PMT Simulation

Glass Transmission

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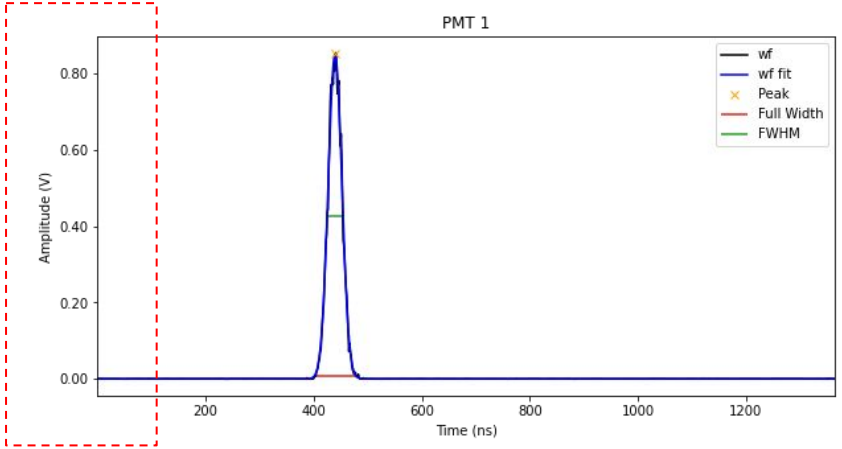
Introduction

In my last presentation…

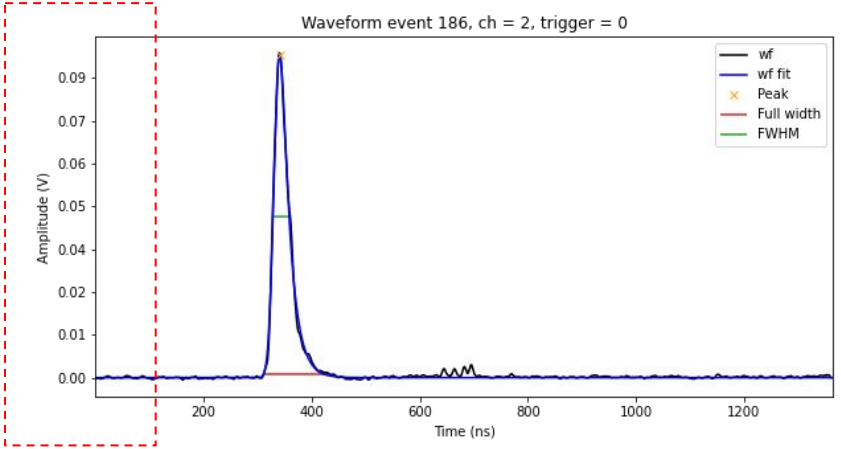
- 55Fe waveforms height peaks problem

Example (Step 5 = 46.6 cm)

