

Update on PMTs

Reconstruction & analysis meeting

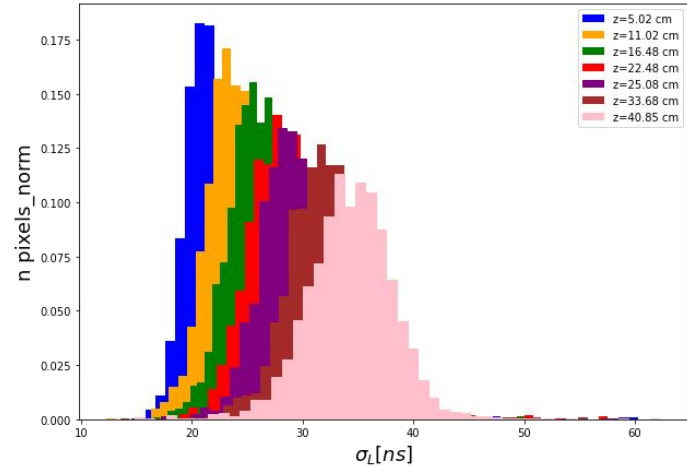
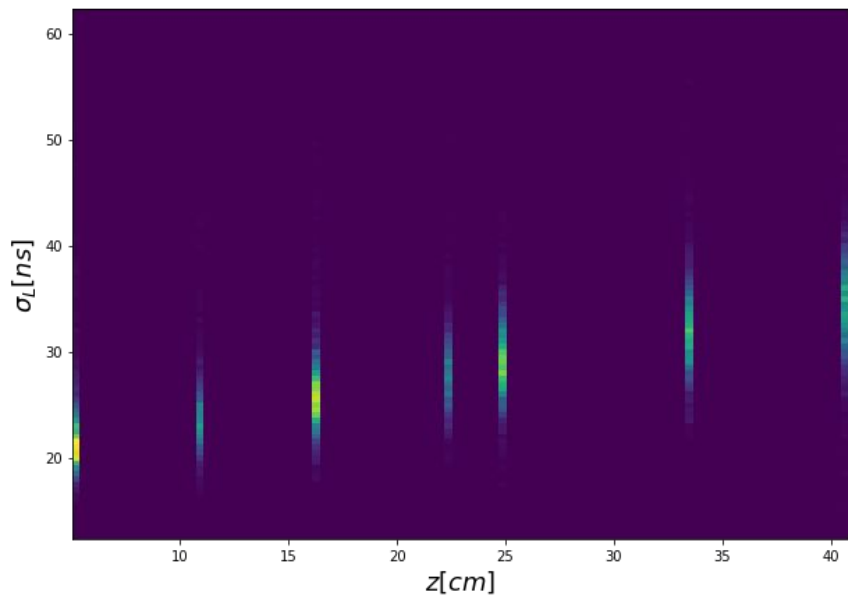
2023/03/16

Z diffusion of ^{55}Fe spots

Procedure:

- Waveform selection
- Waveform normalization
- Plotted the normalized width vs the z position of the iron source

