

3D-TIMING

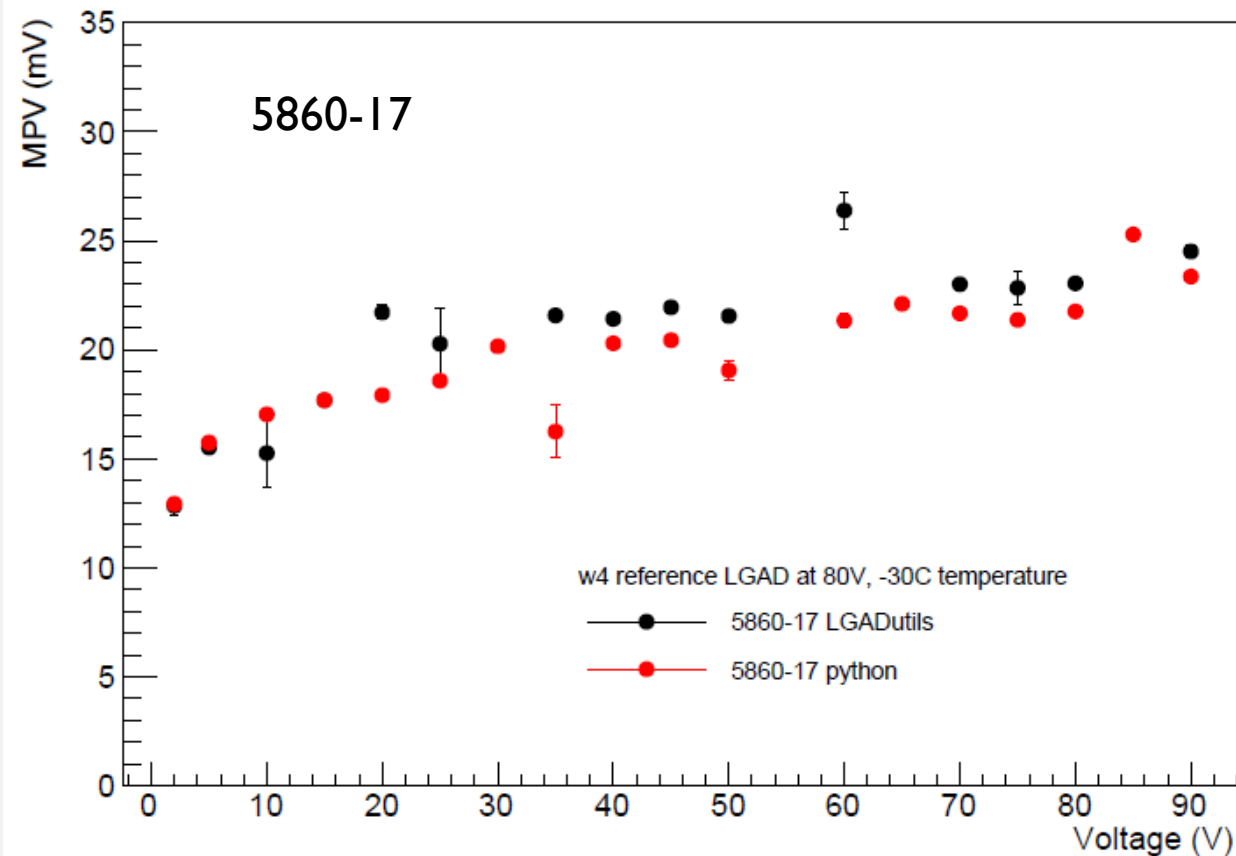
OVERVIEW

- **1st part:** Software comparison
- **2nd part:** Results from irradiated sensor

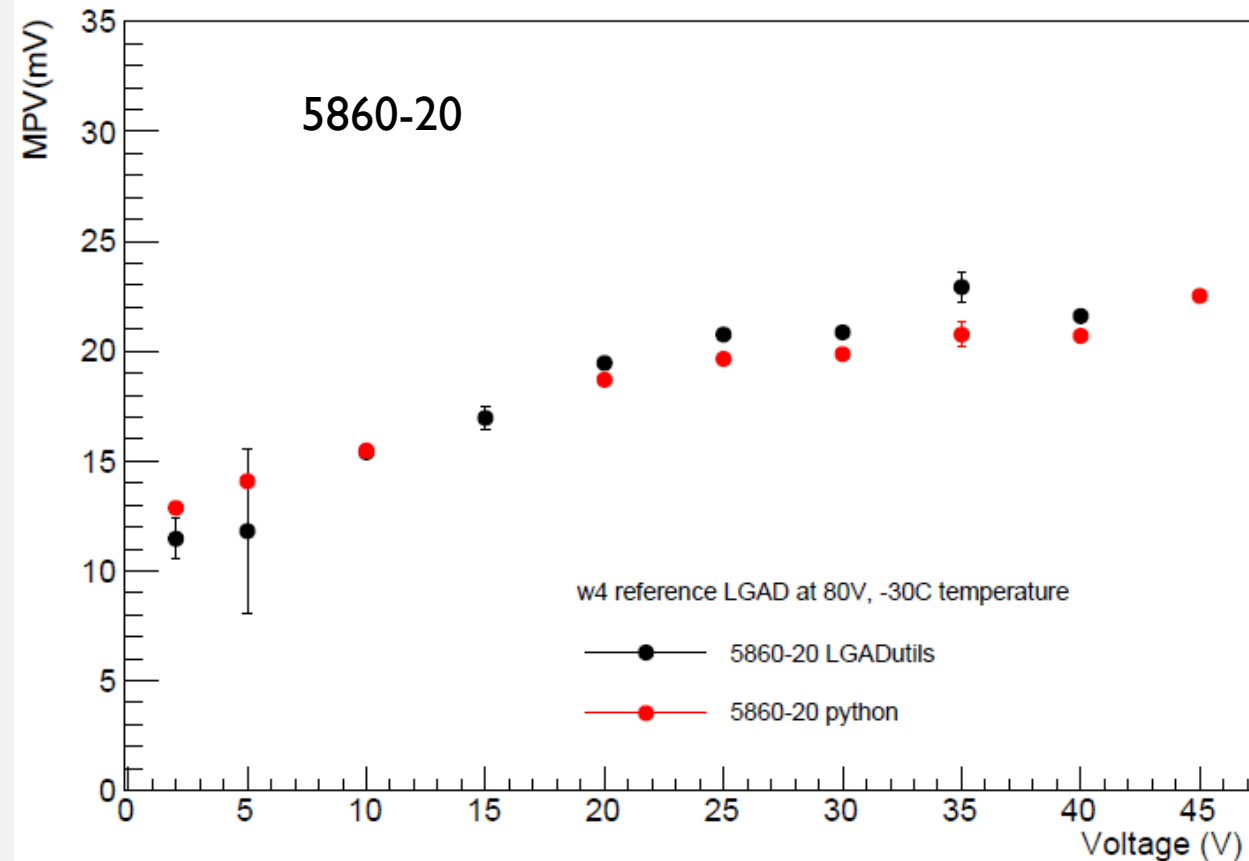
COMPARISON BETWEEN DIFFERENT ANALYSIS SOFTWARE