Simulation

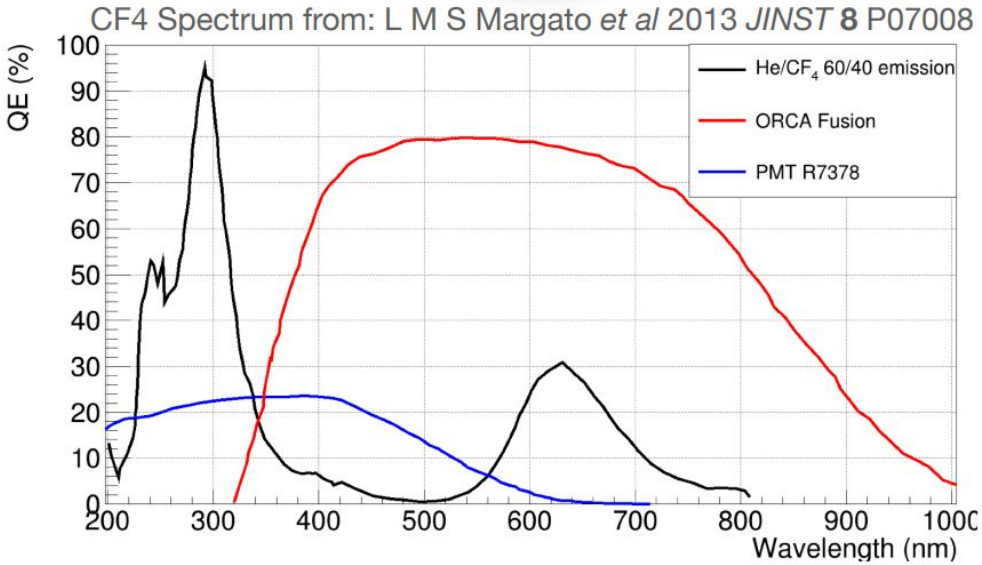


Real data



Introduction

In my last presentation…



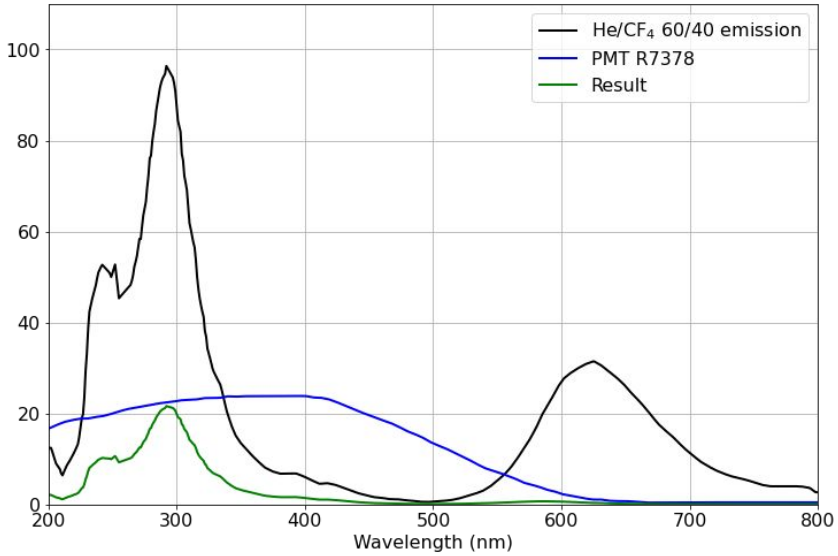
- Spectrum of the produced light
- Camera quantum efficiency
- PMT quantum efficiency

Reference

Introduction

In my last presentation…

Method - Multiplying the curves



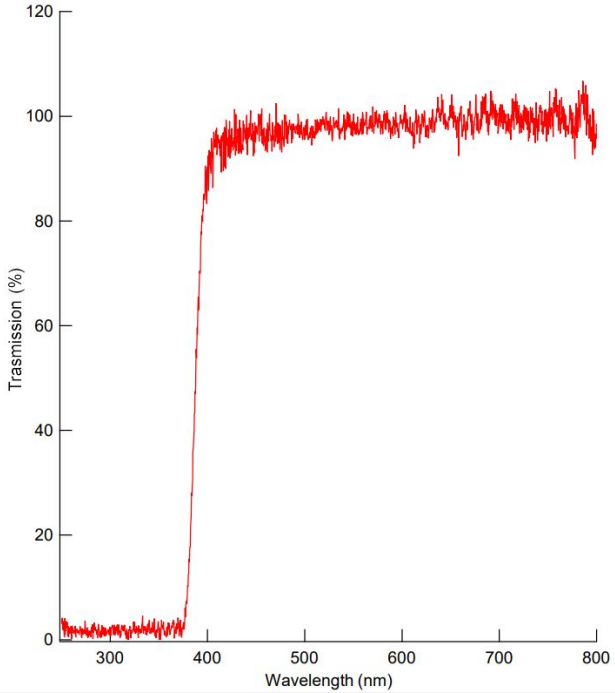
$$\frac{Area_{green\_curve}}{Area_{black\_curve}} = 15\%$$

15% of produced photons by the GEMs will have the possibility of hitting the PMTs and generating a signal

