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Reviewer(s)' Comments to Author (if there no comments below, please check the attachments):
Referee: 1

Comments to the Author
Comments on EPJ-17-05-77

General comments:
This is a thorough study of a luminometer in the test beam at CERN. The measurements examine the longitudinal and transverse shower profiles. The measurements are reproduced by detailed shower simulations which take into account the geometry of the sensors.

While the paper should be published one is missing a concluding statement on the suitability of the device (or rather the technical approach) for applications for e.g. the ILC. Such a statement should be added.

Some confusion arises in the discussion of the Moliere radius. The abstract, in particular, makes a statement on a discrepancy which probably is none. It could be interpreted as casting doubt on the basic formalism for the transverse shower shape. I do not think that this is intended. Rather, the geometry of the setup requires the application of a slightly different formula than Eq.4, in which the extra contribution from the air gaps is included. It would be nice if this discussion and the numerical comparison could be added to the discussion at the end of the text.

There are a few other comments as added in the following.

Abstract
p2 line 11
"This value is significantly large than the one obtain from the formula based on the material composition." What does this mean in detail? Any conclusions? See also statement at the bottom.

p3 line 9
Why does a high rate require low-power electronics ? Please explain in the text.

p5 line 30
Jargon: L1 and R1 are introduced before being defined. Define segmentation in radial and azimuth. Pads are connected. How? Electrically?

p5 line 47
20 MS/s what is this unit? 20M /s

p7 line 21
as it takes place in the target detector -> as expected for the setup in ILC detectors

p9 line 18
"and only a small fraction of multiple track events is acceptable" What is the reason? Rate limitations in the chip or imposed requirements? Please clarify in text.

p10 line 45
Since particles arrive stochastically an asynchronous mode was used? What is meant by this sentence? Figure 9 suggests a triggered readout, i.e. synchronous with the beam particles.

p12 Figure 11
The different colours should be explained in the caption. Is the signal expected in two samples as suggested from the figure? What is the dip at 400 in the left figure? How can this be derived from a CR-RC filter?

p12 line 39
There seems to be a contradiction: the simplest method is of the highest complexity. Also: probably rather fitting of a theoretical pulse-shape or of an expected pulse shape or similar rather than theoretical fitting.

p12 line 49
There is an unresolved reference in [7,?]

p14 Figure 14
What is the spike at 300 counts?

p15 Figure 16
First, second and third "configuration" should be associated to the geometrical arrangement such as sampling the front middle and rear part of the shower. The figure caption should explain the various colours.

Do you expect a variation of the SNR for the various configurations? Why is S2 significantly worse in R-feedback? I believe this warrants a comment.

p15, line 35
It would be helpful to see indicated whether there is any additional physics implemented in the LUCAS package beyond that of Geant4.

p16, line 39
What is meant by "appropriately adjusted"? How do the shapes compare between the doubly sampled layers. Fig 19 just indicates the means.

p20 Figure 22
Why is the distribution not centred at zero? Please comment in text.

p20 line 47
It is important for the LumiCal operation to achieve the transverse size of the electromagnetic shower as small as possible. -> Maybe:
It is important for the LumiCal operation to achieve the smallest possible transverse size of the electromagnetic shower.

p20 line 47
Why do you wish to confine the transverse size (as small as possible)? Please give a word of explanation.

p21 Figure 23
Is this more than simple geometry from a divergent shower? Or in more general terms should one not restrict the application of eq (4) to thin slabs of material?

p 23 Figure 24a
The figure seems to indicate an extra contribution at small energies and the peak is considerably shifted by some 10 MIPs. What is the origin? Doesn't this translate into a >10% uncertainty in contrast to the 5% claimed in the text?

p23 Eq 9
After the equation you may consider inserting a text such as "and integrating over the horizontal position X" the vertical energy distribution G_E(Y) is"

p23 Eq 10
The equation is easier to read by replacing (\sqrt{(X^2+Y^2)})^2 by (X^2+Y^2)

p24 line 16
"For the numerical integration, the normalization integral in denominator of equation (7) must be limited by some finite number." The denominator is physically finite by definition so no action should be needed for a reasonable ansatz/parameters. The statement is technical and simply refers to the integration procedure. By the way, what is this number? Rephrase.

p26 line 39 cc
"The value for the Moliere radius obtained in the measurement is larger due to the large space between the layers creating big air gaps. This supports the necessity of thin sensor layers tightly connected to the absorber plates with minimal air gaps."
I am not sure that I understand this statement. Do you refer to the somewhat trivial statement that the effective Moliere radius of an object composed of multiple thin material layers separated by gaps needs to include the divergence resulting from the air gap? Please compare the value from that calculation with the one extracted from the detailed simulation and discuss.

p27 line 4
Somehow one is missing a concluding statement on the suitability of the luminometer of this kind for application on the ILC and elsewhere.