- Starting from 2, same-structure (single pixel) 3D, unirradiated devices
- We can first have a look at the amplitude's MPV, which is a critical value of our studies (indicates threshold etc.)

Amplitude's MPV (3Ds)

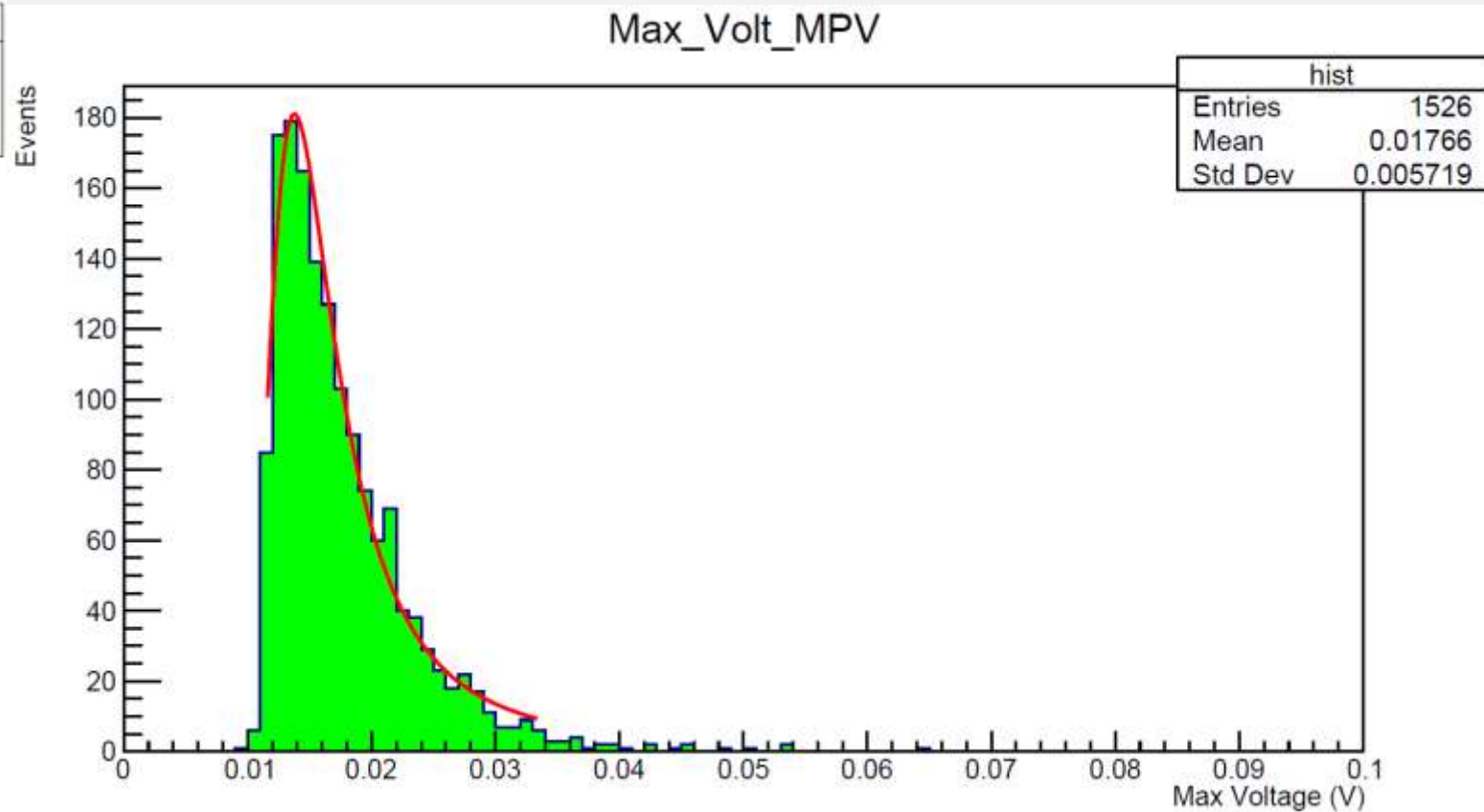
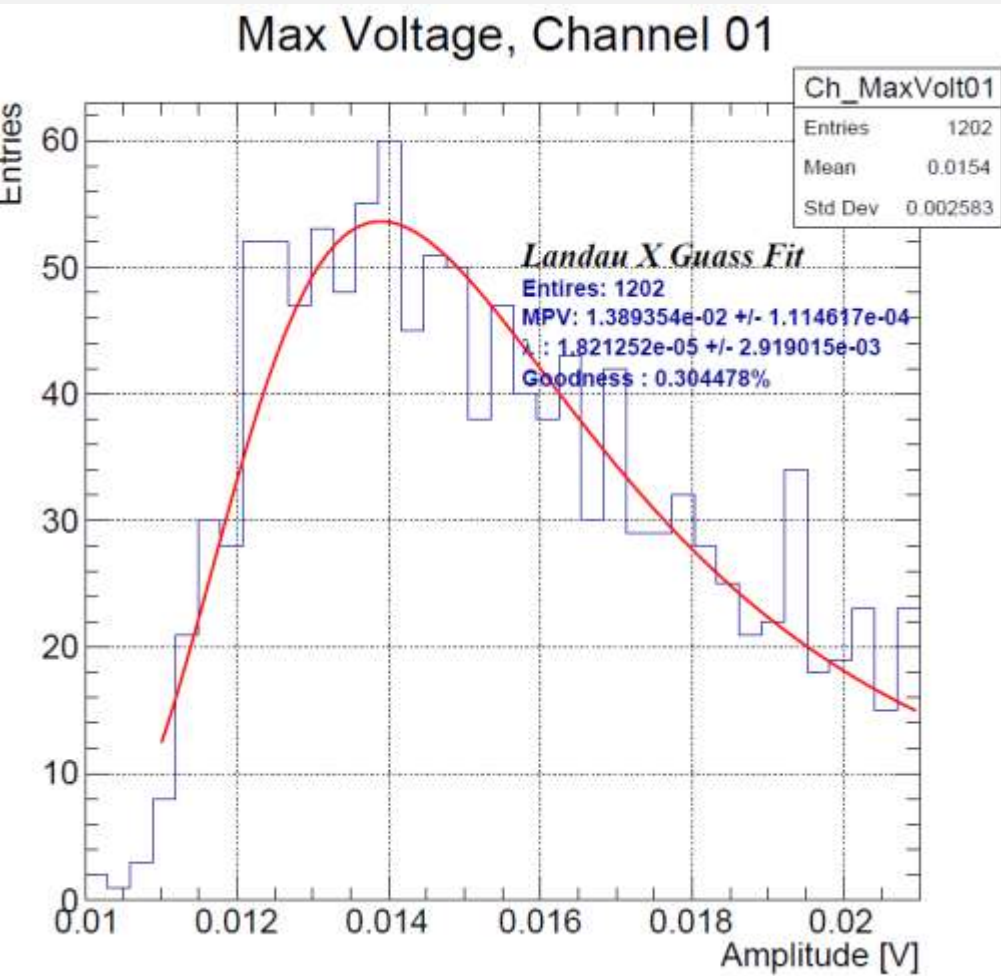