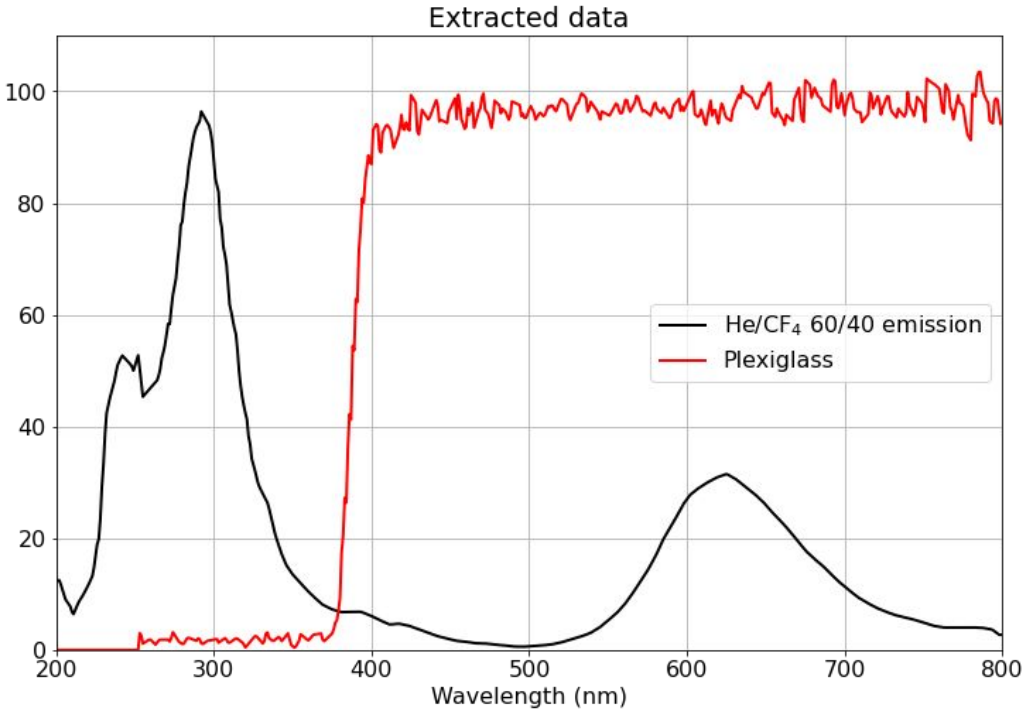
Multiply the number of produced photons by this value before simulating the PMT

Glass transmission

Plexiglass transmission spectrum

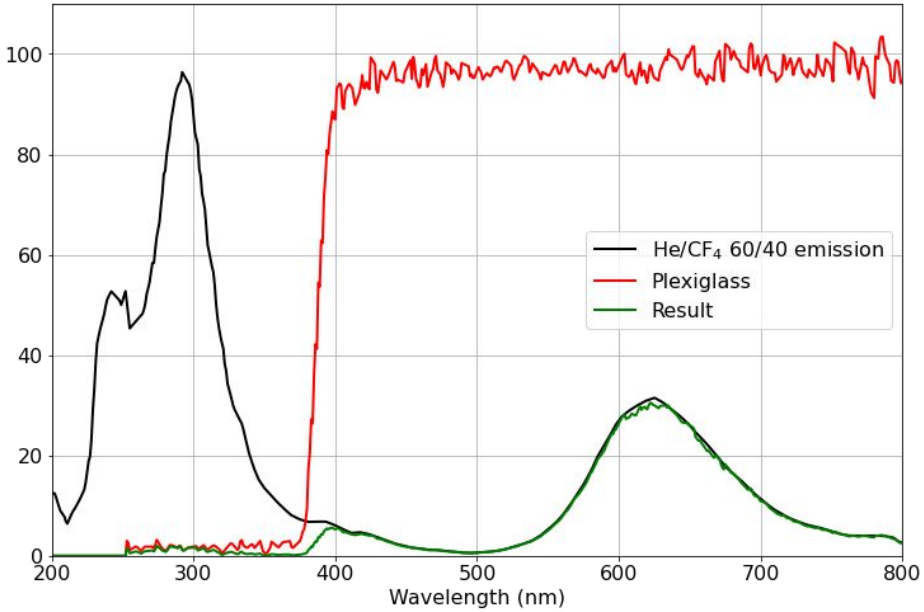


Glass transmission



Glass transmission

Analyzing just the glass transmission:



