

Performance of a full-scale upstream MAPS-based verification device for radiotherapy

Reviewer comments

I was asked to review the manuscript “Performance of a full-scale upstream MAPS-based verification device for radiotherapy”. It describes a Si imager for machine quality assurance in radiation therapy. Generally, the quality of the development and the tests are good enough to justify a publication. However, I identified the following major shortcomings:

1) The paper is too long. The only novelty concerns the extension of previous studies to a 2x2 stitched large-area imager. This can be reported if the manuscript is shortened by a factor of 2. This especially concerns the number of figures. I don’t think that 26 figures are necessary to convey the main message.

2) Parts of the manuscript are not original. Figures 1-2 are the same as in Ref. 4. Similarly, the authors recite on several occasions the achievements of previous studies –even in the abstract.

Detailed comments:

- L. 8: Much more is necessary to infer on the dose distribution in the patient. The sensor cannot measure the photon energy and good dose engines are necessary.
- I think the language is a mixture of B.E. (e.g. “ionising”) and A.E. (“minimize”).
- L. 33: I think the argument regarding the advantages of the upstream mounting is not correct. The upstream position only checks the machine, while an EPID allows to verify the interaction of the field with the patient. I think these options can only be compared on the level of a risk analysis (which is missing here).
- L. 42: radiation hardness is mentioned as requirement. However, neither the reference nor the current study deal with radiation hardness.
- Fig. 1: it should be clearer indicated where the “sensing cell” and the “active layer” are located.
- L. 67: The authors tend to cite themselves. I think the claim of a pioneering work for RT verification requires a paper about the successful clinical use. Technical papers and patents are not sufficient.
- L. 92: There was no MU definition provided. I think the dose rate is a better quantity.
- L. 118/333: please explain “PCB”/”FFF”

- Fig. 3: I think the sensor and the foam have to be indicated on the photo. The vertical U-shaped structure needs an explanation in the caption.
- L. 133, 'FFF' should be explained
- Fig. 4.: I think the (possible) angle should be indicated which is discussed in the text.
- L. 154: please avoid "usual way", "data are"?
- L. 160: What "variations" do you refer to?
- L. 169: "The angle is ..."
- L. 171: please indicate "trapezoidal" in Fig. 4 and discuss the consequences if they are relevant.
- L. 219: I wonder about the relation of Eq. 1 to the auto-correlation. I think Eq. 1 is neither auto nor correlation. It's more RMSE/chi-square.
- L. 254: why was a new experiment necessary? In a 2x2 configuration there are always gaps in parallel/orthogonal to the leaves.
- L. 268: 'range' with respect to?
- L. 278: please explain how the '+-9 um' are derived.
- L. 292: "Here, it was shown ..." I think this was not the contents of the paper at all.