A look to the width normalized distribution:
gaussian shape



Z diffusion of ^{55}Fe spots

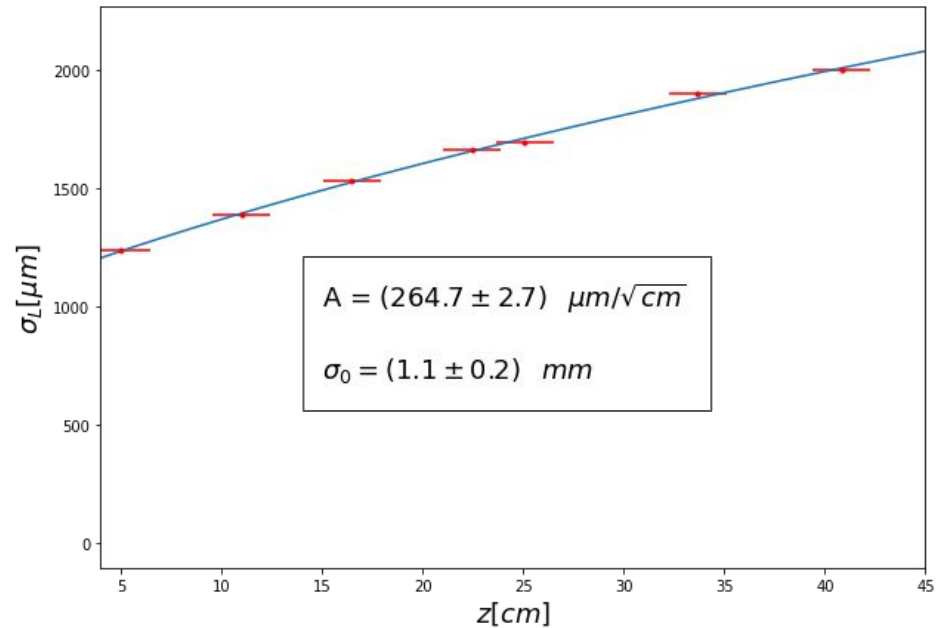
Fitting

Fitting function:

$$\sigma_L = \sqrt{\sigma_0^2 + A^2 z}$$

The uncertainty in the z position has been evaluated assuming a flat distribution between two rings of the field cage

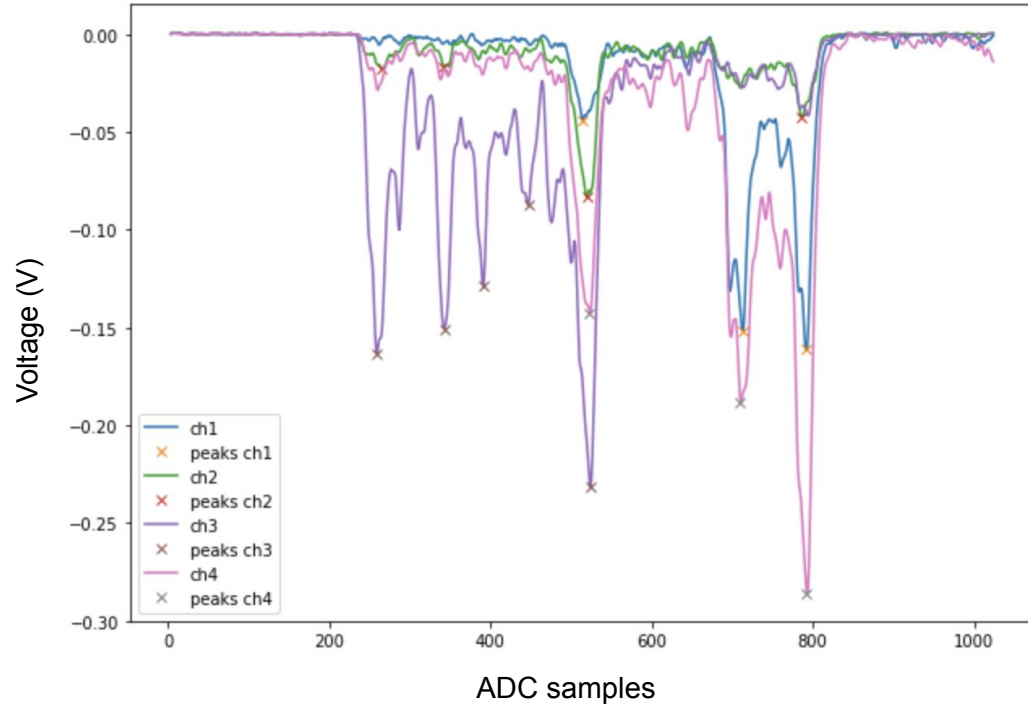
Same analysis done by Rita Roque with images:
My A is her D



