

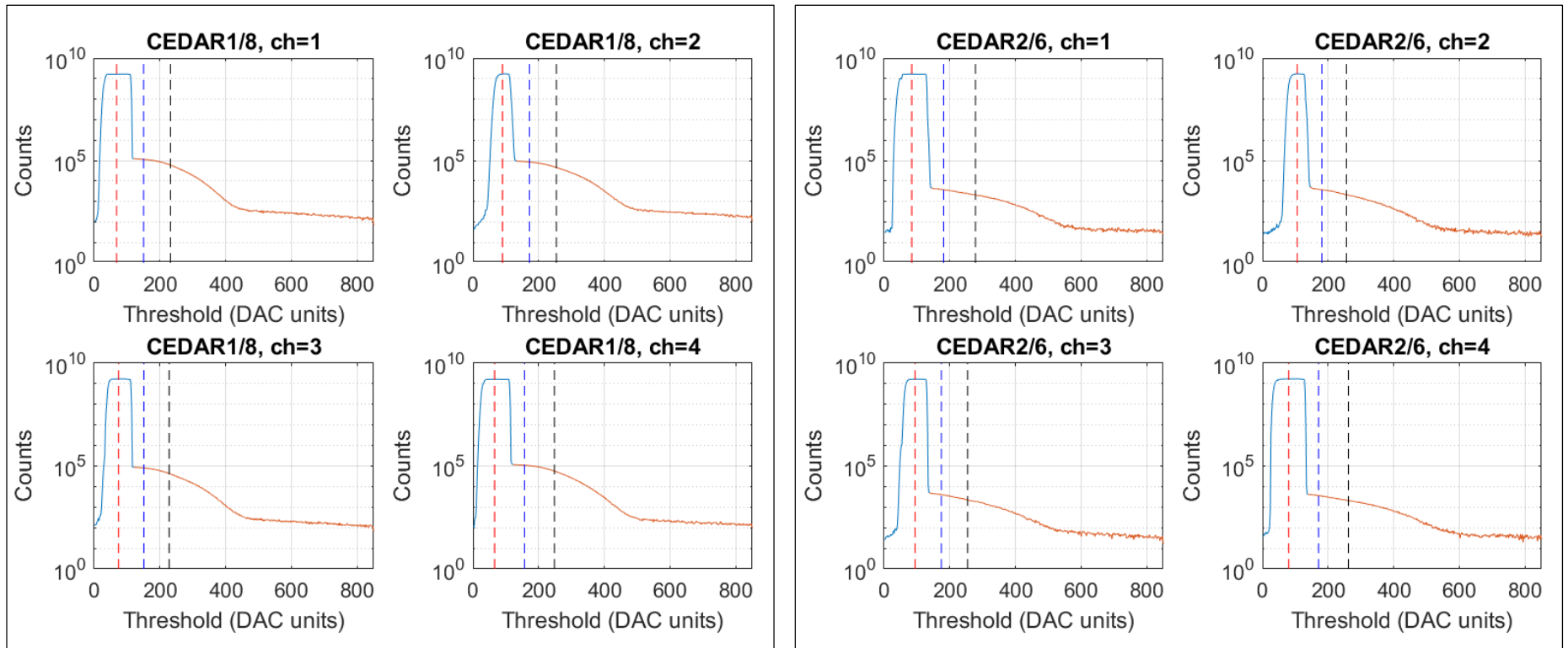
Status of CEDARs

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Current Status

- Readout
 - New firmware working well, still commissioning
 - Suspected base failure was a fake problem – all is working well
 - For some reason scope turned on differentiating filter
 - New feature – built-in scalers for every channel
- Commissioning status
 - HV equalized
 - Probably one more check needed, waiting for answer from Flavio concerning Monte-Carlo results
 - Threshold scans done
 - Software for threshold scans and alignment check using our electronics is ready
 - First pressure scan done using our electronics shows pion peak, but poor resolution
 - Suspect too wide coincidence window
 - Currently working on T0 and proper setting of coincidence window
 - See much higher rates in PMTs than suspected (LD = 0.3 mm)
 - CEDAR 1 / PMT 8 -> over 20E+6/s per channel, over 80E+6/s per PMT. Currently checking if this is signal or background from halo (suspect the latter)
 - Average is approx. 8E+6/s/channel.
 - Monitoring tools ready
 - Expect to finish by Thursday Oct 11 (or sooner if all goes smooth).
- Gain monitoring
 - Lower priority for now