Amplitude's MPV (3Ds)



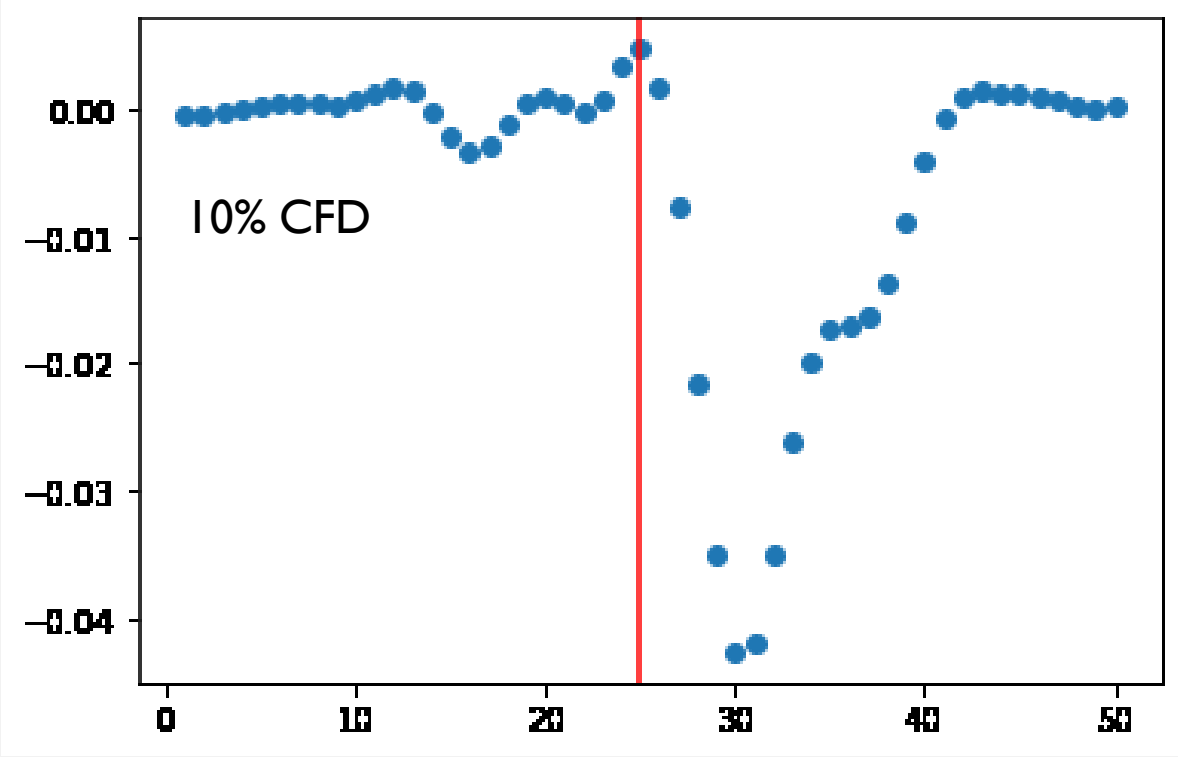
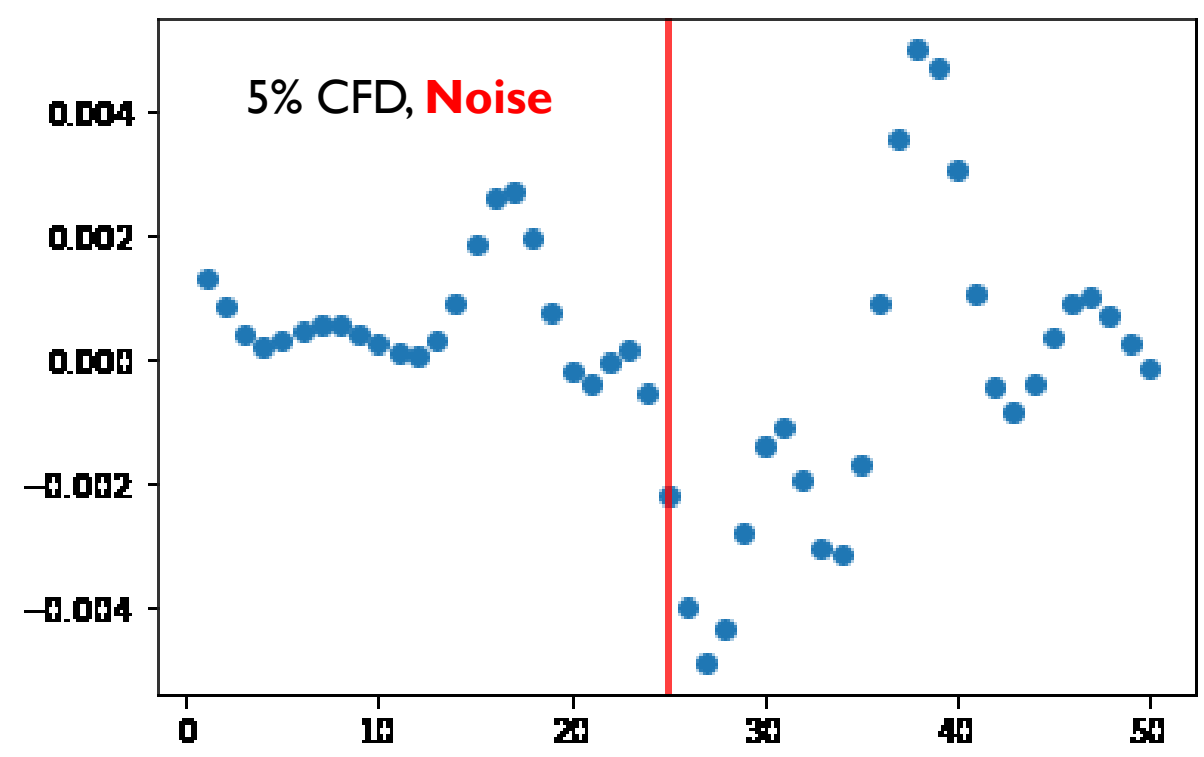
WHICH ONE TO CHOOSE-TRUST?

- The control on the histograms and the fits is much higher using the python version
- The following MPV plots (-30C, 20V) are confirming that