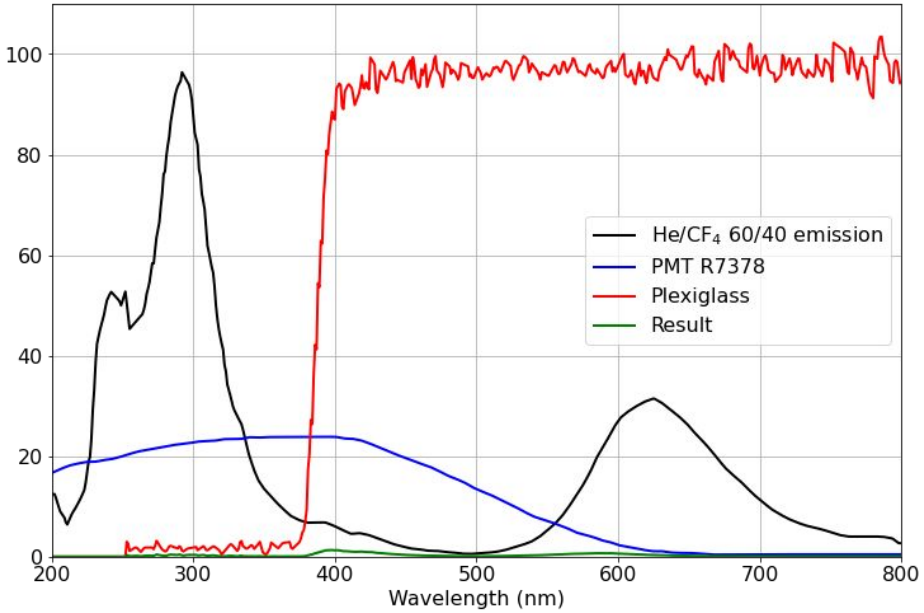
$$\frac{Area_{green\_curve}}{Area_{black\_curve}} = 36.4\%$$

36.4% of produced photons by the GEMs will have the possibility of hitting the PMTs and generating a signal

Multiply the number of produced photons by this value before simulating the PMT

Glass transmission

Analyzing PMT QE and glass transmission together:



$$\frac{Area_{green\_curve}}{Area_{black\_curve}} = 1.36\%$$

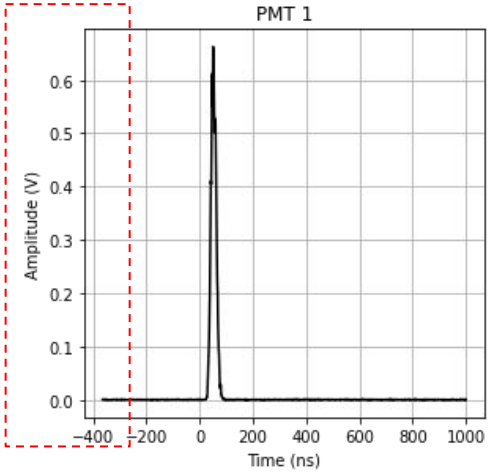
1.36% of produced photons by the GEMs will have the possibility of hitting the PMTs and generating a signal

Multiply the number of produced photons by this value before simulating the PMT

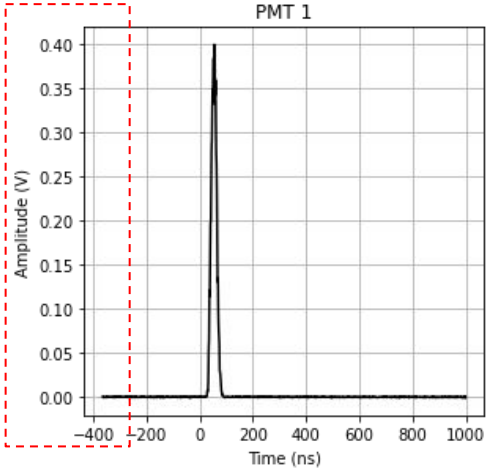
Amplitude comparison

Amplitude comparison
(centered 6 keV spots at z = 10 cm)