Threshold Scan Results (example)



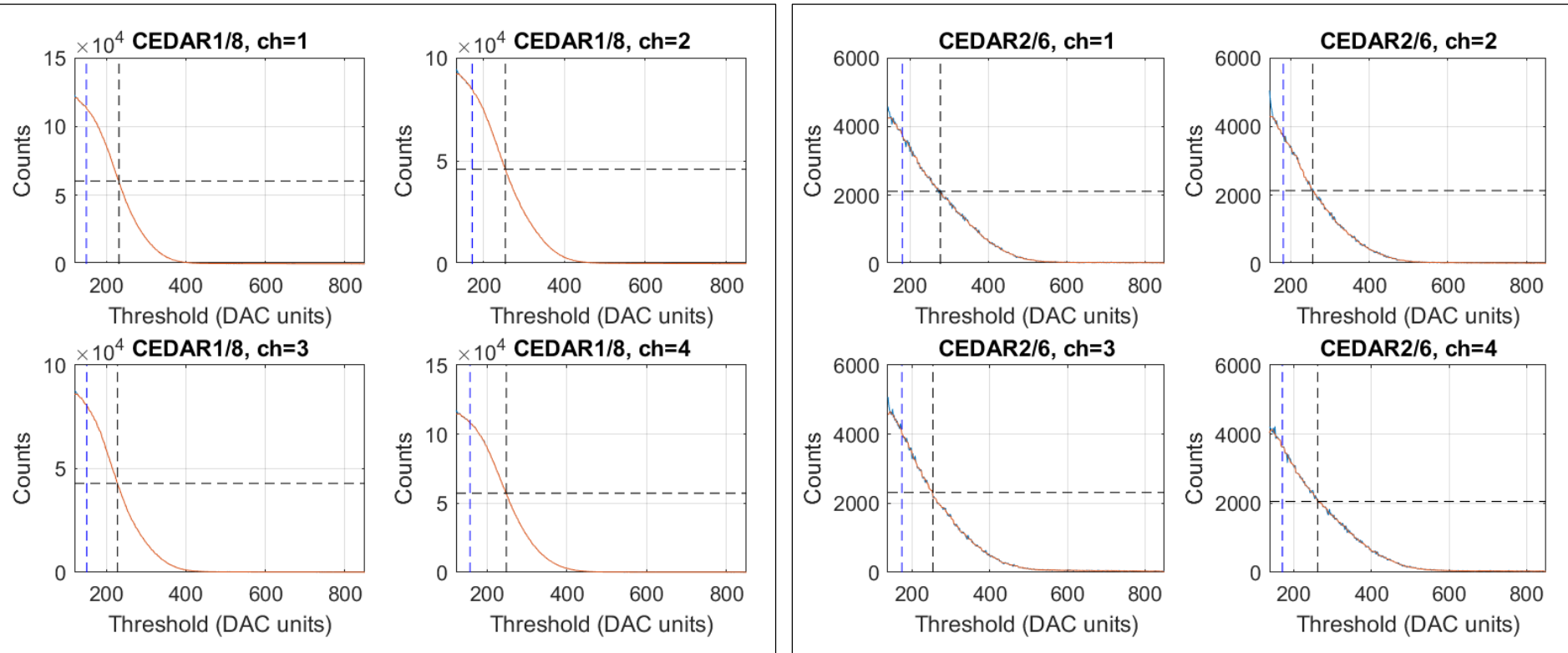
Red = estimated offset (pedestal)

