

PMT Simulation Status update

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Overview

Code updates (Digitization-PMT)

- Fixed a bug in the electrons arrival times
- Improved the code readability
 - Standardization of the variables

Known problems

- Photon propagation duration time
 - Temporarily solved using propagation equation or map
- Simulated signal shape
 - Single photoelectron characterization
 - Longitudinal diffusion parameters

Known problems

Simulated signal

Dispersions to be considered in signal generation:

Electron
multiplication
process

Photon
Time Arrival

Transit Time
Spread

GEM
Time response

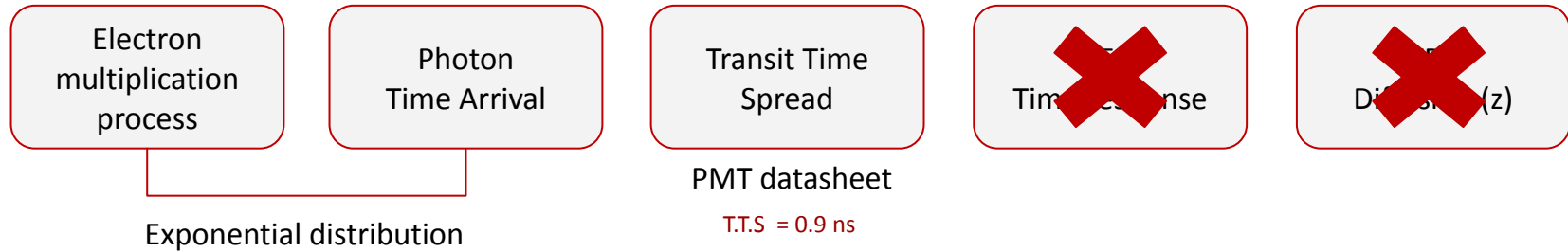
TPC
Diffusion (z)

Known problems

Simulated signal

Results from my previously analysis:

LED database analysis

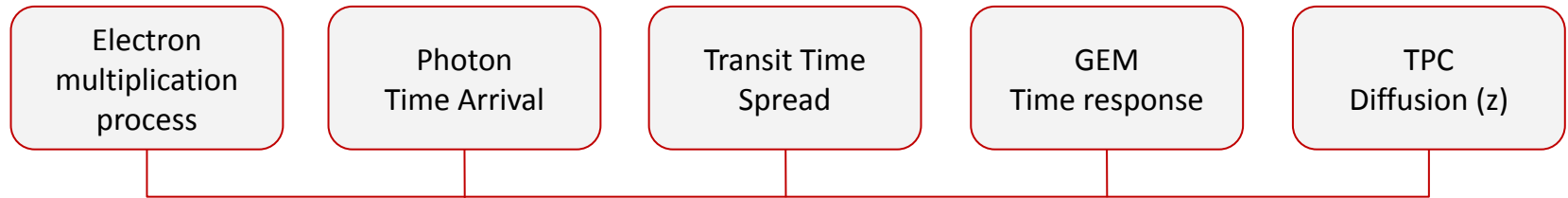


Known problems

Simulated signal

Results from my previously analysis:

