

ePIC Pre-TDR TOF

The entire section needs a read through edit for voice/content. The writing styles are different enough to be noticeable and the tense (past, present. e.g. 'has been', 'was') are not consistent. There are also inconsistencies about LGAD, AC-LGAD, LGADs, etc. and between some other acronyms (e.g. RB and RDO for readout board, should be specific about which is which to remove confusion and ambiguity). There are formatting errors for units, sometimes many spaces before the value and sometimes no space before the unit. There are a large number of grammatical errors that make it difficult to parse the document for content. I found the sections about layout/construction to be relatively clear and concise. Requirements from physics: Very general. Nothing specific about how this affects the physics goals or what the requirements are. There are sections later that could be reduced to increase the information in this section. The first figure (8.29) might be better suited in a different section that describes the detector, rather than the physics requirements.

2039-2042: Long sentence. Suggest breaking up

2047: remove comma after resolution

2048: add comma after budgets

2048: in ePIC → in the ePIC

2050- 2051: the covered area → spatial coverage

2051: add comma after counts

2051 - 2052: "Figure 8.29..." → "The BTOF and FTOF layouts are shown in Figure 8.29."

2055: "...performance which includes..." → "...performance, including the TOF as an integral component, meets..."

Table 8.12: Suggest making material budget in X/X0 (%) to be consistent with other detectors

Figure 8.29: BTOF (left) and FTOF (right) geometries. Needs a bit more explanation in this caption.

Would suggest to think about splitting this figure up into 2 figures to better describe the BTOF and FTOF separately.

Requirements from Radiation Hardness:

2058: "It is safe to assume...will be.." → "The maximum fluence foreseen for the lifetime of the TOF detectors is..."

2060: comma after Here

2065: made use of → used

2070: at room... → at or slightly lower than room temperature for the lifetime of the experiment.

2074: Therefore, → SOMETHING HERE

2076: effect → effects

2077: would be → was

2081 - 2082: encouraging,... → encouraging and are shown in the X section.

2082: Sensors were... → Sensors irradiated at the FNAL ITA facility are still cooling down....

Requirements from Data Rates:

2085: On top of that, → Additionally,

2090: BTOF contains → The BTOF contains

2090: which give... → with an average

2091: comma after strips

2092: on maximum 3 → on a maximum of 3

2095: (both) FTOF → the FTOF

2095: comma after channels

2096: comma after pixels

2097: on maximum 3x3 → on a maximum of 3x3

2098 - 2099: Such a noise... → This noise...

2099 - 2100: ...and is deemed... → ...and is considered pessimistic and used in our calculations as a conservative estimate.

2103: used in... → used in the precursors (e.g. HGCROC) to our expected ASICs.

2176: kbs → kbps

2108: BTOF which contains 288 half staves: BTOF, which contains 288 half staves,

2113: For the → The

2115: interconnects as well as → interconnects, and

Device concept and technological choice: Is there a reference that could be put in this paragraph for AC-LGADs? Might benefit from a table in this section to summarize the many ASIC designs being considered/tested.

2122: remove comma after layer

2127: EIC → the EIC

Subsystem description: Should include a figure of the detectors here with good caption description. Possibly move the figure from the earlier section to this section

2131: low mass → low-mass,

2132: with → to

2133: comma after structures

2133: low density → low-density

2134: frontend → front-end

2137: thermal-conductive → thermally conductive

2138: around → approximately

Sensors: change all μm to μm

2146: comma after pre-amplifiers

2158: is → are

2161 & 2164: frontend → front-end

2165: deliver → delivery

2166: the French group is not defined. Institutes?

2167: optimized → optimized for

2172: remove space between μ and m

2176: consists → consist

2177: serves → serve

2177-2178: for FTOF... → are shown in Fig. 8.35 for the FTOF.

2179: remove comma before and

2180: lpGBT and VTRx+ → The lpGBT and VTRx+

2181: so → and

2185: provide → provides

2186: (1.2V), as well for.... → (1.2V) and for the lpGBT...

2190: from DC-DC → from the DC-DC

2193: number → the number

2195: FTOF → the FTOF

2197: developed and under testing... → developed based on an....transceiver and is undergoing testing.