Blue = threshold 0.5 photoelectron

Black = estimated single photoelectron level

Log scale

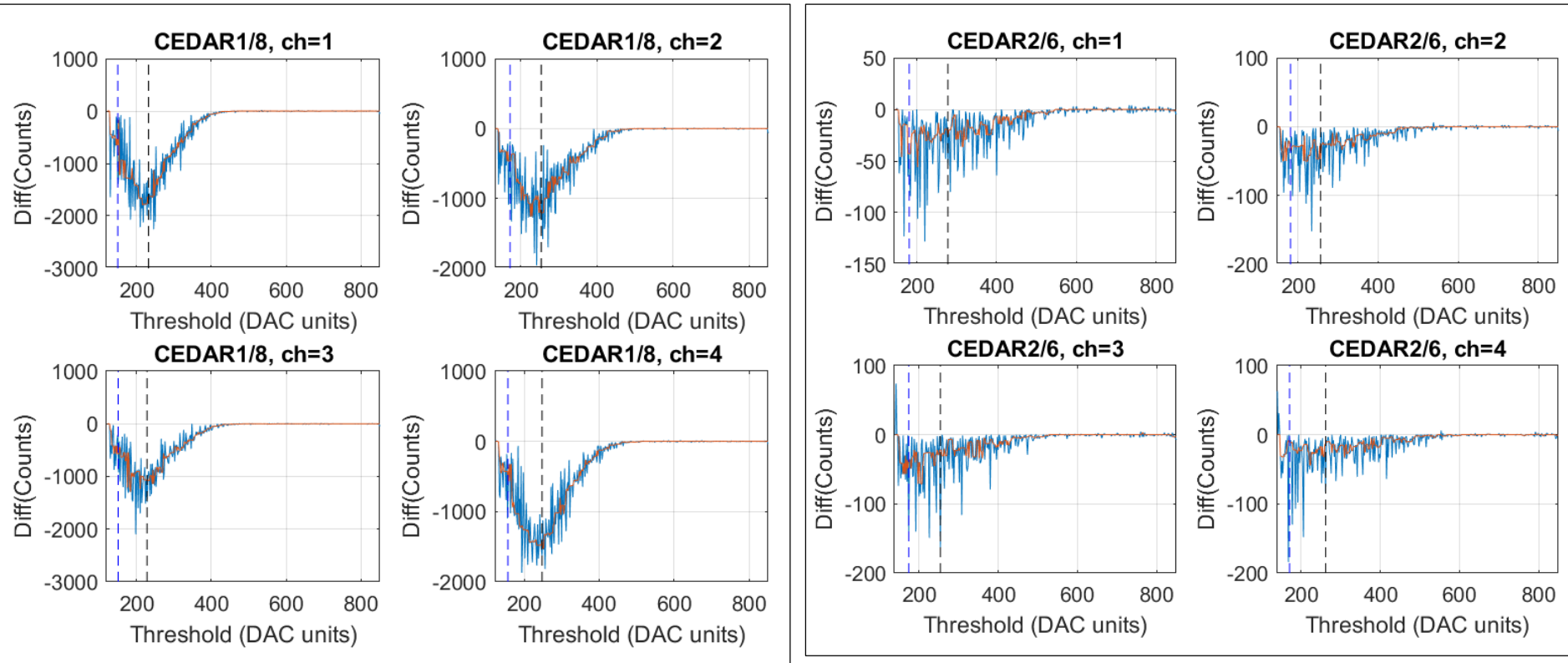
Threshold Scan Results (example)



Blue = threshold 0.5 photoelectron
Black = estimated single photoelectron level

Linear scale
Only part above noise

Threshold Scan Results (example)



Blue = threshold 0.5 photoelectron

Black = estimated single photoelectron level

Amplitude spectrum
*Differential of filtered
threshold scan curve*

Background

At low intensity, PMTs see rate of approx. $5E+5$ which does not come from the inside of the CEDAR (max $1.2E+6$).

Test was made at $P=11.0$ bar, $LD=0.1$ mm.

Rate calculation assumes spill length of 4.8 sec.

Rates may actually be lower, as I didn't take into account that some hits in single PMT may have coincidence between channels

CEDAR 1 - LD=1.0, P=11.0, coll = 6 mm								
Meas.	PMT 1	PMT 2	PMT 3	PMT 4	PMT 5	PMT 6	PMT 7	PMT 8
#1	3190467	1270635	1097184	1235311	1203574	1356227	2346594	5863500
#2	3168337	1273008	1115733	1233870	1203997	1354215	2342853	5872240
#3	3134103	1265023	1104261	1227461	1192627	1355322	2327282	5771160
Mean	3164302	1269555	1105726	1232214	1200066	1355255	2338910	5835633
Rate	6,59E+05	2,64E+05	2,30E+05	2,57E+05	2,50E+05	2,82E+05	4,87E+05	1,22E+06