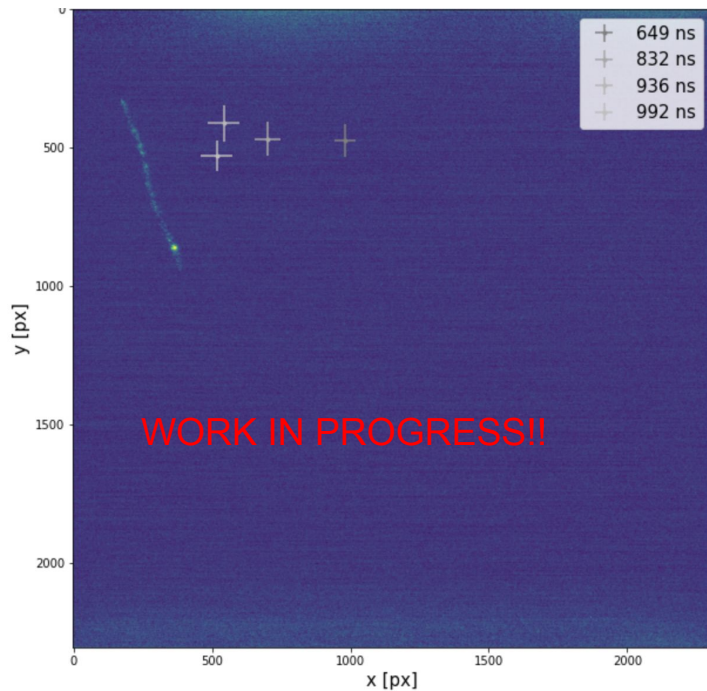
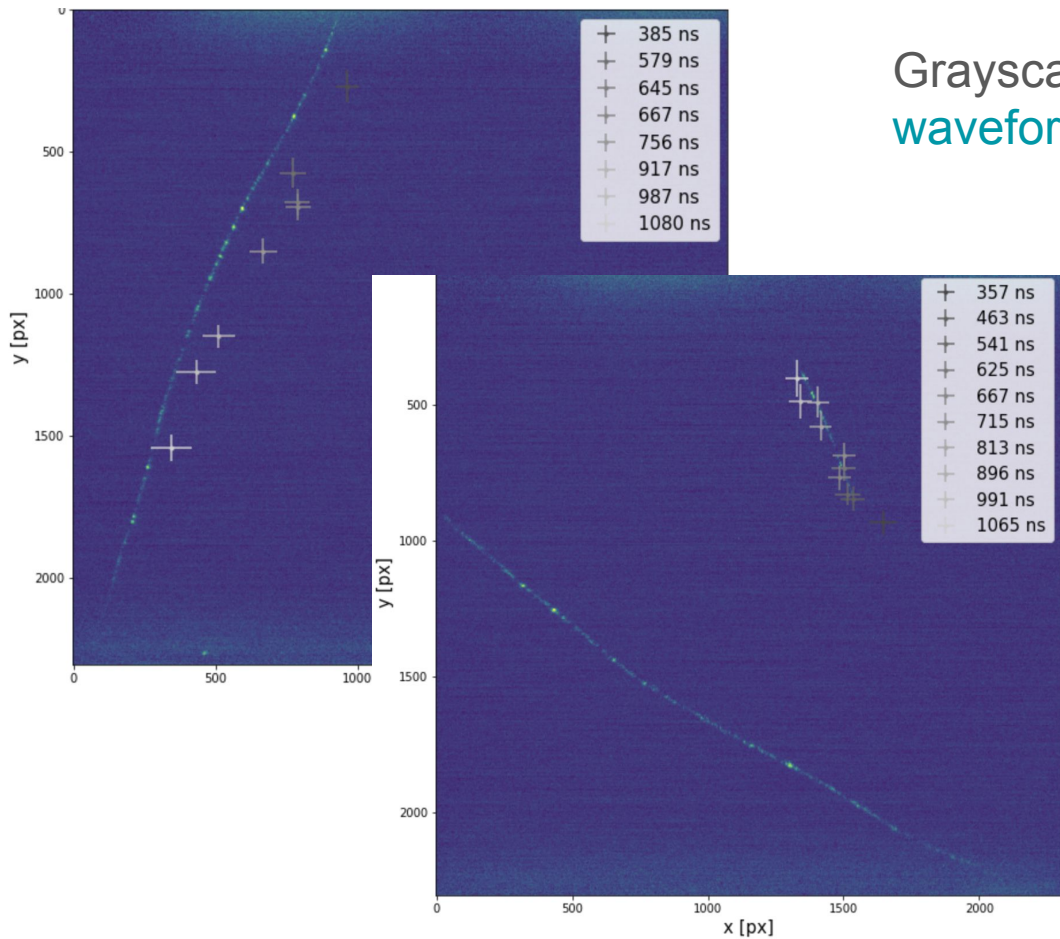
σ_T	LEMO (MIP)	LIME (^{55}Fe)	
D	129.7(31)	117(29)	um/sqrt(cm)
σ_0	292(12)	530(15)	um

