UUB Charge and Peak histograms

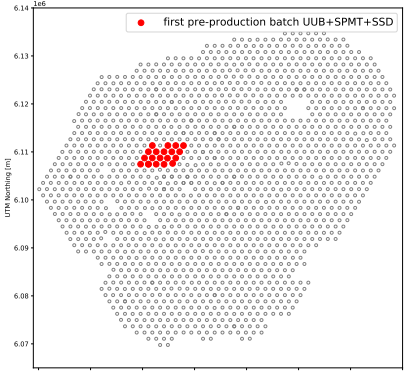
Mauricio Suárez Durán and Ioana C. Mariș

IIHE-ULB

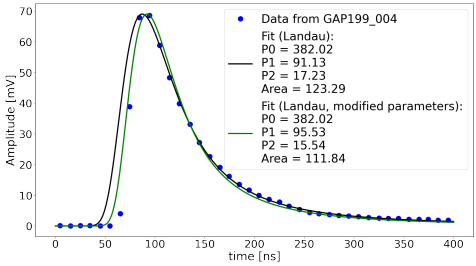
May 27, 2021

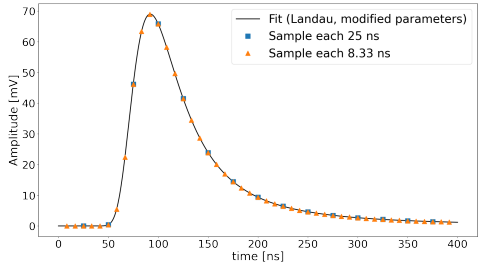
UUB Charge and Peak histograms

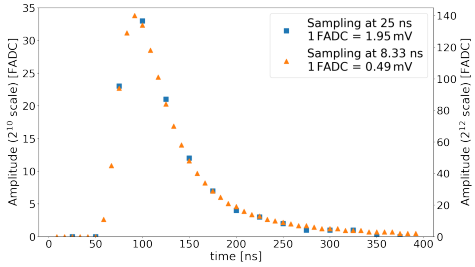
- Station studied: 863 1222 1219 1211 1740 1743 1221 1223 1217 1747 1741 1745 1818 1851 1729 1735 1746 1819 1791
- Data from CDAS.
- Software CDAS, pre-production version.



Understanding the sampling







	Orig. Pulse	2^{10} at 25 ns	2^{12} at 8.33 ns
Area	111.85 pC	105.30 pC	109.88 pC
Peak	69.01 mV	64.35 mV	68.60 mV
AoP	1.62 nF	1.64 nF	1.61 nF

From FADC to Amplitud (mV):

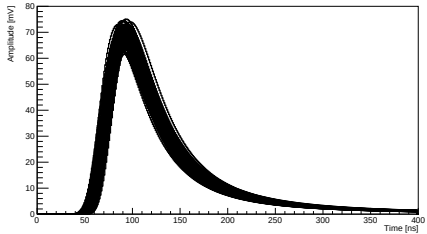
$1\,\text{FADC} = 2000.\,\text{mV} \,/\, 2^n$, where n takes 10 or 12.

From FADC to Charge (pC):

$$Q = \frac{(\Delta t\ \text{ns})(2000.\ \text{mV}/2^n)}{50.\ \Omega} \sum n_i = \sum n_i\ \text{pC}$$

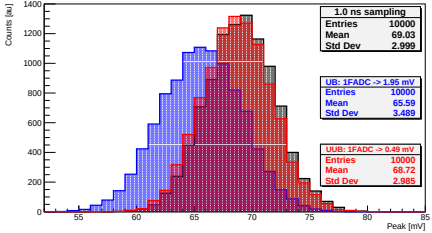
AoP ratio expected for 25.00 ns / 8.33 ns

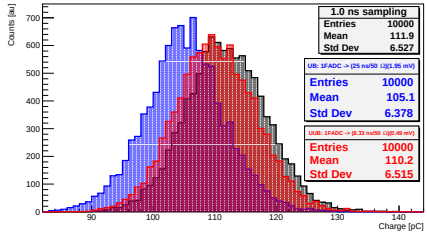
$\frac{\mathrm{AoP}^{25}}{\mathrm{AoP}^{8.33}} = \frac{1.64\,\mathrm{nF}}{1.61\,\mathrm{nF}} = 1.02$; How is this ratio for an artifial sample of 10^4 pulses?