CEDAR 1 - LD=0.1, P=11.0, coll = 6 mm								
Meas.	PMT 1	PMT 2	PMT 3	PMT 4	PMT 5	PMT 6	PMT 7	PMT 8
#1	3022654	1117554	928293	951995	1012772	1177487	2125004	5617962
#2	3027684	1130594	924485	948110	1011112	1164184	2129245	5657861
#3	3015498	1118952	921228	945399	1005005	1169532	2119374	5583580
Mean	3021945	1122367	924669	948501	1009630	1170401	2124541	5619801
Rate	6,30E+05	2,34E+05	1,93E+05	1,98E+05	2,10E+05	2,44E+05	4,43E+05	1,17E+06
LD 1.0-0.1	142357	147189	181057	283713	190436	184854	214369	215832
	4,7%	13,1%	19,6%	29,9%	18,9%	15,8%	10,1%	3,8%

CEDAR 2 - LD=1.0, P=11.0, coll = 6 mm								
Meas.	PMT 1	PMT 2	PMT 3	PMT 4	PMT 5	PMT 6	PMT 7	PMT 8
#1	2471707	2480493	2575815	2778783	2588643	2118891	2331711	2247573
#2	2507100	2511682	2626316	2800198	2596809	2149764	2357382	2265556
#3	2458642	2466908	2587684	2771364	2591915	2110163	2310719	2241584
Mean	2479150	2486361	2596605	2783448	2592456	2126273	2333271	2251571
Rate	5,16E+05	5,18E+05	5,41E+05	5,80E+05	5,40E+05	4,43E+05	4,86E+05	4,69E+05

CEDAR 2 - LD=0.1, P=11.0, coll = 6 mm								
Meas.	PMT 1	PMT 2	PMT 3	PMT 4	PMT 5	PMT 6	PMT 7	PMT 8
#1	2292282	2306732	2368879	2582670	2405848	1939574	2152546	2083719
#2	2293408	2292139	2370469	2560562	2408875	1928946	2125358	2071843
#3	2274938	2277285	2365171	2562594	2384136	1922033	2125715	2093735
Mean	2286876	2292052	2368173	2568609	2399620	1930184	2134540	2083099
Rate	4,76E+05	4,78E+05	4,93E+05	5,35E+05	5,00E+05	4,02E+05	4,45E+05	4,34E+05
LD 1.0-0.1	192274	194309	228432	214840	192836	196088	198731	168472
	8,4%	8,5%	9,6%	8,4%	8,0%	10,2%	9,3%	8,1%

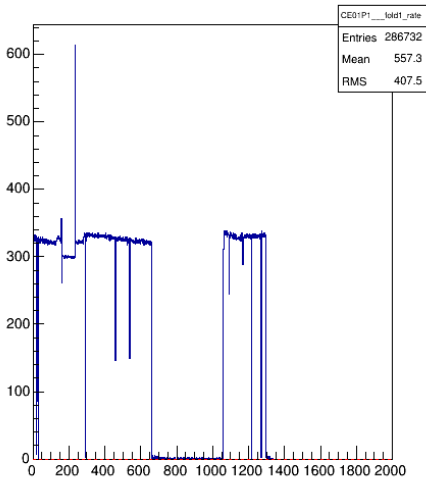
Rates at High Intensity (LD=0.3, 4.8 s)

CEDAR 1						
PMT 1	rate	1,191E+07	1,019E+07	1,696E+07	1,484E+07	
PMT 2	rate	9,683E+06	7,842E+06	4,187E+06	4,788E+06	
PMT 3	rate	2,959E+06	4,812E+06	6,762E+06	4,053E+06	
PMT 4	rate	5,513E+06	6,581E+06	3,519E+06	3,498E+06	
PMT 5	rate	4,729E+06	7,854E+06	6,219E+06	5,553E+06	
PMT 6	rate	8,419E+06	6,716E+06	9,162E+06	1,243E+07	
PMT 7	rate	1,221E+07	1,517E+07	1,129E+07	1,115E+07	
PMT 8	rate	1,742E+07	1,731E+07	2,014E+07	1,944E+07	

