LED tuning for PDS calibration

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Introduction

- A preliminary analysis has been performed for the following data
 - **10 runs** for endpoints 111, 112 & 113 (**APAs 3 and 4**) taken on 14/06/2024
 - **11 runs** for endpoint 109 (**APA 2**) taken on 17/06/2024
 - ~30 runs for endpoints 104, 105 & 107 (APA 1) taken on 17-18/06/2024 (ongoing analysis)
- A 270-nm LED, biased with 30 V, was used in every case
- For each APA, the data taking consists of an scan of the pulse_bias_percent_270nm this is the variable that lets us tune the LED light intensity. Its span is [0, 4095]
- We acquired roughly
 - 7k waveforms per channel and per run for APA 1
 - 5k waveforms per channel and per run for APAs 2, 3 & 4
- The goal is to find a minimal set of LED configurations that yield at least one proper charge histograms for every channel in all four APAs





APAs 3 & 4

- A preliminary analysis of the data for **10 runs** with endpoints 111, 112 and 113 (**APAs 3 and 4**) taken on 14/06/2024 has been performed
 - Light was pointing to the center of APAs 3 & 4 plane (channel_mask = 1)
 - LED coupled to polymicro fiber ticks_width = 1 (4 ns)
 - **10** runs in total (27089–27098) 90 seconds each
 - Scanning pulse_bias_percent_270nm from 400 to 2200 in steps of 200
 - 10 Hz DAQ trigger rate
 - 6250 Hz trigger ad-hoc 0x7
 - ~5000 waveforms per channel and per run
- For most channels, we found at least one LED configuration which yields a proper calibration charge histograms

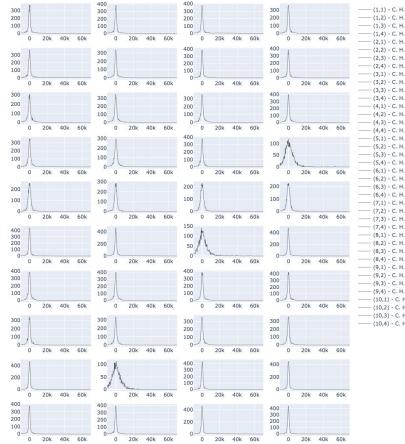
Run number	Date	Start time	End/run time	Shifter	PDS expert	Active Endpoints	# triggers	type	Configuration						
				Cha	nges in seed	d to correct a ty	po> solved	errors in	APA34 configurations. THRESHOLD set back to 9000 and redout is back!! 😽	1aL		1bL			
27089	14/06/2024	17:32	90 s	lperez		111,112,113		LED	Calibration Run. Bias DCS:30V. Trigger ad-hoc 0x7 set to 6250Hz. 10Hz daq trigger rate. runtime 90 s. Tests 270nm: SSP_config. mask_channel:1, ticks_width:1, Pulse_bias_percent_270nm: 400	-					
27090	14/06/2024	17:36	90 s	lperez		111,112,113		LED	Pulse_bias_percent_270nm: 600	_					
27091	14/06/2024	17:39	90 s	lperez		111,112,113		LED	Pulse_bias_percent_270nm: 800		2L			Beam	
27092	14/06/2024	17:42	90 s	lperez		111,112,113		LED	Pulse_bias_percent_270nm: 1000				$ \rightarrow $	Deam	_
27093	14/06/2024	17:46	90 s	lperez		111,112,113		LED	Pulse_bias_percent_270nm: 1200	-					
27094	14/06/2024	17:52	90 s	lperez		111,112,113		LED	Pulse_bias_percent_270nm: 1400						
27095	14/06/2024	17:54	90 s	lperez		111,112,113		LED	Pulse_bias_percent_270nm: 1600	3aL broken fibe	r				
27096	14/06/2024	17:56	90 s	lperez		111,112,113		LED	Pulse_bias_percent_270nm: 1800	3aL		3bL			
27097	14/06/2024	17:59	90 s	lperez		111,112,113		LED	Pulse_bias_percent_270nm: 2000		APA 3 & 4				
27098	14/06/2024	18:03	90 s	Iperez		111,112,113		LED	Pulse_bias_percent_270nm: 2200						



