Dear Wataru,

Thank you very much for your careful review, and for raising these valuable questions and suggestions. Below are my responses.

- [1 Introduction]

"Silicon Photomultipliers (SiPMs)..."

--> If there is any good reference for the SiPM, please consider adding it. In particular, it would be nice to have a reference that explains the meaning of "precision in light detection".

Thanks for your suggestion. I changed the description to “Silicon Photomultipliers (SiPMs)~\cite{KLANNER201936, SIMON201985} are characterized by their high photon detection efficiency, high gain, insensitivity to magnetic fields, compact structure, and low operating voltages.”, which specifically describes its characteristics. And I also added the references.

- "to achieve high granularity while minimizing the number of readout channels"

  --> The number of pixels of the SiPM and the positional resolution of the detector are different with each other. Compared to other new calorimeters that have been used recently, it seems to be difficult to say "high granularity" in case of 1 cm Crystal Scintillators.

Yes, of course. I did not mean that the positional resolution of the detector is determined by the pixel density of the SiPM. The ECAL achieves positioning through long crystal bars arranged in a crossed pattern across two adjacent layers, with a granularity of 1*1*2cm^3. Compared to calorimeters known for their high granularity, such as the CMS HGCAL, our granularity may not match it. However, in the context of crystal calorimeters, particularly homogeneous crystal calorimeters, our design can be considered to have high granularity.

To avoid misleading, I changed it to “to achieve spatial positioning while …”, which just describe the function of orthogonal bars.

- [Figure 1.]

  "(a)Structure..."

  --> "(a) Structure..."

"(b)Energy deposition..."

--> "(b) Energy deposition..."

There is no description about Figure 1 (b). Since the energy deposition for 240-360 GeV was explained in the sentence, why don't you show the energy deposition for "360 GeV" (or 240 GeV) electron events as Figure 1 (b) ?

Apologies for the unclear description. The maximum energy deposition in a single bar should come from 180 GeV Bhabha electrons, where the center-of-mass energy is 360 GeV. To obtain the maximum energy in a single bar, I used 180 GeV single electrons scanning the ECAL, which resulted in Figure 1(b). I revised the description about this part.

- [Table 1.]

Three SiPMs were tested, but one SiPM has the larger active area than others. Was there any reason why you did not choose HAMAMATSU S13360-3025PE instead of HAMAMATSU S13360-6025PE ?

For the CEPC crystal calorimeter, SiPMs with 25 μm pixels would experience significant saturation. The S13360-6025PE was selected to broaden the testing scope. And S13360-6025PE has more pixels than the S13360-3025PE, offering a larger dynamic range. In some sense, this makes its response curve more challenging to measure.

- [2.2 Calibration]

"For our experiments, the laboratory temperature was..."
--> I think that a large signal causes a temperature rise in the SiPM, but how can you say that temperature dependence is removed from the SiPM ? For instance, did you test a SiPM using the very low frequency LASER beam (= enough intervals between beams)?

Sorry, there was no direct temperature control on SiPM in the experiment. We only relied on the air conditioning in the room to regulate the ambient temperature. The laser pulse repetition rate in the experiment was 1 kHz. As you said, SiPMs may experience temperature rise under large signals, we have not yet tested this effect. I have added content in the article to emphasize this point: “It should be noted that SiPMs may experience a temperature rise under large signals, but in our experiment, no separate cooling was applied to the SiPMs.”

- "600V"
  --> "600 V"

"500 V"
--> "500 V"

"600V and 500V bias voltages. which"
--> 600 V and 500 V bias voltages, which

Thanks for pointing that out.

- "However, the PMT’s gain being too low at 600V to detect single photon signals."
  --> "However, the PMT’s gain was too low at 600V to detect single photon signals." ?
  --> Was the gain too high, not too low ?

  Thank you for pointing that out. It should be “was”, not being.

At a bias voltage of 600V, the PMT's gain is too low to distinguish single photoelectrons. The PMT we used (HAMAMATSU R7725) typically operates at a bias voltage close to 2000V. However, to maintain a linear response over a wider range of light intensities, we reduced the bias voltage to between 500V and 600V.