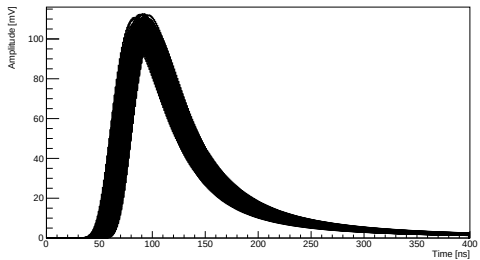
	25 ns	8.33 ns	1.0 ns
Area	105.11 pC	110.23 pC	111.87 pC
Peak	65.59 mV	68.72 mV	69.03 mV
AoP	1.60 nF	1.60 nF	1.62
Ratio AoP		1.00	

The AoP is the same for both sampling.
8.33's Area and Peak bigger than 25.'s ones.



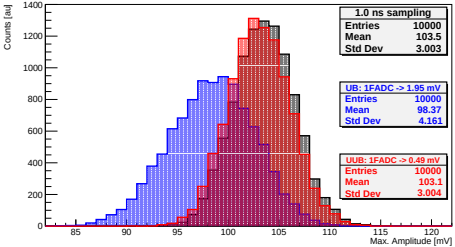


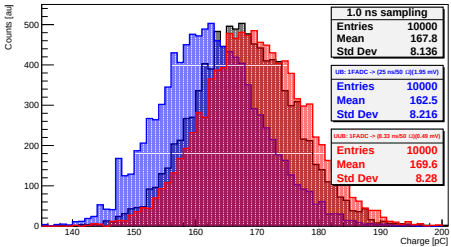
What to expect for different HV (1.5∗P0)?



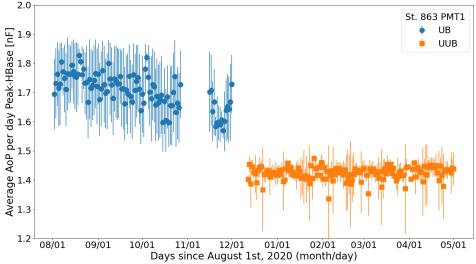
	25.00 ns	8.33 ns	1.0 ns
Area	162.50 pC	169.57 pC	167.79 Pc
Peak	98.37 mV	103.06 mV	103.55 mV
AoP	1.65 nF	1.65 nF	1.62 nF
Ratio AoP		1.00	

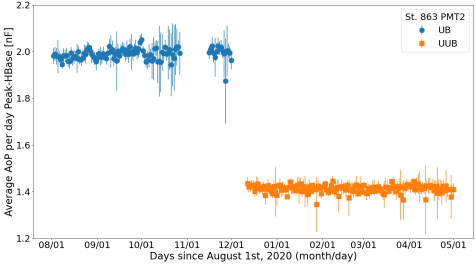
Here, the change of amplitude causes a different of $\sim 3\,\%$ in the AoP value.
8.33's Area and Peak bigger than 25.'s ones.

