*Dear Editor,*

*We would like to thank the referees for reviewing our paper and producing detailed comments and suggestions.*

*We have considered all comments, and we have applied changes to the original version of the paper to address the issues raised. Detailed responses to all the comments can be found below. For ease of review, the original question is written in black font, the author response is written in blue font, and any modification to the paper draft is written in bolded green font.*

*We are at your disposal for any further clarifications and/or additional information.*

*Sincerely,*

*Cristian, Artur, Si et. al*

Reviewer #1: This paper reports on the timing resolution of simulated events of a 50 micron LGAD sensor. The simulation is called Weightfield 2, from U. Santa Cruz and INFN. The authors (from Fermilab and CalTech) have done an admirable job of using this simulation to determine the time resolution under varying degrees of detector and electronics performance. As they say in their abstract:

The simulation includes modeling of signal fluctuations in the LGAD sensor, variations of the analog bandwidth and signal-to-noise ratio (SNR) of the front-end electronics, time bin quantization, and radiation damage of the LGAD sensors. Two approaches to measure the timestamp are considered: leading edge and constant fraction. Simulated LGAD pulses before irradiation, and after irradiation with neutron fluences of 5\_1014 n/cm2 and 1\_1015 n/cm2, are studied.

The timing resolutions they obtained in this wide-ranging program seem reasonable (~30-50 picoseconds) and will likely be useful in developing the next round of detectors that need to deal with the difficult task of pile-up at LHC.

Reviewer #2: This paper presents a nice study of the expected timing precision expected for low-gain avalanche detectors as a function of parameters describing the readout electronics, the signal-to-noise ratio, and the level of irradiation. The irradiation level chosen is ~what is expected for a timing detector aimed at the CMS upgrade so it is directly relevant to future applications. The shaping times chosen and signal-to-noise ratios are in the range of what has been achieved so can provide guidance for a realistic scenario.

A minor correction: line 40 has as units ps, should be nsec.

This is correct, we have modified the text as suggested.

**“shaping times: 0.5, 1.0, 2.0, and 4.0 ns”**

The electronics impulse response (equation (2)) has been chosen to be a response characterized by one time constant and is particularly simple. It, however, doesn't correspond to the circuits typically chosen. I believe this doesn't matter for the leading part of the signal as long as the rise time for the convolution with the signal corresponds to the rise time of the realistic circuit but the back end of the signal(needed for the time walk correction) varies quite a bit depending on the circuit implementation. This may change the numbers in the table, but probably by only a small amount.

Also the shaping time and signal-to-noise ratio are probably correlated for a realistic circuit so the conclusions from the entries in the table, in so far as it provides guidance for the circuit choice may not be as crisp as it appears. I would not suggest any major changes to the paper, but the authors may wish to address some of these issues.

The authors agree with this comment. We realized the same fact and that’s why we decided to concentrate on general parameters rather than in different circuit implementations. Since the final optimization solution for a detector – including the circuit implementation, power consumption etc -- will depend on the on the particular application being considered. Since the general behavior will be maintained we consider the circuit implementation and possible correlations among the parameter studies here outside the scope of this article.

We add the following sentences in order to address the comment (right at the end of line 94):

**“… We choose a relatively simple impulse response**

**function in order to study the general behavior of the time resolution,**

**while detailed studies of more realistic circuit implementations and correlated effects are left for future studies.”**