

## Comments from LHCB/SHiP Bari group:

**Authors:** for Liliana, please leave only INFN Bari affiliation

For Gabriella Pugliese and Dayron, please note they are **PoliBa**+INFN Bari and not UniBA

### **Paper:**

L44 → this is the first time we introduce the GIF++. Move here reference [6] instead at L108 and refer from now on to the Gamma Irradiation Facility as GIF++.

L46 → we would prefer to move “e.g. the LHC..upgrade” at the end of the sentence

L49 → please, add a reference to AidaInnova Project

L53 → we would propose to add “operated with such mixtures” between RPCs and before and remove “for different...mixtures” at L54

L63 → remove “One should note that”

L64 → “scientific” → research ?

L66 → please, add a date to reach this (CERN) goal, and a reference to CERN report. Then, one can think to add something like “and several actions have been put in place” after “2020”.

L69 → we would propose to modify “about 90-95%” with “more than 90%”

L70 → we would propose to modify “which are” with “both”

L71-72 → “(the reference ..=1) → could be in footnote?

L79 → typo: “of”->”to”

L80 → “(HFO)” in “(HFOs)”

L90 → we propose to add something like “in current conditions” after “operation.”. Moreover, not really convinced by the use of “mitigating”. Is it really needed?

L92 → missing “RPC” ECOgas@ ....

L94 → “several” in “with several”

L99-100 → this can be the right place to cite our first paper. One can add a sentence saying that first results related to RPCs performance studies have been reported in XXX. Then, current L100 is ok.

L101 → “beam test campaigns” in “2022 beam test campaign”

L103 → remove “preliminary”

L108 → Gamma Irradiation Facility

L112 → “a number”?

L113-116 → We propose to remove “The 137 Cs...with” and rephrase like this: “A steel ..walls), grant ..detectors.”

L114 → maybe, “r being..” in footnote + add “gamma” before “irradiation”

L115-116 → we propose to remove “perpendicular to the facility wall” and cite here Fig.1, indicating there the xyz reference system. Moreover, please increase Fig.1 dimensions, it is too small to appreciate details.

L117 → “lead”: in our first paper we say they are not only lead. Better to check to be consistent.

L125 → “, that was” in “. They are”

L126-129 → we propose to link to previous sentence and rephrase like this: “and are characterized by different layout (area, gas gap..gaps), as reported in Table 1. Results from ...paper.”

Table 1 title: “ECOgas” → “RPC ECOgas@GIF++”

Table 1 content: SHiP → LHCb/SHiP (here and later on, f.e. L164), then from CMS RE11 footnote the layout is not very clear: is (TN+TW)/BOT? Is it really needed such a detail or we can simply state it is a double gap of mean area XXX?

L130 → please remove “distribution” and “one”

L131 → “send” in “sends”, “gas” in “Gas”

L132 → maybe add “by a dedicated software” after “monitored”

L133-135 → please, add model details for mainframe and boards. Please, remove “(one with...members)”

L138 → remove “used by the CMS collaboration” and reference 8

(1) → this item was already discussed for our 1rst paper and this definition is not consistent with it. Moreover, during beam tests it is not used by all the detectors employed. We suggest to use the same definition we put in the first paper.

L139-140 → remove “and alpha is ...0.8”

L140 → Add “As for aging studies, “ before “the data acquisition”. In general, better to comment what is used in beam tests, given Table one and its last column.

L144 → modify “providing..analysis” in “produce on-the-fly data quality monitoring plots.”

L145 → remove all the sentence.

L146 → remove “The main difference is that,” + “periods” in “tests”

L145 → we suggest to remove () brackets

L148-150 → we suggest to rephrase like this: “and their coincidence with two external scintillators triggers the data acquisition during the beam spill.”

L151-153 → if already cited at L115-116, we suggest to remove all the sentence.

L154 → redundant, please remove “(given by...)”

L155 → remove, already detailed in the caption

L166 → remove “, once discriminated,” and add “soon after” before readout

L172 → remove “Reference”

L173 → “to” maybe “into”?

L180 → we suggest to modify “, this is because “ with “:”

L183 → “One can see” → “It is worth noting”

L184 → “the mixture”, maybe “in the mixture”?

L186 → “with no” -> “without”?

L187 → “describes some of the results” → “summarizes the main outcomes “

L190 → “reported here”, maybe “here reported”

L191 → we suggest to modify in “Efficiency and Working Point” as in next section

Fig.2: Rephrase like: “Time profile obtained for RPCs operated with the standard gas mixture at 90% efficiency at source off (left panel) and under maximum gamma-induced background (right panel).”