TIME RESOLUTION

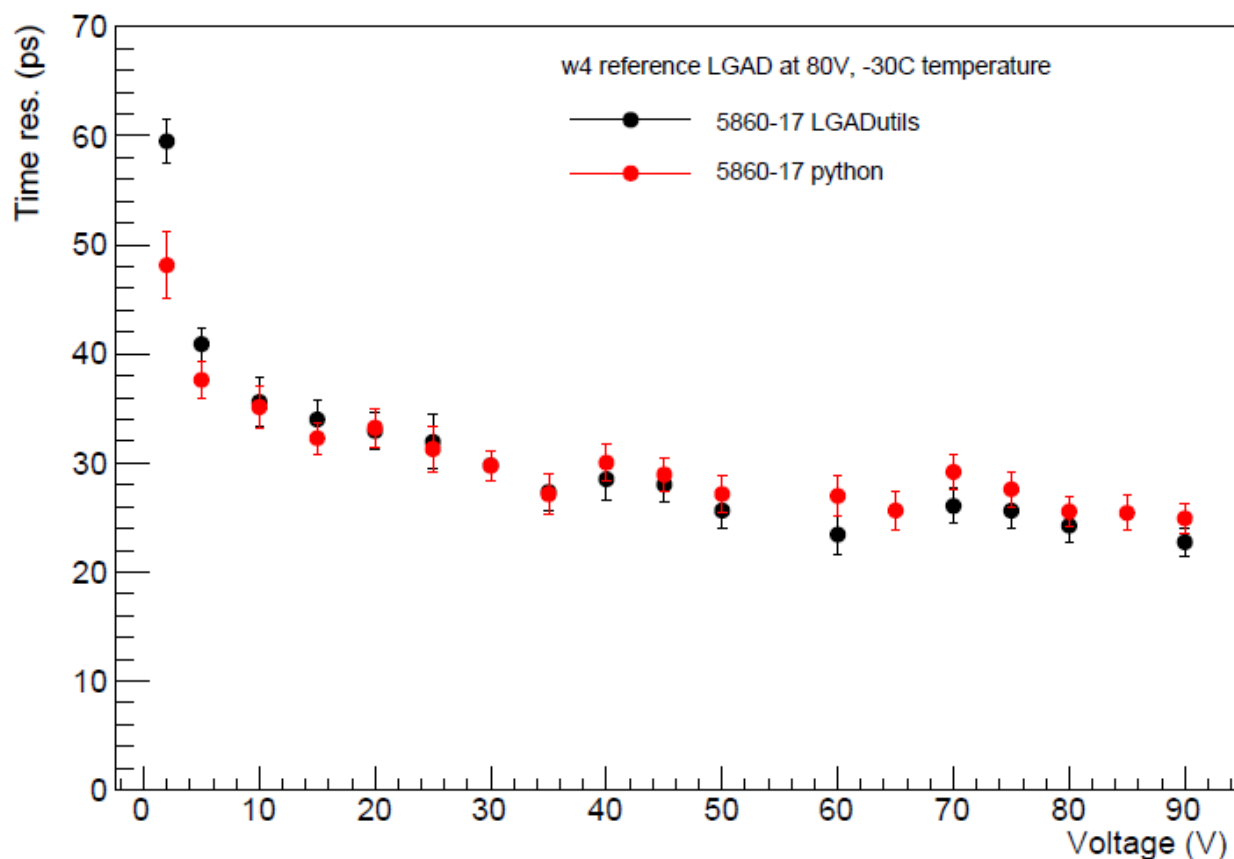
- The selection of the proper combination 15%-30%, between the CFDs (ref. LGAD-3D) was obtained using the info that the following plots are providing
- We keep the exact same combination in all of our time resolution results (instead of selecting the combination with the minimum value) in order to provide a solid comparison



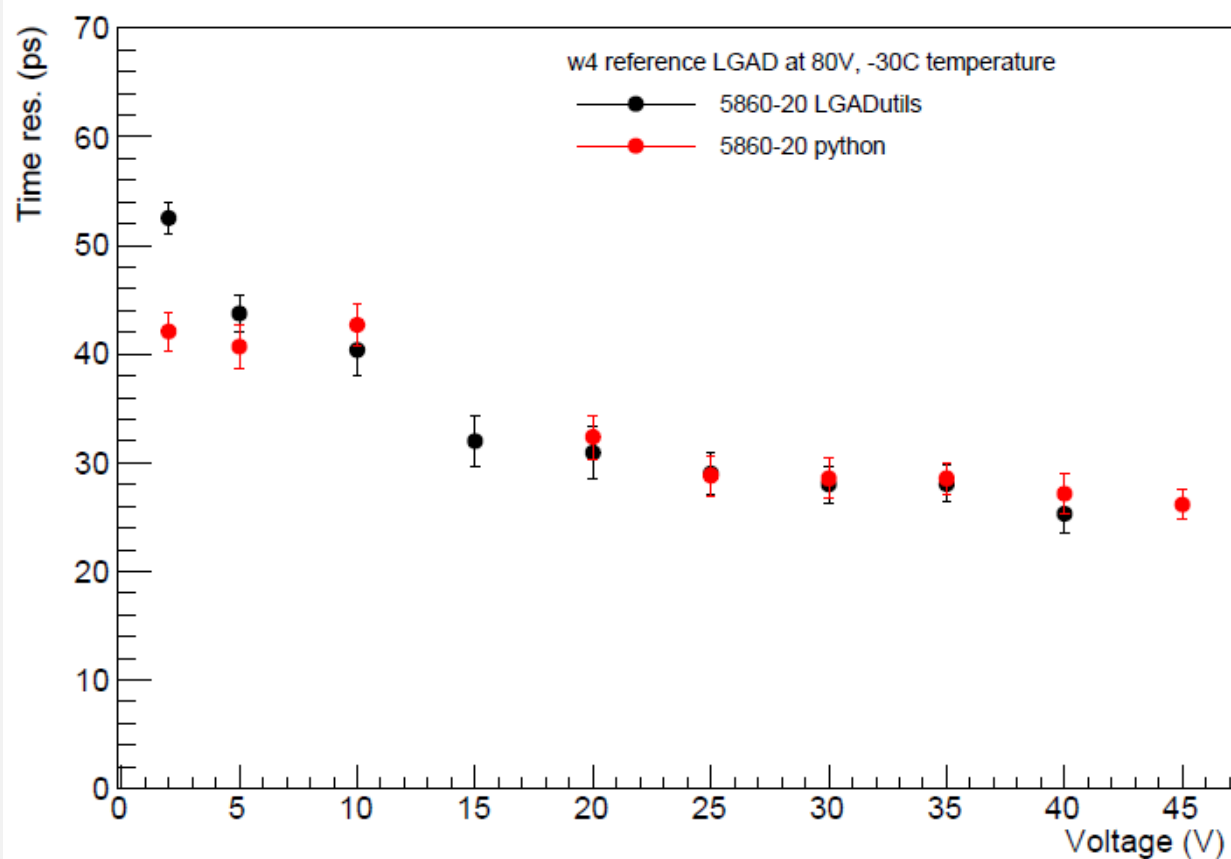
SOFTWARE COMPARISON ON TIME RESOLUTION

- The following plots present the time resolution vs bias voltage of our two 3D sensors
- As we did with the MPVs, we compare the results coming from the two software, for each sensor separately
- There is an obvious agreement between the two methods
- It is also needed to be clear that the calculation process to obtain the time res. is independent of the previous, failed histos and fits
- For that reason we were expecting the time resolution results to be identical in both frameworks (since both are following the same calculation concept)