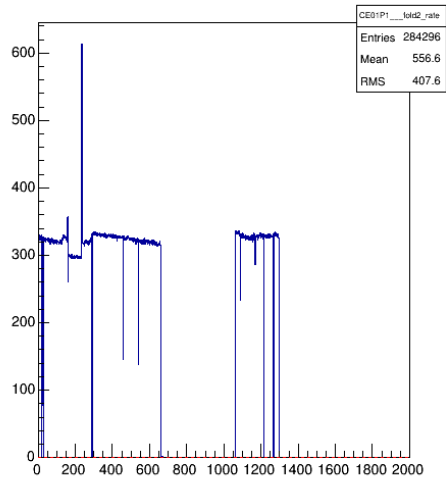
CEDAR 2						
PMT 1	rate	1,130E+07	1,409E+07	1,242E+07	1,077E+07	
PMT 2	rate	9,508E+06	1,103E+07	9,515E+06	8,917E+06	
PMT 3	rate	1,091E+07	1,044E+07	7,762E+06	7,053E+06	
PMT 4	rate	8,721E+06	6,584E+06	9,277E+06	1,046E+07	
PMT 5	rate	7,589E+06	9,068E+06	9,366E+06	8,748E+06	
PMT 6	rate	8,412E+06	8,961E+06	5,698E+06	7,323E+06	
PMT 7	rate	7,490E+06	9,671E+06	1,248E+07	1,104E+07	
PMT 8	rate	1,519E+07	1,215E+07	7,774E+06	1,038E+07	