Long track position reconstruction (1)

- Find **peaks** of the waveform (using the moving average to smooth it before)
- Take **majority 2 peaks** (i.e. at least 2 channels have peaked in a **10 sample window** from each other)
- Open a window around these peaks → **slice the wf**
- Fit the slice of the waveform as a **spot-like interaction**



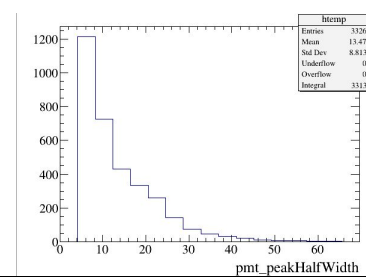
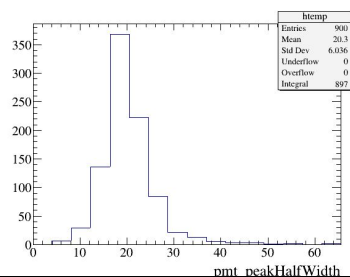
Long track position reconstruction (2)



PMT Reco

1. Tree finished - with basic variables
 - a. Allows for selection
2. Config file updated
3. Consistency tests \Rightarrow Mostly done:
 - a. Reconstruction can be ran as Camera; PMT; Camera + PMT
 - b. Debug mode also working

Almost ready to be pushed to GitHub!



Events->Draw("pmt_peakHalfWidth", "pmt_nPeaks == 1") Events->Draw("pmt_peakHalfWidth", "pmt_nPeaks > 1")

```
## 'time_range'           : [7300,7700],  
'threshold'              : 0,  
'height_RMS'             : 3,                ## 3 * RMS  
'minPeakDistance'       : 1,  
'promnence'              : 0.1,  
'fixed_prom'             : True,             ## If True, overrides prominence value with optimized one  
'width'                  : 5,  
'resample'               : 5,                ## Number of samples used for moving average  
'pmt_plotpy'            : True,             ## Create a folder called 'waveforms' to save them
```

MISSING:

- a. Implementation of waveform corrections in CYGNO-libs
- b. Finalize consistency tests

root
├── PROOF Sessions
├── ROOT Files
├── reco_run07178_3D_root
└── Events:1
 ├── run
 ├── event
 ├── pedestal_run
 ├── cmos_integral
 ├── cmos_mean
 ├── cmos_rms
 ├── nSc
 ├── sc_size
 ├── sc_nhits
 ├── sc_integral
 ├── sc_corrIntegral
 ├── sc_rms
 ├── sc_energy
 ├── sc_pathlength
 ├── sc_redpix1fx
 ├── nRedpix
 ├── redpix_1x
 ├── redpix_1y
 ├── redpix_1z
 ├── sc_theta
 ├── sc_length
 ├── sc_width
 ├── sc_longrms
 ├── sc_latms
 ├── sc_fulrms
 ├── sc_fulrms
 ├── sc_t0amplitude
 ├── sc_t0prominence
 ├── sc_t0whm
 ├── sc_t0whm
 ├── sc_t0mean
 ├── sc_t0whm
 ├── sc_xmean
 ├── sc_ymean
 ├── sc_xmax
 ├── sc_xmin
 ├── sc_ymax
 ├── sc_ymin
 ├── sc_pearson
 ├── sc_lgaussamp
 ├── sc_lgaussmean
 ├── sc_lgaussigma
 ├── sc_tch2
 ├── sc_tstatus
 ├── sc_lgaussamp
 ├── sc_lgaussmean
 ├── sc_lgaussigma
 ├── sc_tch2
 ├── sc_tstatus
 ├── pmt_wt_run
 ├── pmt_wt_event
 ├── pmt_wt_channel
 ├── pmt_baseline
 ├── pmt_RMS
 ├── pmt_tot_integral
 ├── pmt_tot_charge
 ├── pmt_max_ampi
 ├── pmt_nPeaks
 ├── pmt_peakPosition
 ├── pmt_peakHeight
 ├── pmt_peakHalfWidth
 ├── pmt_peakFullWidth
 └── gitHash:1