Time resolution 5860-17 (3Ds)



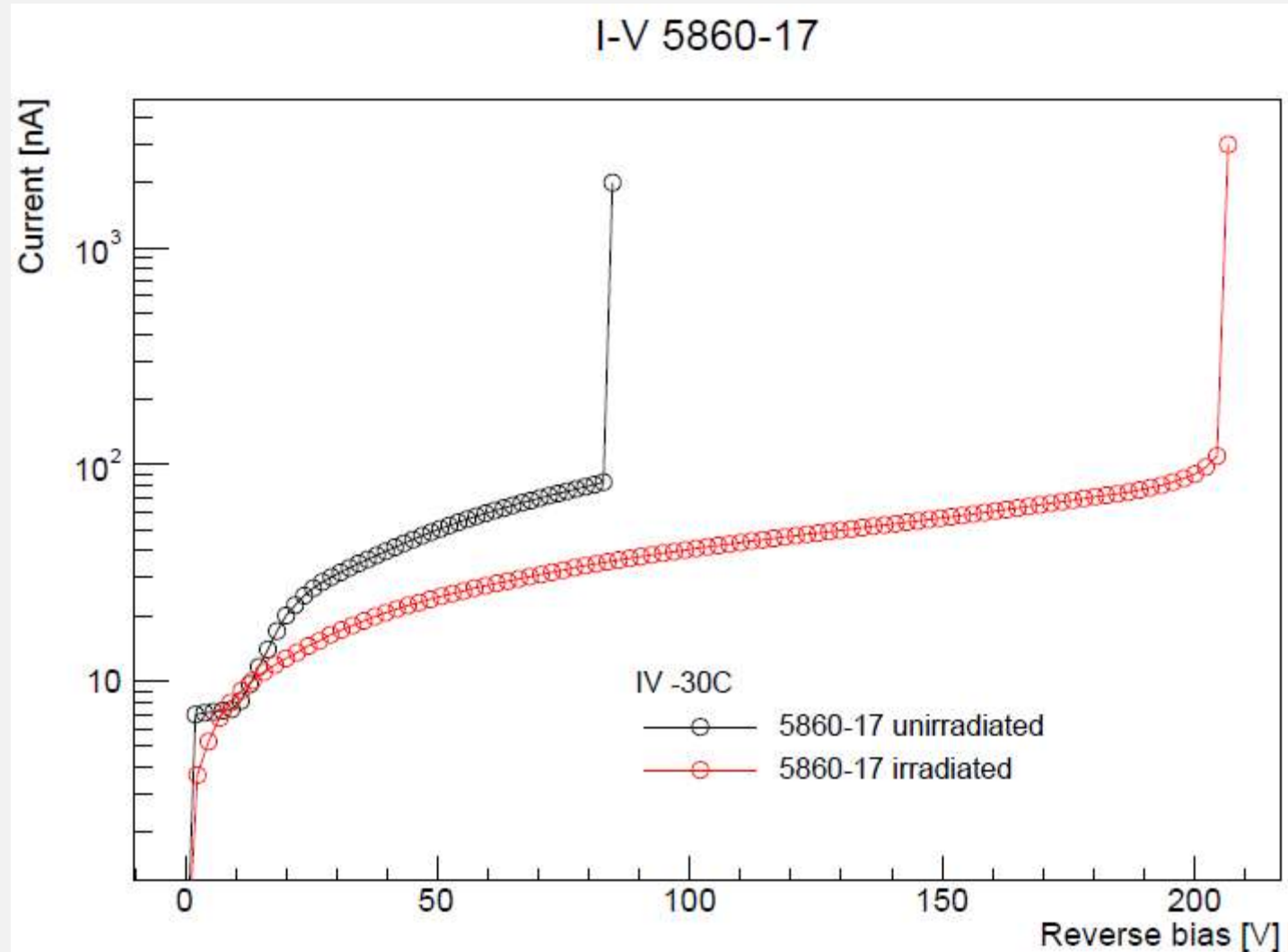
Time resolution 5860-20 (3Ds)