CEDAR 1 – first pressure scans

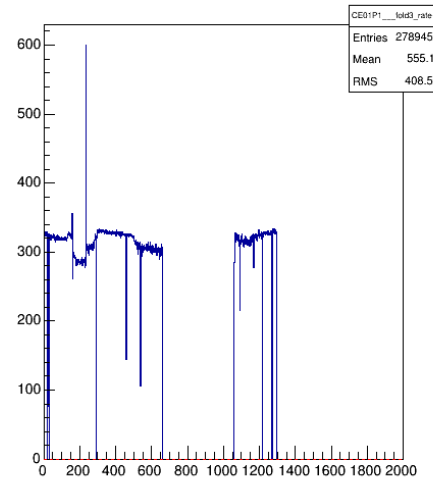
CE01P1__ 1-fold rate



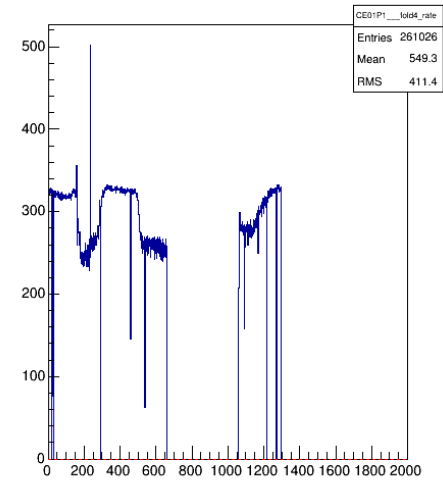
CE01P1__ 2-fold rate



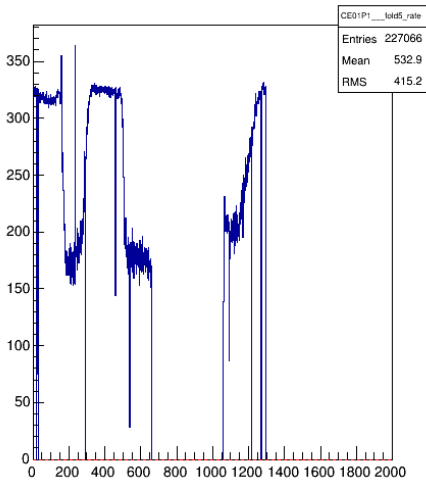
CE01P1__ 3-fold rate



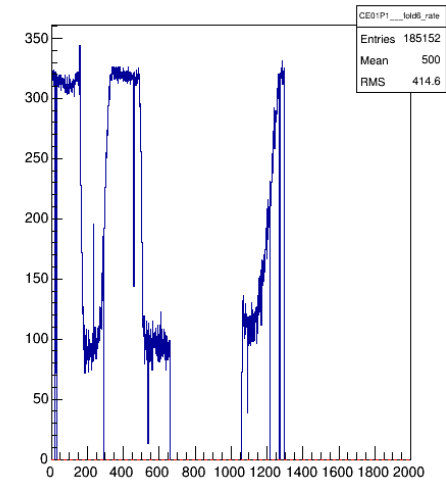
CE01P1__ 4-fold rate



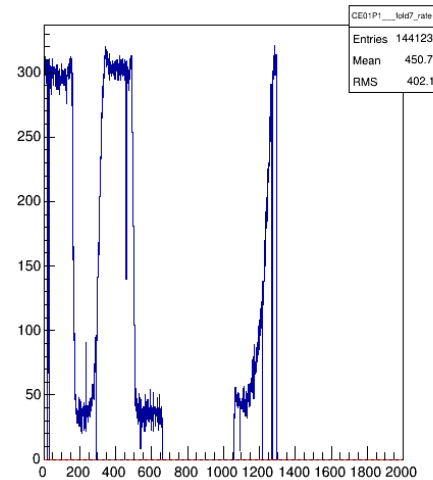
CE01P1__ 5-fold rate



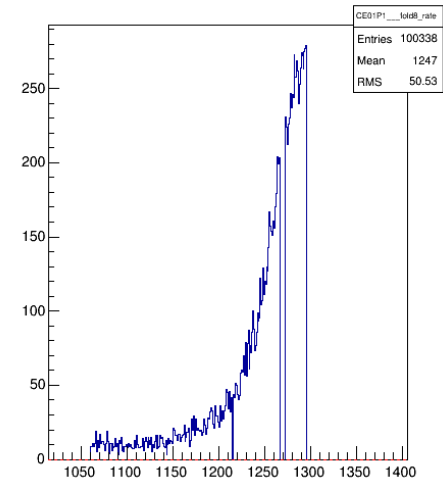
CE01P1__ 6-fold rate



CE01P1__ 7-fold rate

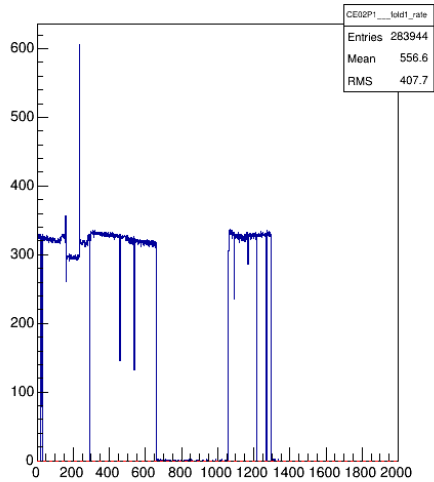


CE01P1__ 8-fold rate

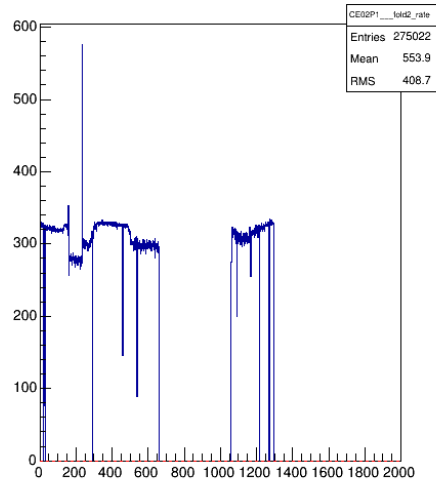


CEDAR 2 – first pressure scans

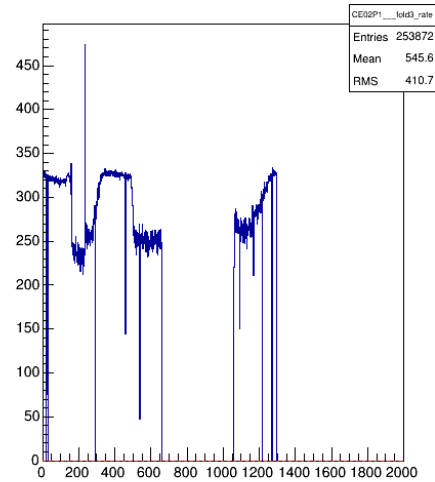
CE02P1__ 1-fold rate



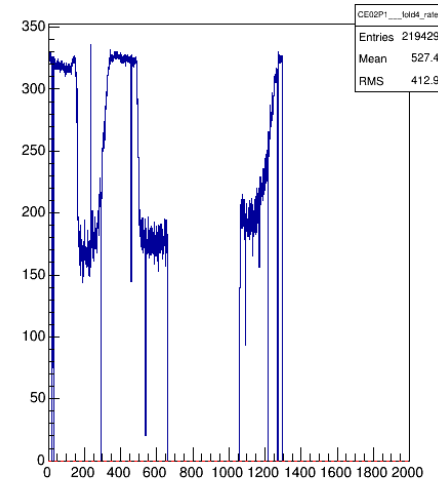
CE02P1__ 2-fold rate



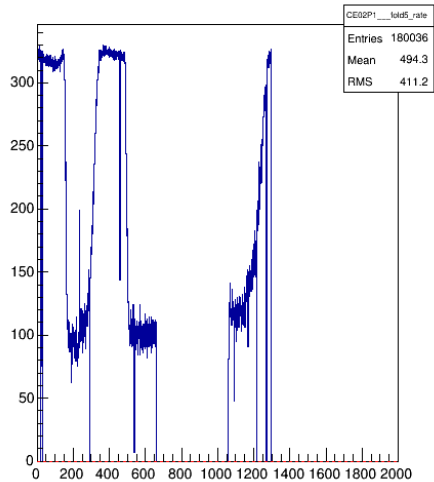
CE02P1__ 3-fold rate



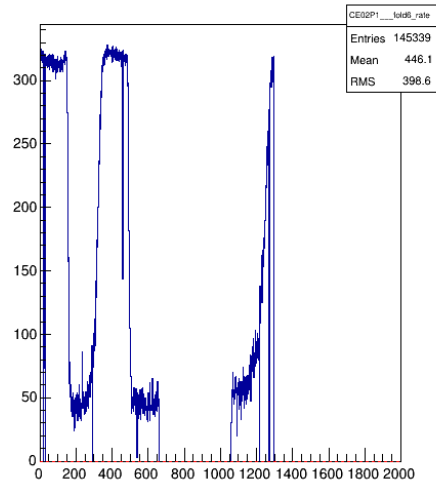
CE02P1__ 4-fold rate



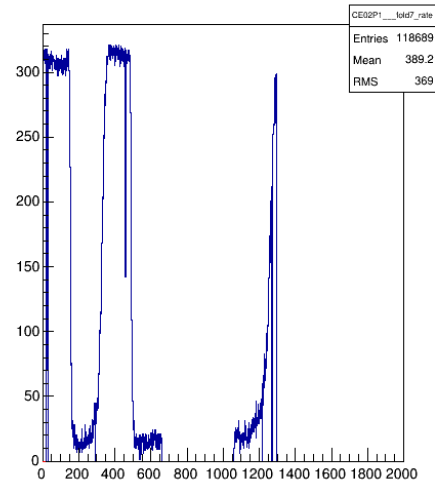