- "As a result, in Figure 3(b), the laser, split by a beam splitter, simultaneously illuminates both the SiPM and PMT"
  --> "As a result, Figure 3(b) shows the responses of SiPM and PMT with the splitted laser beam." ?

  Thanks for your polishing.

- "As light intensity increases, the PMT’s output continues to progress linearly,"
  --> From Figure 3 (b), it seems to be difficult to say "linearly".
  --> "As light intensity increases, the PMT’s output continues to get larger," ?

  Sorry for the bad description. In Figure 3(b), to display the response characteristics of both the PMT and SiPM, the y-axis is set to a logarithmic scale, which is difficult to clearly observe the linear increase of the PMT response. Nevertheless, from the results in Figure 3(a), without the photoelectron count scaling, the PMT's linear response is evident.

  I added a linear function to fit the PMT response in Figure 3(b) to verify its linearity.

- [Figure 3.]

  "(a)PMT..."
--> "(a) PMT..."

  "(b)Response..."
--> "(b) Response..."

  Thank you for pointing that out.

- [2.3 SiPM Response]

"This behavior is attributed to the pulse width of..."

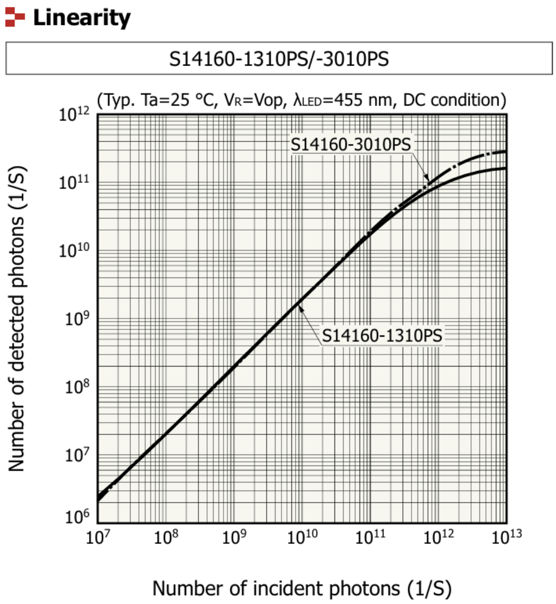
--> It was not clear why a short pulse width was the reason for a saturation point. Could you explain clearly ?

Sorry for the unclear description. This paragraph was polished, and more explanation was added.

- "For the two HAMAMATSU SiPMs with pixel counts of 57,600 and 89,984, nonlinearity effects start to appear at approximately 7% to 10% of the total pixel count."
  --> Was it reasonable with the datasheet by Hamamatsu ?

Only the datasheet of HAMAMATSU S14160-3010PS provides such kind of property. They used LED as light source, not Laser. And there is not too much description about this experiment. But I think it can be regarded as a simple validation. You can see it as below:

Only the datasheet of the HAMAMATSU S14160-3010PS provides this type of data. They used an LED as the light source, not a laser, and there is limited information available about the details of the experiment. But I think it can be considered a simple validation. The results are shown below:



MPPC (multi-pixel photon counter) S14160-1310PS/-3010PS/-6010PS etc.

The saturation value of S14160-3010PS is approximately 3e+11. At around 2e+11, the response starts to be non-linear. So I believe our measurements is reasonable.

- "For the SiPM with 244,719 pixels from NDL, the measured result does not meet expectations."
  --> SiPMs by Hamamatsu seem to have a different photon detection peak wavelength from the SiPM by NDL, and the peak wavelength of your picosec laser seems to be close to that of the SiPM by NDL. Is there any possibility of the wavelength effects on your calibration process ?

  Thank you for your comment. In Figure.4, the y-axis represents the actual number of photoelectrons detected by the SiPM. While the photon detection efficiency (PDE) of different SiPMs varies, we can always increase the light intensity to saturate the SiPM, and the saturation value should approach the total number of pixels. However, in Figure 4(c), as the x-axis values increase, indicating increasing light intensity, the SiPM's saturation value is only about half of its total pixel count. This suggests that the wavelength of the light may not be the primary cause of this phenomenon. We suspect it may be related to the SiPM manufacturing process, such as only about half of the pixels functioning properly.

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