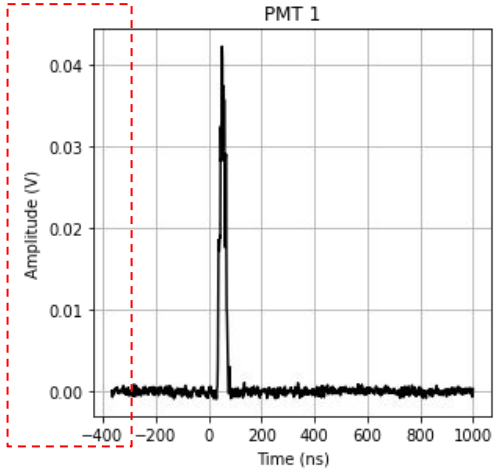
Constant PMT QE - 26%



PMT QE Curve - 15%



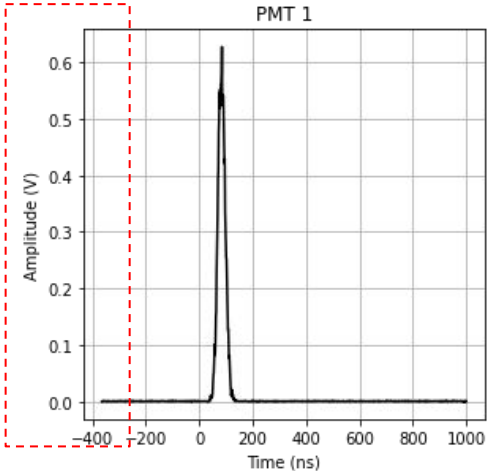
PMT QE + Glass transmission - 1.36%



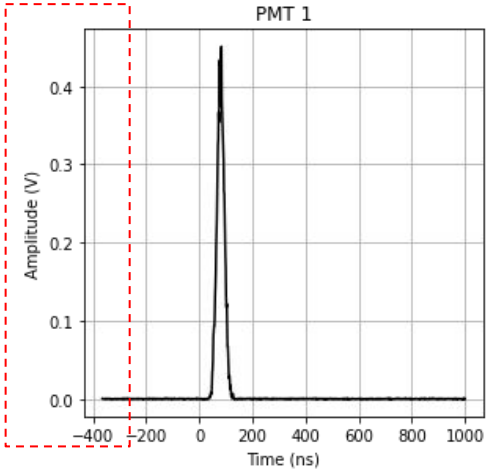
Amplitude comparison

Amplitude comparison
(centered 6 keV spots at z = 46.6 cm)

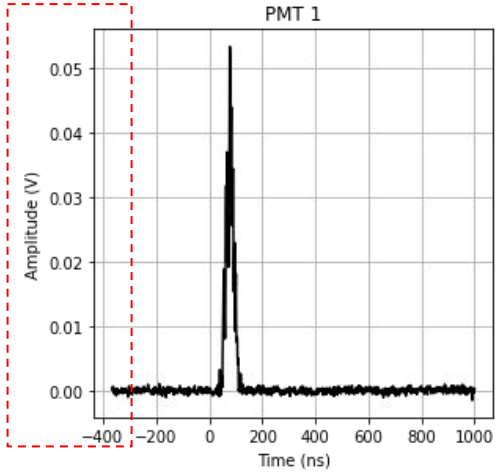
Constant PMT QE - 26%



PMT QE Curve - 15%



PMT QE + Glass transmission - 1.36%



Conclusion

Next steps

- Focus in fixing the simulated waveform shape
  - Charge and time response
- Do the complete analysis
  - Average width, integral, amplitude, RMS, SNR, as a function of the position of the iron source (X , Y , Z)
  - Camera + PMT reco codes
- Simulate different tracks with different energies