CE02P1__ 5-fold rate



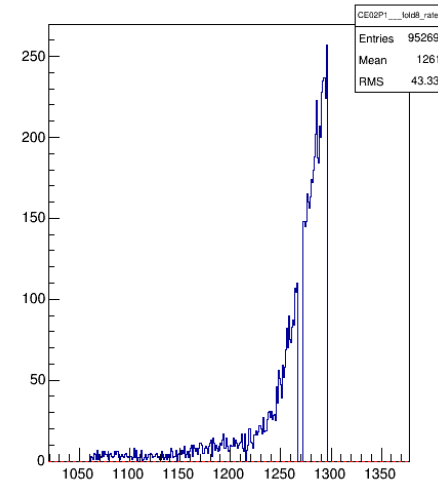
CE02P1__ 6-fold rate



CE02P1__ 7-fold rate



CE02P1__ 8-fold rate



Summary

- Still commissioning – expect to finalize next week
- Made first pressure scans using our electronics, but resolution was not satisfactory
- Major problems encountered:
 - Higher than expected rate, which caused firmware issues - needed time and manpower to debug it
 - No tools for commissioning new electronics, all of them needed to be developed
- To do:
 - T0 calibration
 - Coincidence setup (need to study how narrow coincidence window can be)
 - Final pressure scan after coincidence setup
 - Potentially another HV & threshold check at low intensity beam and widely open diaphragm
 - Depends on results of Monte-Carlo study by Flavio to confirm uniform illumination on PMTs (I asked for this yesterday evening)