IRRADIATED SAMPLE

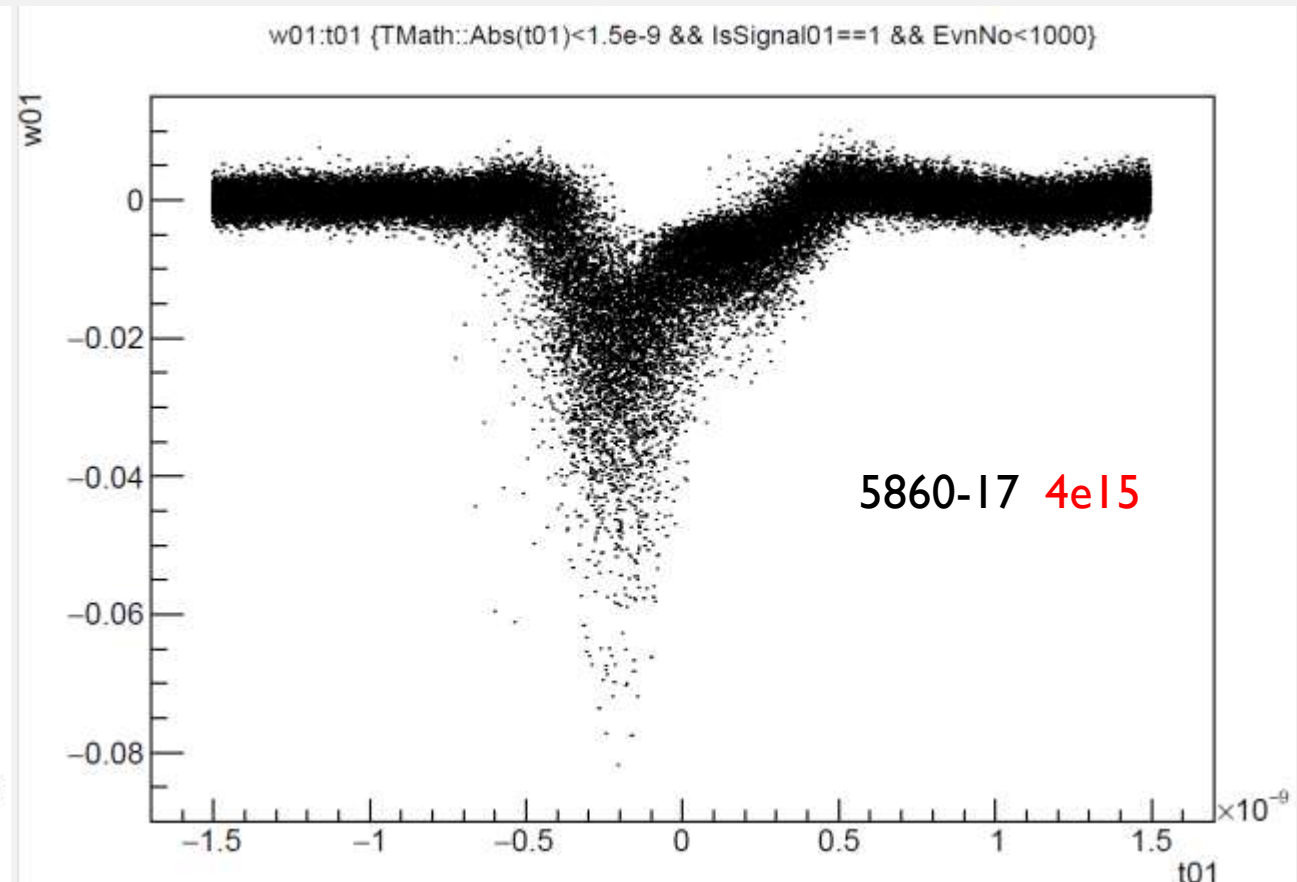
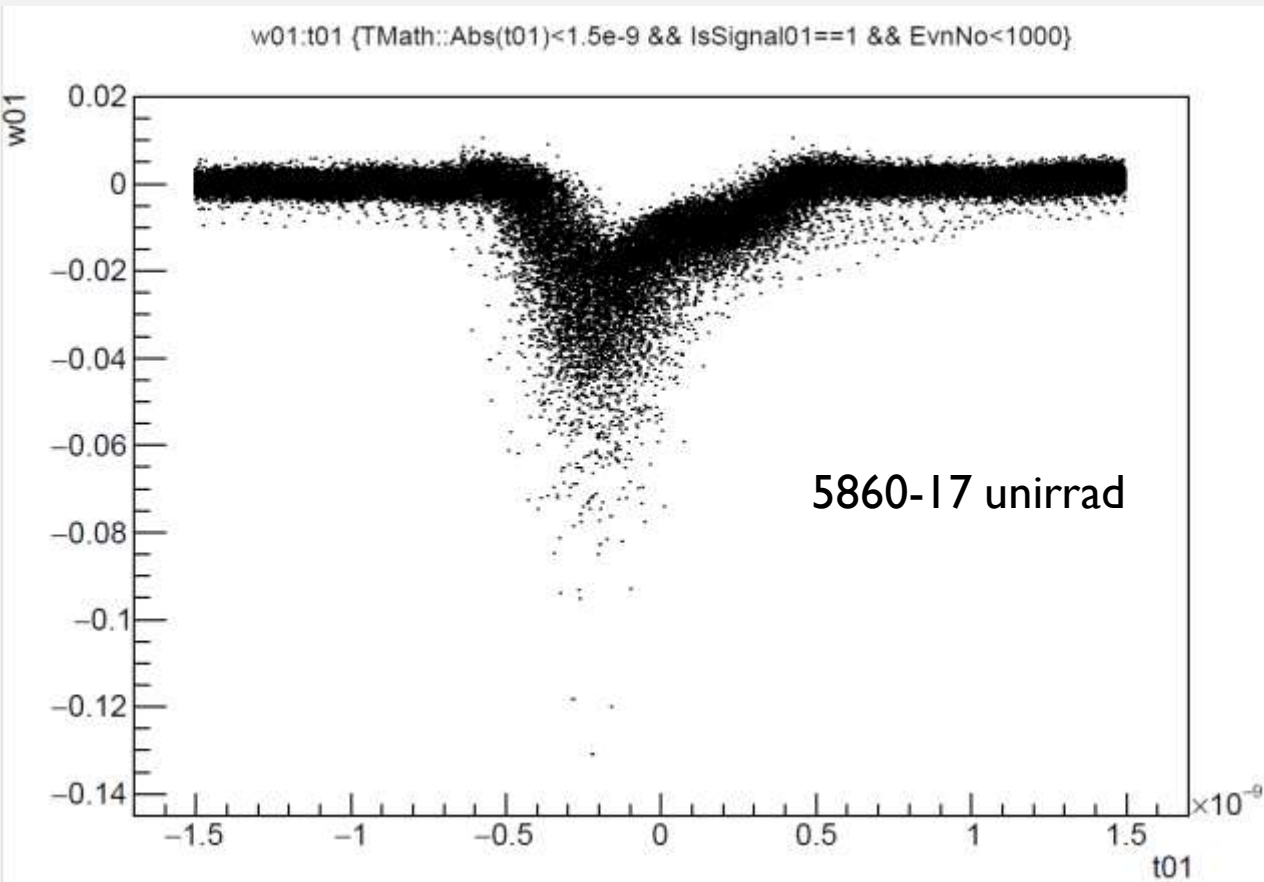
We finally irradiated the 5860-17 3D single pixel sensor, at the fluence of $4e15$, $1MeV n_{eq}/cm^2$