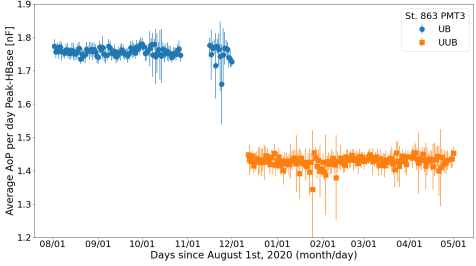




Checking AoP for Station 863

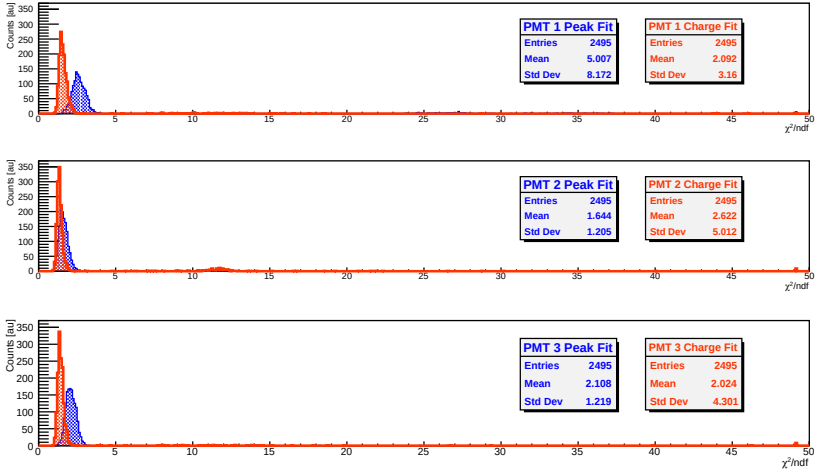






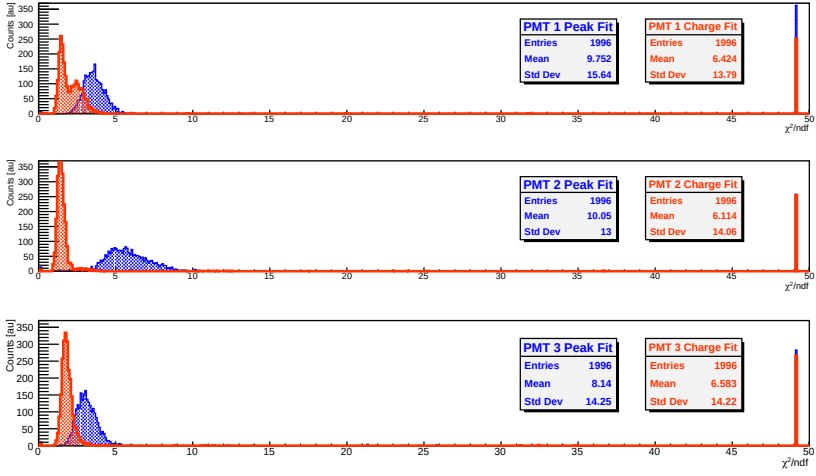
How good is the fit?

Checking for UUB χ^2/ndf Station 863



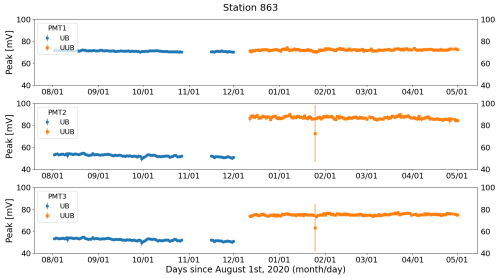
All fits with $\chi^2/\mathrm{ndf} > 50$ were counted as 49.

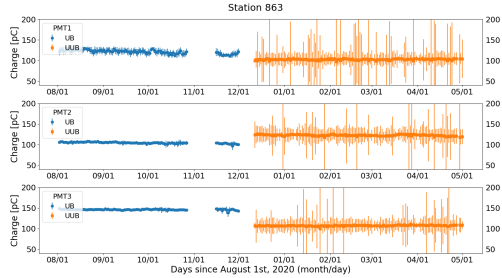
Checking for UB χ^2/ndf Station 863



All fits with $\chi^2/\mathrm{ndf} > 50$ were counted as 49.

