

# REPORT ON JINST\_014P\_0220

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AUTHOR(S): ICECUBE COLLABORATION

TITLE: In-situ calibration of the single-photoelectron charge response of the Ice

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## Report of referee 1

The authors have responded to all questions/comments raised in our previous report. The new version of the paper is substantially improved. We support the publication of the paper as it stands. However, we would like to suggest few minor changes, as it follows.

Page 11, Section 3.3, 5<sup>th</sup> paragraph. Please correct  $\text{Exp1}_1$  to  $\text{Exp}_1$ . It would be better to change the term “efficiency”, which is used in the text, by the term “estimated efficiency”.

Page 13, Table 1 and Page 14 Section 4.1. We still believe that a discussion on the statistical correlation between the estimated parameters will add to the clarity of the paper. Despite the title of Section 4.1 such a discussion does not appear in the text.

Page 17, paragraph “dim source measurement”. Please change the subscript 0.25 to 0.23

Page 18, Section 4.3.1 and Table 2. No all differences are in “sub-percent” level. Better use in “few percent” level. Please correct the header of the last column in Table 2.

## Report of referee 2

We thank the authors for a substantially improved version of the paper. We have reviewed the revised manuscript. The content flow, the presentation of the studies, and the discussion of the results are largely improved over the previous version. We support the publication of the paper. We also believe that a few additional improvements would be beneficial for the clarity of the

presentation.

A few suggestions are listed below.

with my best regards

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- p.5, 5 lines from the bottom: ->"in units of PEs, or photoelectrons". Then, replace PE with PEs wherever appropriate in the following.
- p.9, sec.3.2: zero charge ->small charge values
- 10, last paragraph: it would be clearer to rephrase it to ->found to have SNR=57,9 and SNR=0,69x10<sup>5</sup>, in the bin with the lowest SNR value and for the full distribution, respectively.
- p.11: 5th paragraph ->an efficiency
- p.11, last paragraph: "withing"
- p.12, 3rd paragraph: may want to use the greek symbol for  $\chi^2$ , as in Fig.6
- Fig. 6, legend: symbol appears twice for "event dataset"
- Fig.6, caption:
  - >what are N, mu, sigma? please add explanation in the caption.
  - >"is the 2PE contamination". If so, what is the expected "PE contribution? perhaps it can be quantified.
- Table 1:
  - >"NQE"? does it refer to "Standard QE"?

>2nd column: is this "P\_e2" instead?

>in the column titles, it would be OK to simply refer to the names of the variables, as in Eq.2.1

- p.13, 2nd paragraph: 15,85%. I find 16.1% (by comparing numbers in the 2nd column, 1st and 2nd lines, in Table1).

- p.13, 2nd paragraph: "Gaussian norm". If you are referring to a value in Table1/Eq.2.1, please clarify what is the term and how that is defined.

- p.13, 2nd paragraph: 3,177%: I find 3,4% by comparing the SDs (1st and 2nd lines). Also: Is the difference significant? It is small and compatible with the uncertainties.

- p.13, 4th paragraph: Standard QE DOMs: add "(NQE in Table 1)"

- Fig.8: Values/colors/legend seems to be inconsistent with text. HQE red (in the text) is it with the Old Toroid (in the legend)? Also, Standard QE is blue (in the text) w/ New Toroid (in the legend). Please verify.

- Fig.8, caption: There is no mention of HQE in the caption, whereas the text refers to HQE. Please clarify.

- Fig.9:

>Please clarify what are the vertical dashed lines, in the caption/legend.

>The white line (solid, dashed, dotted) is not in the legend. Suggest choosing different colors and make the symbols consistent in the Fig. and in the legend.

- p.16, 1st paragraph: Greater ->More

- Fig.10, caption: Not clear what is the dependence on the year or IceCube season. Please define  $\Delta P / \Delta t$ . Does it refer to the change of the individual parameters (P) over time (t)? Please clarify in the caption.

>Is there a seasonal effect, ie. winters vs summers, that may also be rel-

evant? Please clarify.

- Suggestion: in many places, the correct term "laboratory" could be used in place of jargon "lab".
- p.17, 2nd paragraph from the bottom: suggest replacing: peak position ->peak charge
- p.18, sec. 4.3.1, 1st paragraph: Q\_0, Q\_013, Q\_023 are defined as bright, semi-bright, and dim. Suggest removing the term "bright-to-dim" as the ratios are defined as they are. Sometimes they refer to bright-to-semi-bright. Twice in the text and once in the caption.
- p.18, last line: ->DOMs
- p.19, Sec.4.5, 2nd paragraph: chain to ->chain as for
- Fig.11, caption: in the text it is not referred to as "neutrino event". Perhaps better use "for upward-going muons". Please make it consistent.
- Fig.11, legend: data symbol appears twice in left and right plots.
- p.20, Conclusions: Please define "Gaussian component". What is it? It is not clear as it is.
- p.20, Conclusions: add quotes around "total charge per DOM" and "total charge over the number of channels". Alternatively, use symbols and define those.

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