2198 - 2199: The first prototype.... → The first prototype RB and PB using the CERN chips will be under development soon and based on the similar existing design...

2206 - 2209: Is there a reference that could be put in for the LCP?

BTOF stave design (2210 - 2216): Would benefit from a figure here. There are more figures for the FTOF than BTOF

2218: LGADs → LGAD

2219: of → from the

2221: LGADs → the LGAD

2221: ASIC → The ASIC

2223: LGADs sensor → The LGAD sensors

2225: LGADs → LGAD

2227: remove been

2229: prototype → prototypes

Figure 8.36: LGADs → LGAD

Performance

2236: to → two, ASIC → the ASIC

2239: that Constant → that a Constant

2240: than leading → than a leading

2241: reduce space before 35 ps

2244: reduce space before 11 ps and 50 ps

2245: sensor → sensors

2247: add comma after with

2248: remove comma after ASICs

Implementation

Table 8.13: Could use a reformat. powersupply → power supply

2277: service → services

2278: TOF → the TOF

2279 - 2286: Is there a type of liquid determined? The tone suggests water (below atm), but it is not explicitly mentioned.

2287-2299: check spacing after units, follow latex conventions (i.e. 63\,cm)

2290-2292: awkward sentence, reword

2292: The three → Three

2297: either way is ambiguous, specify

2298: remove itself

2298: BTOF → the BTOF

Table 8.15: BTOF → The BTOF, FTOF → the FTOF

Figure 8.39: Barrel TOF → BTOF, mechanic → mechanical, EPIC → ePIC, 5mm → 5\,mm

Calibration, alignment and monitoring

2311: suggest changing — to , to be consistent with the rest of the document

2312: an rms → have an rms, check space before 50 ps

2315: procedure but not necessary → procedure.

Status and remaining design effort: Reference the earlier table in the requirements from physics section so that it can be compared to these numbers.

2324: The summary best → A summary of the best

2330: remove instead

2333-2334: Reword to - As the pixel resolution requirement for the FTOF is 30 um, the pixel technology needs to be refined to meet the requirements.

2349: 10^{15} Neq;... → 10^{15} Neq. In the region of interest for ePIC ($< 10^{13}$ Neq) the...

Figure 8.41: , even → . Even if...

2367: comma after pF

2372: sensor → sensors

2375: Looks like this is the first instance of PLL, should define it

Figure 8.42: pf → pF, erd → eRD

2382: of → of a

2384: purpose → purposes

2385: FTOF → the FTOF

E&D status and outlook:

2391 - 2394: long, awkward sentence. Reword

Environmental, Safety and Health (ES&H) aspects and Quality Assessment (QA planning): Focus is mostly (only?) on QA, no clear mention of ES&H.

2399: at → for

2403: temperatures → temperature

2404: IEEE → an IEEE

2405: period, not colon

2411: to colleagues of UNM BNL-made AC-LGADs → BNL-made AC-LGADs to colleagues of UNM

2421: 10%? ← what is this referring to?

2422: remove 'allow to'

2414-2426: There are a lot of semi-colons in this paragraph and feels out-of-sync with the rest of the TOF section. Suggest to make those separate sentences, rather than split by a semi-colon

2429: same 10% comment

Construction and assembly planning:

2440: 135 cm → 135 cm each

2452: 2 → Two

2452 - 2453: Awkward sentence, reword

2463: Sensor and... → remove sentence, redundant

2475: The thermal adhesive..... → remove sentence, redundant

Collaborators and their role, resources and workforce:

2488: by the → by

2491: preproduction → pre-production

2492: months while quality... → months, during which quality and procedures will be confirmed.

Figure 8.45 & 8.46: the scale is not real → not to scale

Risks and mitigation strategy:

2495: sensors → tested sensors

2495: TOF → the TOF

2496: dimension → dimensions

2504: resource → resources, need → needed

2508: comprehends → includes

2509: front end → front-end

2513: R&D test → tests

2514: outcome → outcomes

2516: cooling → the cooling

Additional material:

2519: powersupplies → power supplies

2526-2532: no capitalization after colon. Should these sentences be in separate paragraphs?

2537: ma → mA

2553: later of → after

2562-2563: same sentence as a previous section. Remove or change

2564: what development phase? sensor?