Checking Peak and Charge for Station 863



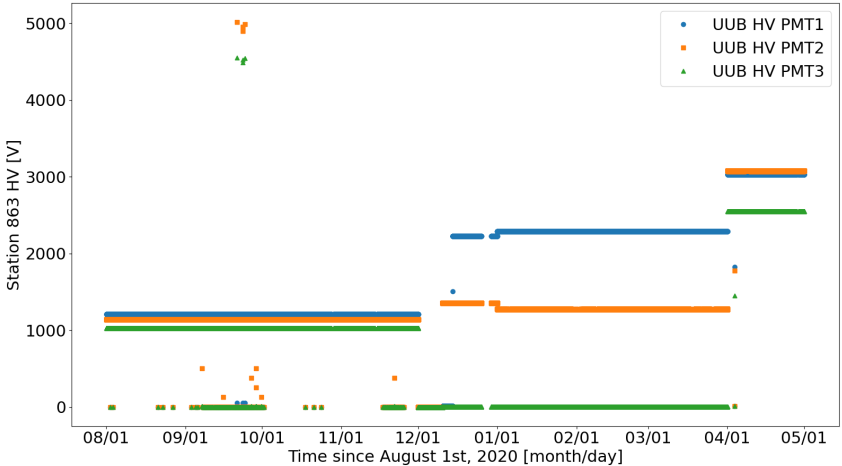


	PMT1		PMT2		PMT3	
	UB	UUB	UB	UUB	UB	UUB
Area	121.43 pC	102.84 pC	104.41 pC	122.81 pC	146.26 pC	107.43 pC
Peak	71.15 mV	72.28 mV	52.51 mV	86.98 mV	52.51 mV	75.26 mV
AoP	1.71 nF	1.42 nF	1.99 nF	1.41 nF	2.79 nF	1.43 nF

May be a differente HV?

Checking for St. 863's HV

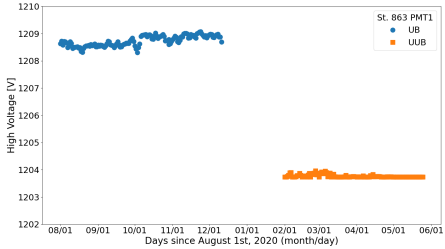
Data from /pbs/throng/pauger/DATA/Raid/monit/ and readed with TSDMonCal.h

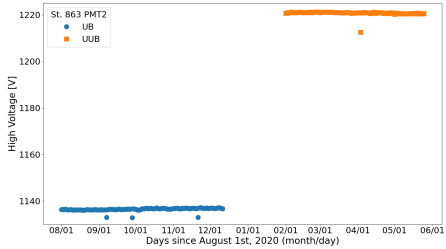


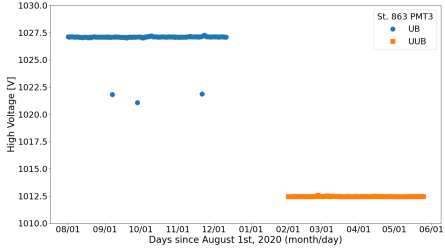
fPMV[pmt] and UPMV[pmt] are not the correct variables to check this?
Which are the correct ones?

Checking for St. 863's HV

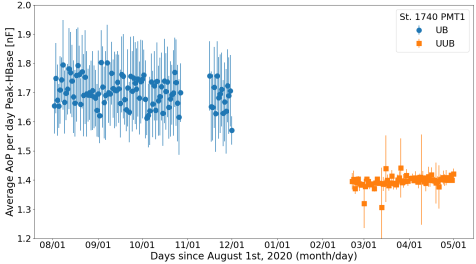
From http://mon.auger.uni-wuppertal.de/pro/SD/LS/Monitoring.php?LSId=863