Fe55 database analysis



Exponentially modified gaussian distribution

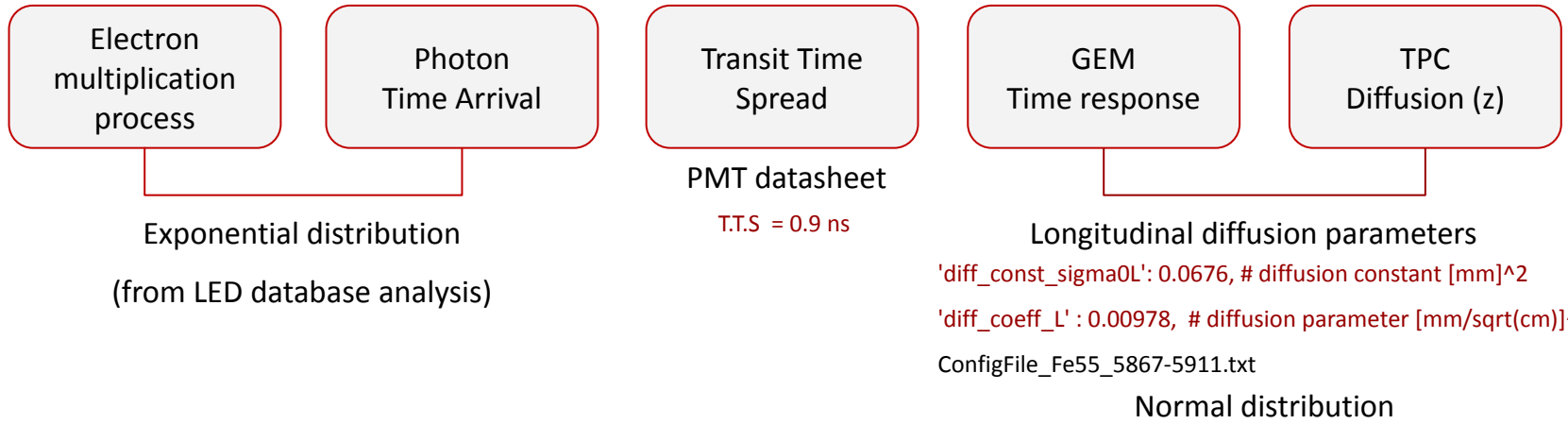
Before Digitization-PMT code integration!!

Known problems

Simulated signal

After Digitization-PMT code integration

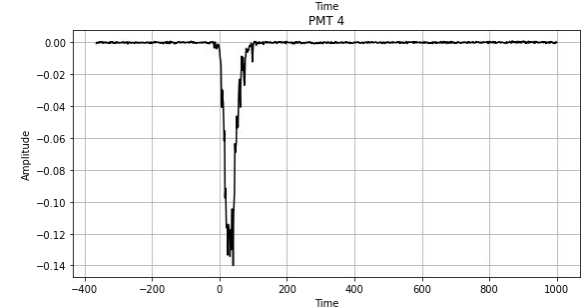
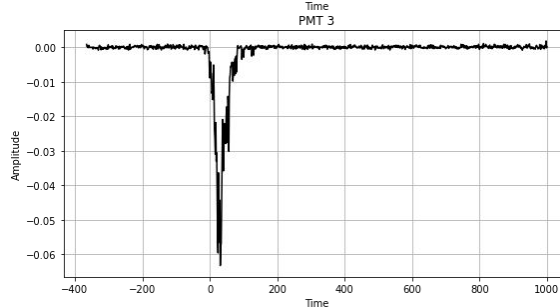
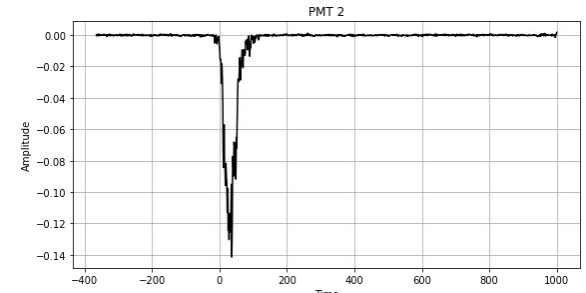
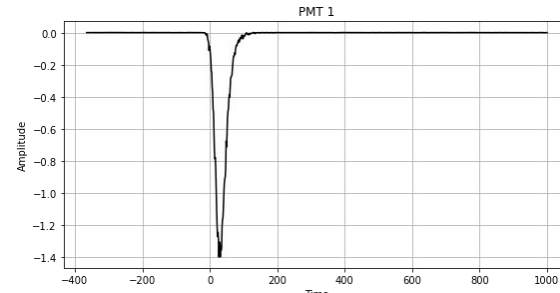
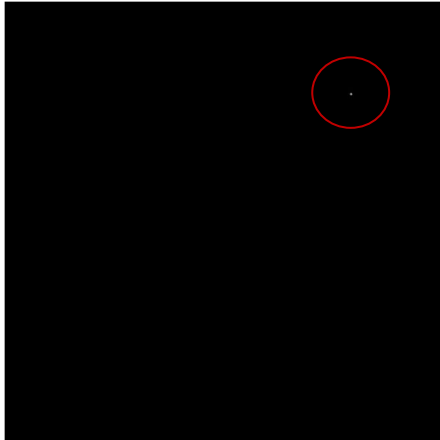
Current situation