L200-201 → maybe DeltaT values outside brackets? (experiments therein instead)

L206-208 → we suggest to remove the reminder

As a general comment: L192-210 including equation (2) are not peculiar of source off case. Why not to include in the general Section 3 (let’s say, 3.0)?

L211 → there is no correspondence between fig.3 a and b and the figure itself, where left and right panels are indicated.

Fig.3 → is it possible to have the same scale on current density between the 2 panels? Y axis-right maybe better to define as current density (also at L216).

L226: typo “show” → “shown”

L227: typo, it is it is

L236: please, add “to higher values” after “working point”

Table 3 caption: swap the name of the chambers, following the order in the table

L242 → please, remove “one”

L245-247 → we suggest to modify as follows: “In the following, results from EP-DT and ALICE detectors will be presented. In the case of ...”

L248 → please, add “one” after ALICE + please, explain why “2 mV” for EP-DT

L251 → “can then be” -> “is”

L252-254: we suggest to rephrase as follows: “In particular, the range for signal integration is determined as follows:”

L261 → remove “is” between charge and calculated? + remove the bullet

L268 → again Fig.5 a/b not corresponding to the figure caption (left /right panel) + “EPDT” → “EP-DT” (also in Figure 5 caption, L272, ...to check later on)

L270 → we would remove “(value ...3.1.1)”

L271 → typo, “.it appears” -> “, it appears”

L273 → “could be” -> “is”

L278 → please, add “contribution” after avalanches, “avalanches” → “avalanche”

L279 → “streamers” → “streamer one”

L285 → quenching effect of HFO or less CO<sub>2</sub>?

L288 → remove “.”

L292 → “both”??

L301-302 → we would remove the comment inside round brackets.

L306 → remove “-small”, never used up to now (again, at L318)

L308 → we suggest to remove “also” + “this increase corresponds to” → “at the level of”

L310 → “one finds that” → “it is worth noting that”

L311 → “and this justifies the” in “, leading to”

L312-313 → “(as well....contamination)” → and the streamer contamination

L316 → typo, filters

L320 → remove “the charts show the” + “the” before “absorbed” + add “density (...) are shown” after current

Fig.7 caption: “the source” → “irradiation” + is it possible to have the same scale for current density?

L326 → fig.7c, missing relation with the caption of Fig.7

L339 → it seems to us we never defined the distance from the source for each detector...

L345-346 → remove “(extracted...3.1.1)”

L347 → “detectors for” in “detectors operated with”

L350 → we suggest to remove “(i.e. ....increases)”

L351 → we suggest to remove round brackets

L354 → remove “(for what ...drop)”

L359 → typo, “in case this case”

L360-361 → we suggest to remove what in round brackets (redundant)

Fig.12 caption: “Working...for ALICE..” -> as stated later, not only ALICE

Fig.13 caption: the end of the sentence is truncated

L382-383 → “This effect...what was said” ??? something missing?

Fig.14, it would be useful to have the same scale on y axis

L390 → typo, they->their?

L391 → switched or set?

L407 → remove “without irradiation”, already said

L409 → remove “(see Table 2)”, mixture referred to already several time + “observed”->observe

L414 → we suggest to rephrase “releasing”. It seems that current releases charge..

L417 → typo, a -> at

L419 → said?

Fig.15 right: we should explain the reason of the jump in current or we remove that part of the plot

L434-435 → remove eco2 definition

L439-441 → explanation not clear to us. I remember we decided to choose HVappl as HV50%\_eff, to avoid h24 high current values during the long irradiation period. That means that the cluster rate should not be closer to the expected values at HL-LHC. May you please clarify?

L459-461 → maybe we should say SHiP detector was the only one exposed at WP instead at 50%eff?

L463-465 → “(indeed,...current)” -> feels like something magic to the inexperienced reader

L485-486 → “not necessary related to the gas mixture” : concept already given before (L460-461). Not really clear what do you mean. Finally, we are studying detector aging (due to eco2 and irradiation) and it seems we see some effect more or less pronounced, depending on the layout (thickness, maybe materials, HV of operation, position wrt the source, ...) Why do we feel the need to stress it is not necessarily related to the gas mix? And in this case, which is our hypothesis?

L505 → we suggest to modify “beam” with “performance”

L595 → ???(2014)

L611 → ???(2018)