Container PMT Testing Data in ROOT format

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introduction

1. Onsite server:login.pmt.ihep.ac.cn [1]
2. raw testing data path: /pmtfs/disk01/container_data/Meassurements_DAQ
3. output ROOT file path: /pmtfs/disk01/container_data/rawdata
4. file size: about 500Mb for one PMT each test.
5. name rule: container+drawer+SN

[1] https://juno.ihep.ac.cn/mediawiki/index.php/Onsite_computing/IT

inside one ROOT file

One can get 13 trees and one TObject ”Pmtdata” from the ROOT file

```
TFile*         sys1_mass10410_channel123_snPA1901-1069.root
 KEY: TTree    mu1pe;1 PA1901-1069_tree0
 KEY: Pmtdata  auxiliary_info;1
 KEY: TTree    mup1pe;1        PA1901-1069_tree1
 KEY: TTree    gainm150;1      PA1901-1069_tree2
 KEY: TTree    gainm100;1      PA1901-1069_tree3
 KEY: TTree    gainm50;1       PA1901-1069_tree4
 KEY: TTree    gainm0;1        PA1901-1069_tree5
 KEY: TTree    gainp50;1       PA1901-1069_tree6
 KEY: TTree    gainp100;1      PA1901-1069_tree7
 KEY: TTree    gainp150;1      PA1901-1069_tree8
 KEY: TTree    TTSdata;1       PA1901-1069_tree9
 KEY: TTree    DCR;1   PA1901-1069_tree10
 KEY: TTree    AP;1    PA1901-1069_tree11
 KEY: TTree    TTStrig;1       PA1901-1069_tree12
```

TObject:Pmtdata

The custom class ”Pmtdta” is inherited from TObject, and it store the auxiliary information of one pmttest such as: SN,test-date,HV,base .etc.

```
41  Pmtdata *thispmt;
42  f->GetObject("auxiliary_info", thispmt);
43  TString pmt_id=thispmt->Getsn();
44  TString test_date=thispmt->Gettestdate();
45  int uid=thispmt->Getuid();
46  int fit_HV=thispmt->Getchv();
47  double cont_dcr=thispmt->Getdcr();
48  int pmtnum=thispmt->Getpmtnum();
49  int umassnum=thispmt->Getumassnum();
50  int base_type=thispmt->Getbasetype();
51  int pmt_type=thispmt->Gettype();
52  int vendor_HV=thispmt->Getvhv();
53  double vendor_qe=thispmt->Getvqe();
54  double vendor_ap=thispmt->Getvap();
55  double vendor_dcr=thispmt->Getvdcr();
56  double vendor_rt=thispmt->Getvrt();
57  double vendor_ft=thispmt->Getvft();
58  double vendor_pvr=thispmt->Getvpv();
59  double vendor_res=thispmt->Getvres();
```

waveform data

There are 11 trees for the storage of testing waveform:

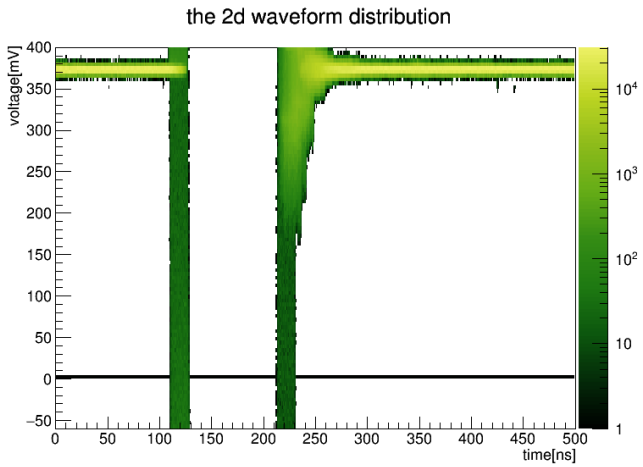
- mu1pe$\rightarrow$ with the LED light intensity @ $\mu \simeq 1$.
- mup1pe$\rightarrow$ with the LED light intensity @ $\mu \simeq 0.1$.
- gain...$\rightarrow$ with the LED light intensity @ $\mu \simeq 0.1$ and HV=vendor HV+{-150V,-100V,-50V,0V,50V,100V,150V}.
- TTSdata$\rightarrow$ waveforms for TTS test.
- TTStrig$\rightarrow$ waveforms for the trig signals of TTS test.