Run 27089 - apa_3



Run 27089 - apa_4



----- (1,1) - C. H. of 4644 Wf(s) ----- (1,2) - C. H. of 4625 Wf(s) ----- (1,3) - C. H. of 4645 Wf(s) ----- (1,4) - C. H. of 4789 Wf(s) ----- (2,1) - C. H. of 4760 Wf(s) ----- (2,2) - C. H. of 4665 Wf(s) ----- (2,3) - C. H. of 4625 Wf(s) ----- (2,4) - C. H. of 4646 Wf(s) ----- (3.1) - C. H. of 4916 Wf(s) ----- (3,2) - C. H. of 5136 Wf(s) ----- (3,3) - C. H. of 5329 Wf(s) ----- (3,4) - C. H. of 5466 Wf(s) ----- (4,1) - C. H. of 5393 Wf(s) ----- (4,2) - C, H, of 5320 Wf(s) ----- (4,3) - C. H. of 5248 Wf(s) ----- (4,4) - C. H. of 5063 Wf(s) ----- (5,1) - C. H. of 4617 Wf(s) ----- (5,2) - C. H. of 4648 Wf(s) ----- (5,3) - C. H. of 4682 Wf(s) — (5,4) - C. H. of 4730 Wf(s) ----- (6,1) - C. H. of 5130 Wf(s) (6,2) - C. H. of 5275 Wf(s) ----- (6,3) - C. H. of 5538 Wf(s) ----- (6,4) - C. H. of 5505 Wf(s) ----- (7,1) - C. H. of 5555 Wf(s) ----- (7,2) - C. H. of 5471 Wf(s) ----- (7,3) - C. H. of 5396 Wf(s) ----- (7,4) - C. H. of 5260 Wf(s) ----- (8,1) - C. H. of 4875 Wf(s) ----- (8,2) - C. H. of 4882 Wf(s) ----- (8,3) - C. H. of 5059 Wf(s) ----- (8,4) - C. H. of 5119 Wf(s) (9,1) - C. H. of 5118 Wf(s) ----- (9,2) - C. H. of 4984 Wf(s) ----- (9,3) - C. H. of 4953 Wf(s) ----- (9,4) - C. H. of 4885 Wf(s) ----- (10,1) - C. H. of 4620 Wf(s) ----- (10,2) - C. H. of 4705 Wf(s) ----- (10,3) - C. H. of 4794 Wf(s) ----- (10,4) - C. H. of 4837 Wf(s)

Run 27090 - apa_3

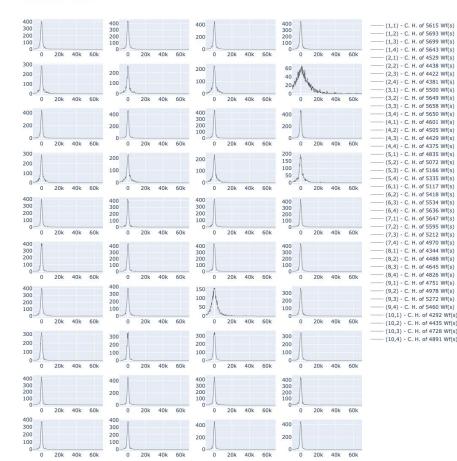


----- (1,1) - C. H. of 5887 Wf(s) ----- (1,2) - C. H. of 5921 Wf(s) ----- (1,3) - C. H. of 5991 Wf(s) ----- (1,4) - C. H. of 5998 Wf(s) - (2,1) - C. H. of 4967 Wf(s) ----- (2,2) - C. H. of 4804 Wf(s) ----- (2,3) - C. H. of 4747 Wf(s) ----- (2,4) - C. H. of 4606 Wf(s) - (3,1) - C. H. of 5798 Wf(s) ----- (3,2) - C. H. of 5911 Wf(s) ----- (3,3) - C. H. of 5962 Wf(s ----- (3,4) - C. H. of 5934 Wf(s) ----- (4,1) - C. H. of 5041 Wf(s) ----- (4,2) - C, H, of 4904 Wf(s) ----- (4,3) - C. H. of 4656 Wf(s) ----- (4,4) - C, H, of 4595 Wf(s) - (5,1) - C. H. of 5217 Wf(s) - (5.2) - C. H. of 5446 Wf(s) ----- (5,3) - C. H. of 5509 Wf(s) ----- (5,4) - C. H. of 5714 Wf(s) ----- (6,1) - C. H. of 5421 Wf(s) - (6,2) - C. H. of 5726 Wf(s) ----- (6,3) - C. H. of 5851 Wf(s) ----- (6,4) - C. H. of 5919 Wf(s) ----- (7,1) - C. H. of 6006 Wf(s) ----- (7,2) - C. H. of 5897 Wf(s) ----- (7,3) - C. H. of 5519 Wf(s) ----- (7,4) - C. H. of 5285 Wf(s) ----- (8,1) - C. H. of 4557 Wf(s) - (8,2) - C. H. of 4729 Wf(s) - (8,3) - C. H. of 4879 Wf(s) - (8,4) - C. H. of 5054 Wf(s) - (9,1) - C. H. of 5111 Wf(s) - (9,2) - C. H. of 5310 Wf(s) - (9.3) - C. H. of 5608 Wf(s) ----- (9,4) - C. H. of 5723 Wf(s) ----- (10,1) - C, H, of 4502 Wf(s) ----- (10,2) - C. H. of 4687 Wf(s) - (10,3) - C. H. of 4930 Wf(s) ----- (10,4) - C. H. of 5141 Wf(s)

