can help with prototyping.

- Dan: concern if fittings are inside ESB; if they leak inside the ESB this is problematic; U tube is better, with fittings outside (radially)
- Zisis to Dan: do we have real estate at the outer part of ESB to install connectors, lines, electronics? Dan said that there is no interference there right now and that the back plate of the sectors might have all purpose electronics mounted on them. Zisis asked that space at the ESB outer plates be "reserved" for ESB. Dan said that needs to be considered.

Discussion Slot

- Wouter to Adam: what do we know about heat load, and where and how ETCs are? No clear idea at this time.
 - Zisis: what are NASA upcoming priorities? Adam: FPGA design to read out ASICS is priority; next interface to astrolinx chains. But need radiation requirements/component selection (Nobert suggested CERN's database). Once these component constraints and I/O have been defined; rough estimates on power can come soon. DC-DC converters 9->36 V; can they be located somewhere else? (In ESB or outside?). No concern on power: 200-300mW per card
 - Wouter: how are ETCs oriented? Zisis: how can they be connected? Adam: maybe 5 blind mating using wedge lock connectors in the card guide.
 - Adam: Second revision of FPGA board being ordered now. He needs to figure out how to talk to astrolinx and among service board.
 - Adam: can I have a step file for the ESB? Tom will provide one.
 - Wouter: what are Aram's plans for the uni-board re density of components and number of connectors? Zisis: Aram will present his plan in the afternoon session; reduction of components and possible a single ribbon cable (in the place of the current 40 MCX connectors for the Baby BCAL version).
 - Adam: how do the cookies work? Zisis explained their use and installation. (GlueX BCAL did not use them; had a 5 mm air gap which made ESB installation much simpler - even without ETC slots)

Other thoughts:

ZP to ask Wouter: build cold stuff at RMS or Manitoba?

ZP: Do we really need to cool CALOROC board and ETCs?