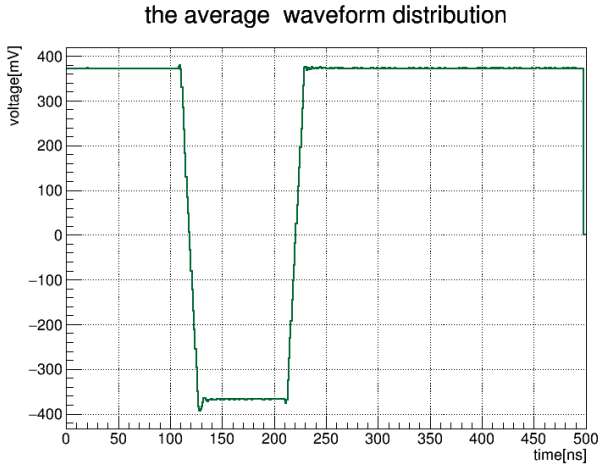
Each waveform is a "TVector" with length 500, and the value is in mV unit.

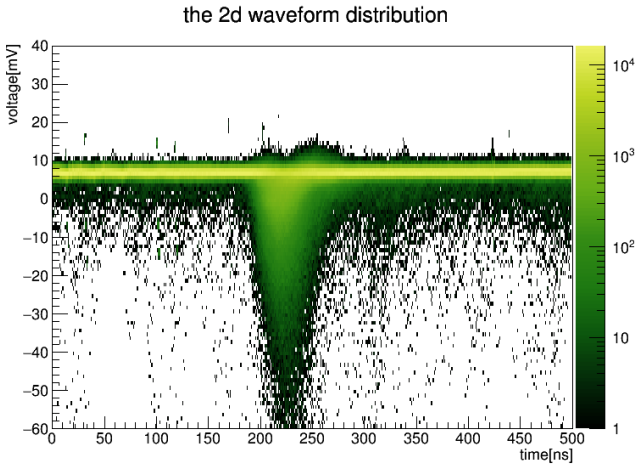
Also, the "DCR" tree is for dark count rate data and "AP" tree is for afterpulse data. The values are accumulated DCRs with 1s step.

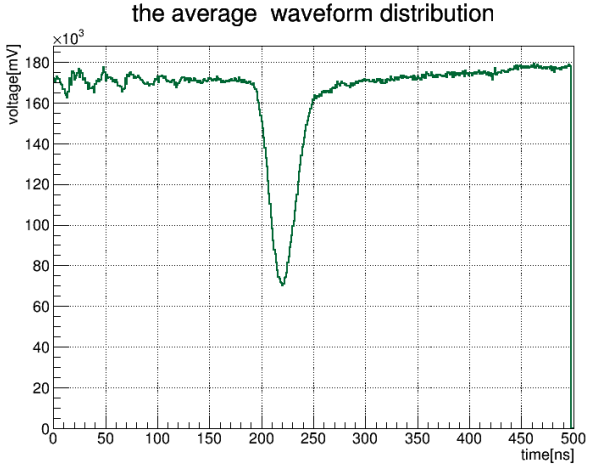
simple test for the ROOT file

read the TTS and mu1pe waveform from ROOT :









HAMAMATSU PMTs

the PDE uniformity of HAMAMATSU PMTs are not so good
we can artificially correct the PDE if these PMTs have fixed orientation and we can extract the light incident angle using reconstraction information.

Back-Up

load the Pmtdata class

to use the shared library:
CINT mode: gSystem->Load(”/home/pmthome/zhaor/zhaorong/cont_v1/pmttest_cc.so”);
in script:
R__LOAD_LIBRARY(/home/pmthome/zhaor/zhaorong/cont_v1/pmttest_cc.so);