Known problems

Simulated signal

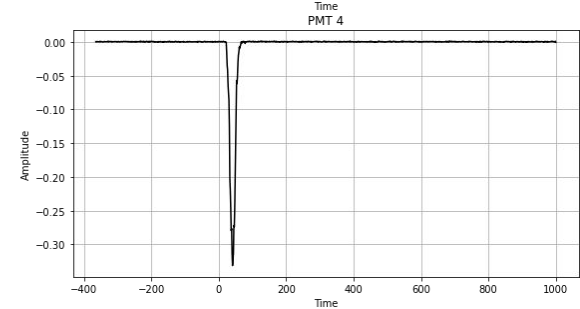
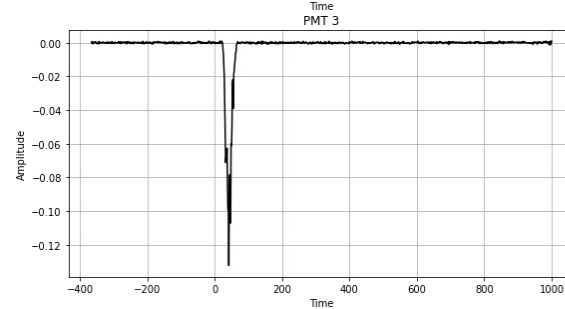
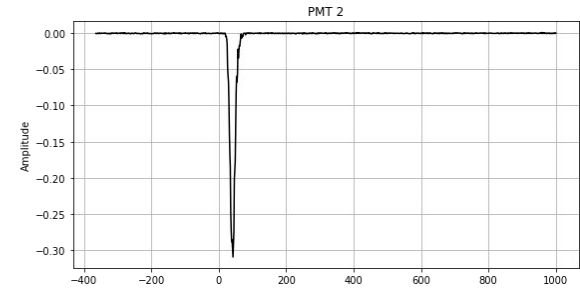
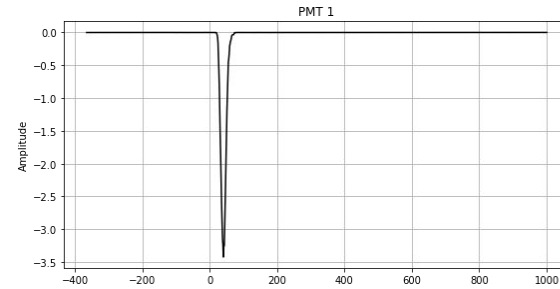
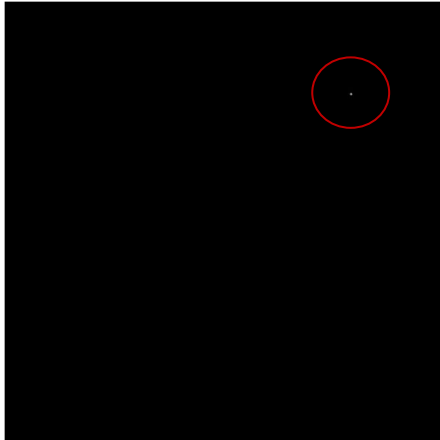
Simulation example 1: **before Digitization-PMT integration** (non-centered 6 keV spot)