The following IVs are taken having the sensor mounted on the single channel board, at $-30C$



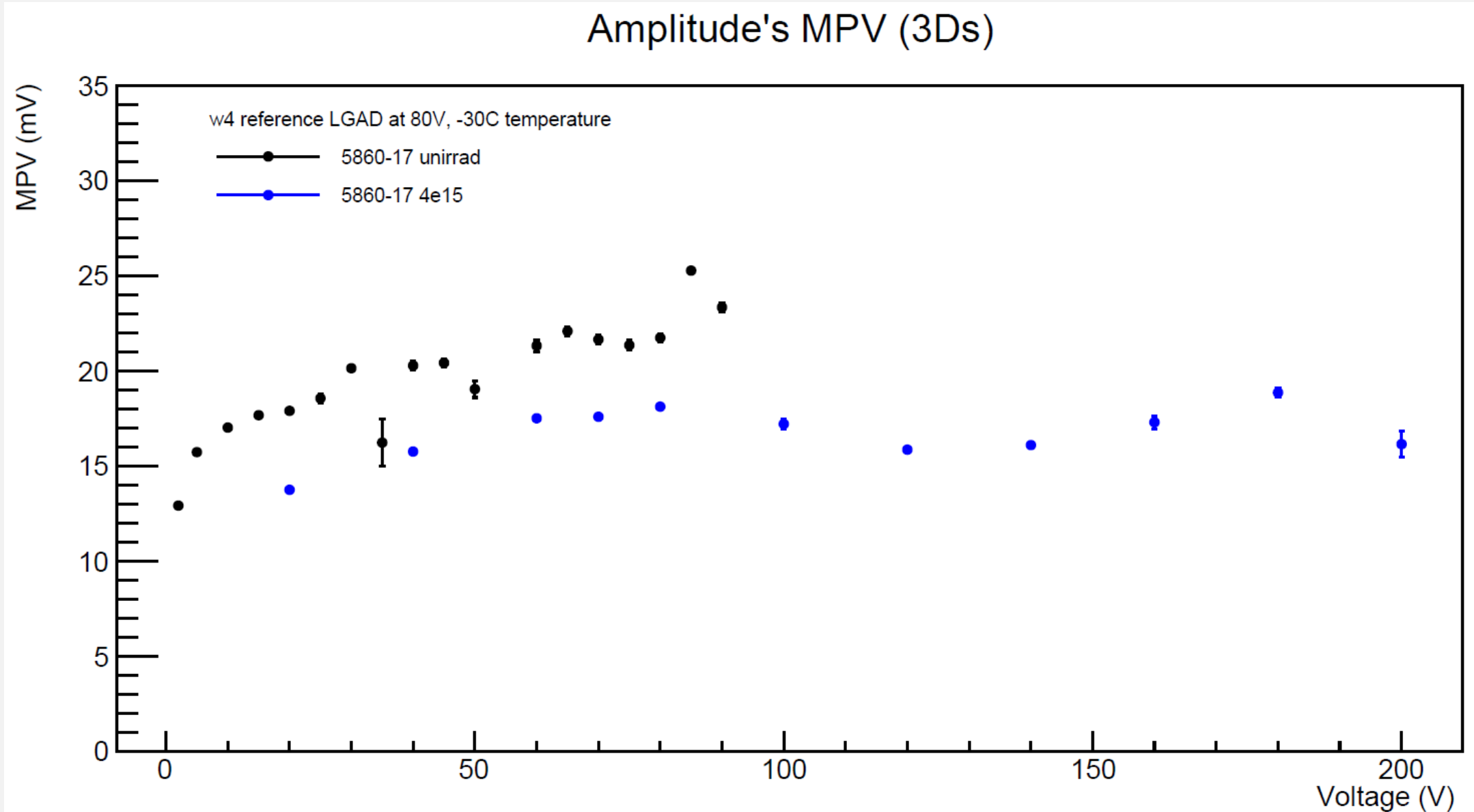
PULSES

From a quick view, the only noticeable difference between the pulses, is the amplitude which is higher for the unirradiated sensor as expected



AMPL. MPV

- As expected from the pulse shape, the signal's amplitude has decreased in the irradiated sensor



TIME RESOLUTION

- As it seems, the time resolution of the detector hasn't changed. Not sure if that result agrees with our expectations
- Going lower than 20V, made the rate of the collecting events very low and inefficient