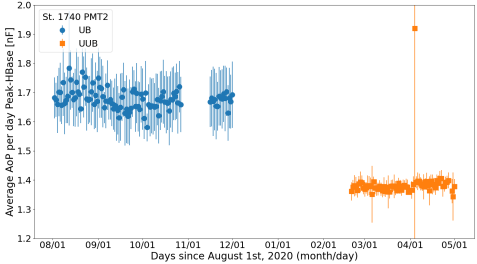


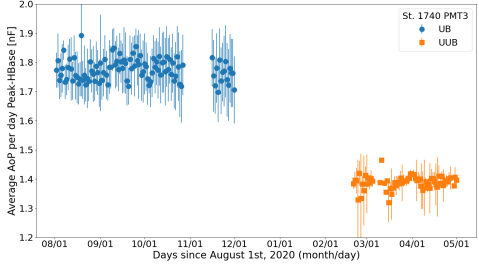




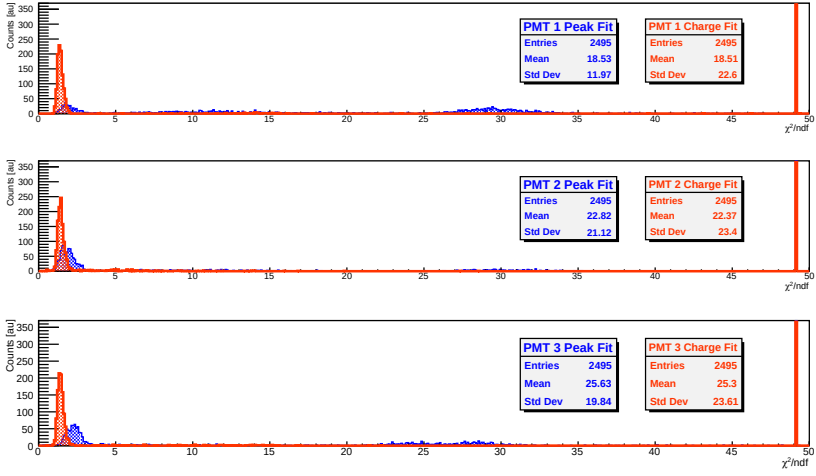
Checking AoP for Station 1740





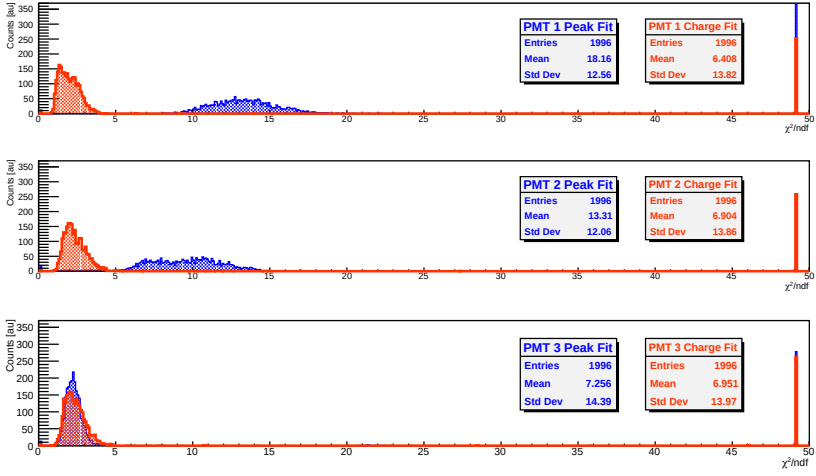


Checking for UUB χ^2/ndf Station 1740



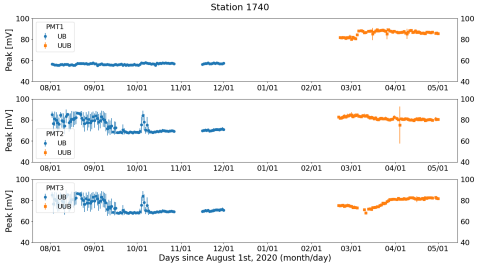
All fits with $\chi^2/\mathrm{ndf} > 50$ were counted as 49.

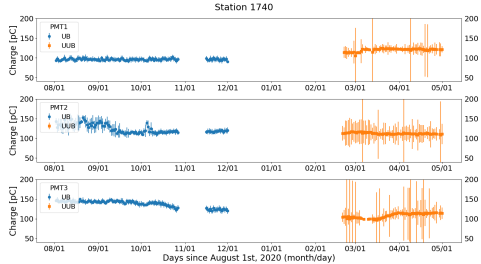
Checking for UB χ^2/ndf Station 1740



All fits with $\chi^2/\mathrm{ndf} > 50$ were counted as 49.