Known problems

Simulated signal

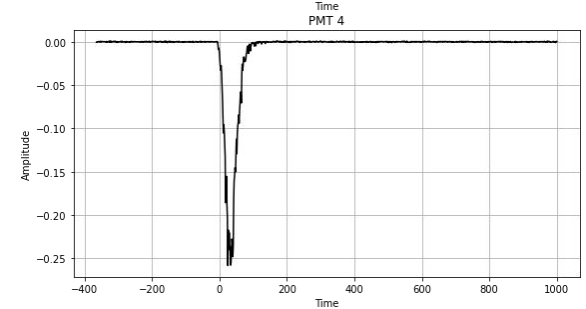
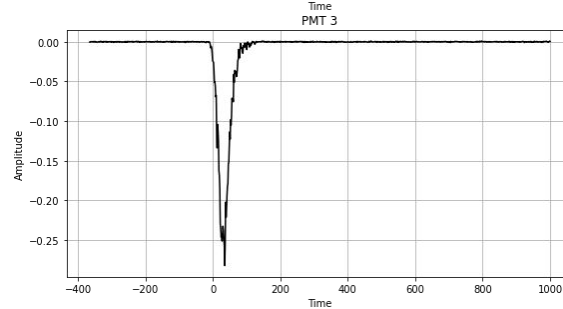
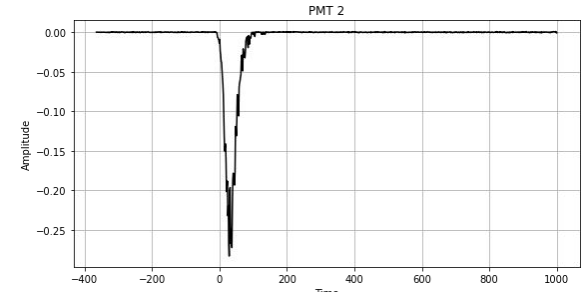
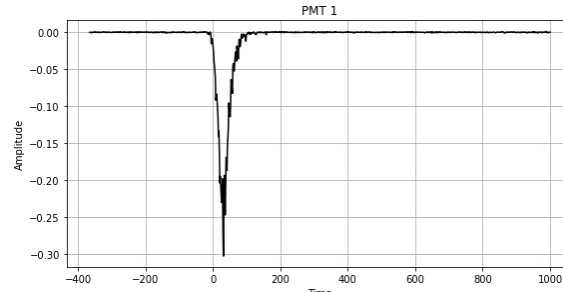
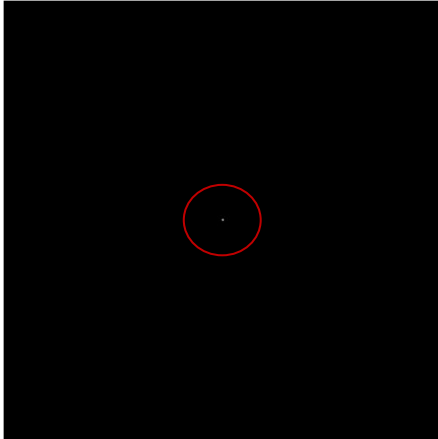
Simulation example 1: **current situation** (non-centered 6 kEV spot)



Known problems

Simulated signal

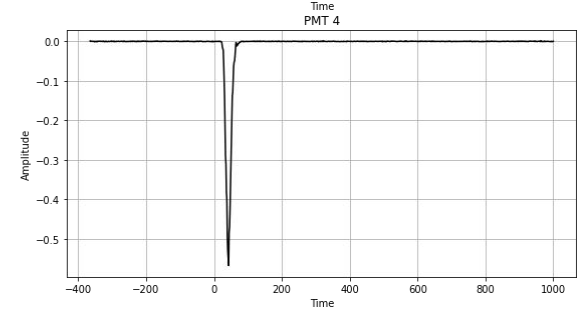
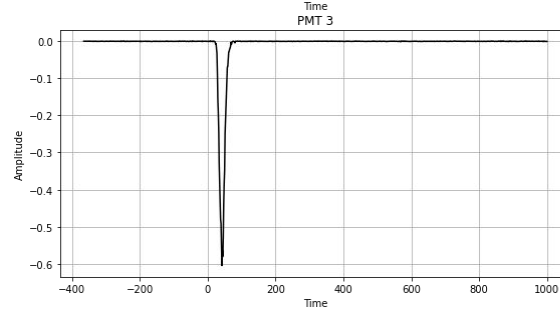
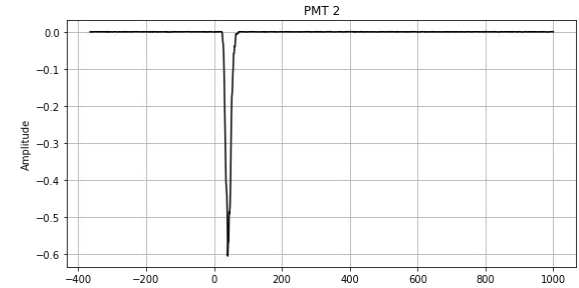
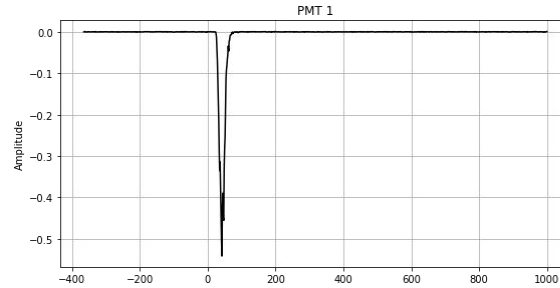
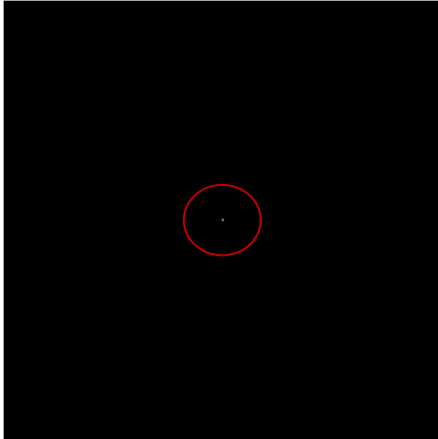
Simulation example 2: **before Digitization-PMT integration** (centered 6 keV spot)