Checking Area and Peak for Station 1740

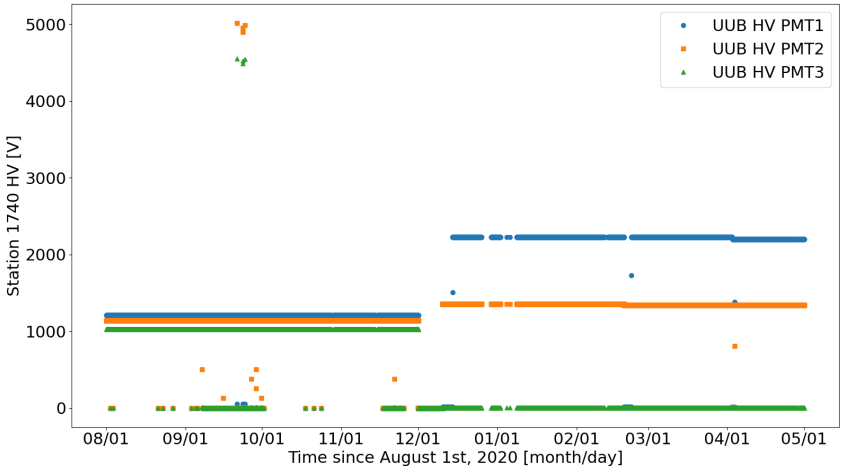




	PMT1		PMT2		PMT3	
	UB	UUB	UB	UUB	UB	UUB
Area	96.21 pC	120.27 pC	124.50 pC	112.60 pC	138.46 pC	108.38 pC
Peak	56.60 mV	86.19 mV	74.15 mV	81.86 mV	74.15 mV	78.34 mV
AoP	1.67 nF	1.40 nF	1.68 nF	1.34 nF	1.87 nF	1.38 nF

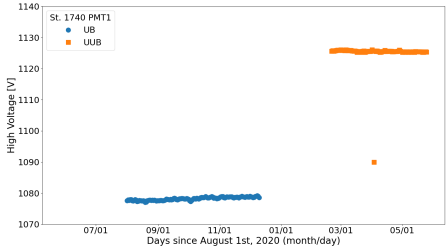
Checking for St. 1740's HV

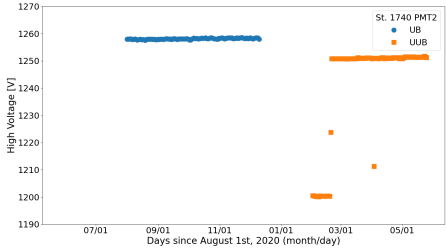
Data from /pbs/throng/pauger/DATA/Raid/monit/ and readed with TSDMonCal.h

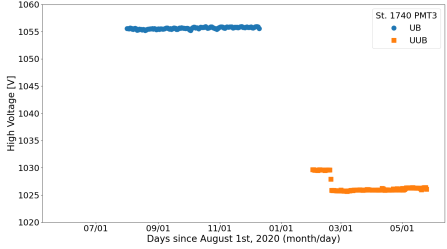


Checking for St. 1740's HV

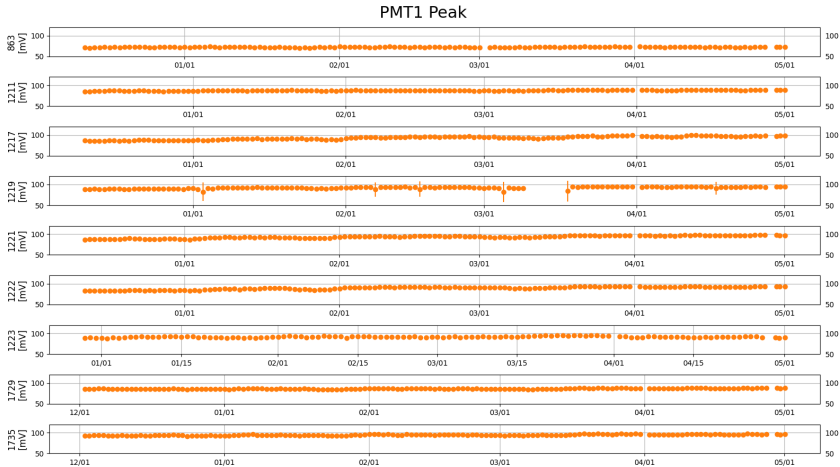
From http://mon.auger.uni-wuppertal.de/pro/SD/LS/Monitoring.php?LSId=1740







Checking for Peak for all Stations



Checking for Peak for all Stations