Known problems

Simulated signal

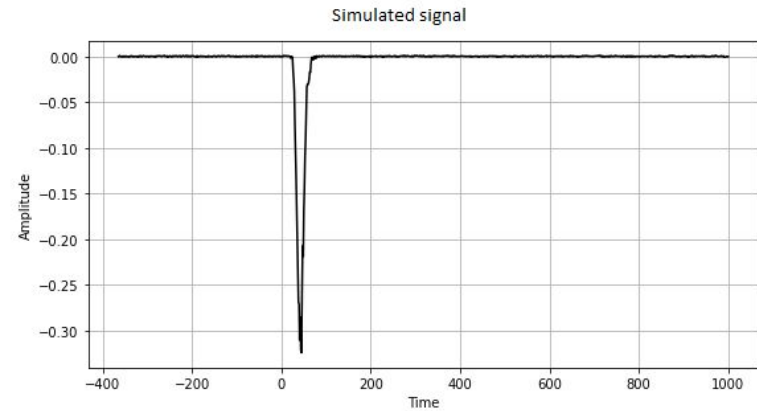
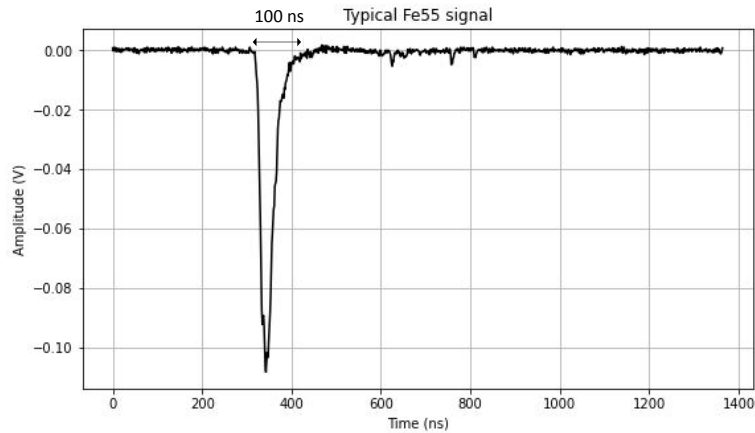
Simulation example 2: **current situation** (centered 6 kEV spot)



Known problems

Simulated signal

Fe55 signal x Simulated signal



Conclusion

Solutions?

- Verify results of changing the longitudinal diffusion parameters
- Review the SPE characterization
- New dispersion study

Next steps

- Right way to save the simulated waveforms ? (for reconstruction code)
- Data and simulation comparison
 - Reconstruction code - PMT Analysis
- Add the modifications to github repository