Run 27090 - apa_4



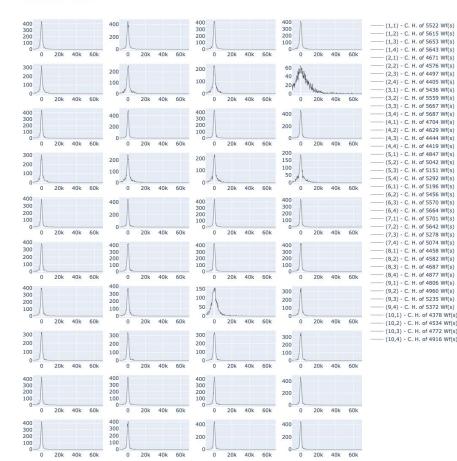
Run 27091 - apa_3



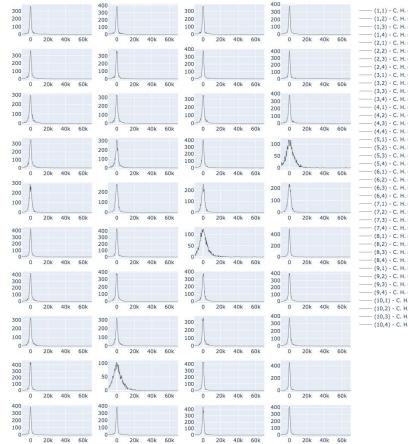
Run 27091 - apa_4



Run 27092 - apa_3



Run 27092 - apa_4

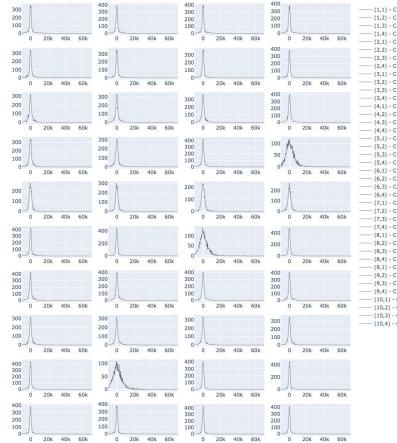


----- (1,1) - C. H. of 4599 Wf(s) ----- (1,2) - C. H. of 4655 Wf(s) ----- (1,3) - C. H. of 4729 Wf(s) — (1,4) - C. H. of 4874 Wf(s) — (2,1) - C. H. of 4855 Wf(s) ----- (2,2) - C. H. of 4742 Wf(s) ----- (2,3) - C. H. of 4692 Wf(s) ----- (2,4) - C. H. of 4607 Wf(s) ----- (3.1) - C. H. of 4955 Wf(s) ----- (3,2) - C. H. of 5209 Wf(s) ----- (3,3) - C. H. of 5411 Wf(s) ----- (3,4) - C. H. of 5472 Wf(s) ----- (4,1) - C. H. of 5443 Wf(s) ----- (4,2) - C. H. of 5387 Wf(s) — (4,3) - C. H. of 5324 Wf(s) ----- (4,4) - C. H. of 5118 Wf(s) ----- (5,1) - C. H. of 4760 Wf(s) ----- (5,2) - C. H. of 4727 Wf(s) ----- (5,3) - C. H. of 4767 Wf(s) ----- (5,4) - C. H. of 4784 Wf(s) ----- (6,1) - C. H. of 5166 Wf(s) (6,2) - C. H. of 5316 Wf(s) ----- (6,3) - C. H. of 5516 Wf(s) ---- (6,4) - C. H. of 5524 Wf(s) ----- (7,1) - C. H. of 5517 Wf(s) ----- (7,2) - C. H. of 5507 Wf(s) ----- (7,3) - C. H. of 5449 Wf(s) ----- (7,4) - C. H. of 5250 Wf(s) — (8,1) - C. H. of 4713 Wf(s) — (8,2) - C. H. of 4827 Wf(s) ----- (8,3) - C. H. of 5002 Wf(s) ----- (8,4) - C. H. of 5120 Wf(s) ----- (9,1) - C, H, of 5110 Wf(s) ----- (9,2) - C. H. of 4974 Wf(s) ----- (9,3) - C. H. of 4889 Wf(s) ----- (9,4) - C. H. of 4764 Wf(s) ----- (10,1) - C. H. of 4540 Wf(s) ----- (10,2) - C. H. of 4634 Wf(s) ----- (10,3) - C. H. of 4695 Wf(s) ----- (10,4) - C. H. of 4710 Wf(s)

Run 27093 - apa_3

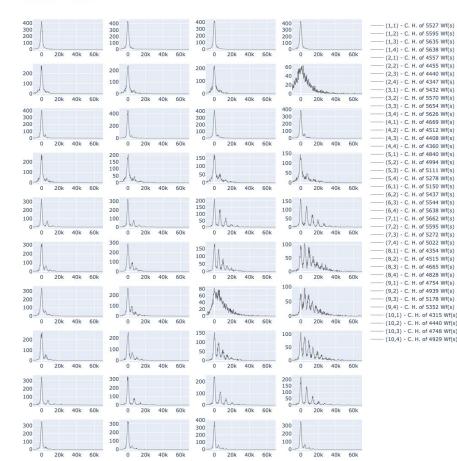


Run 27093 - apa_4



----- (1,1) - C. H. of 4605 Wf(s) ----- (1,2) - C. H. of 4621 Wf(s) ----- (1,3) - C. H. of 4703 Wf(s) ----- (1,4) - C. H. of 4860 Wf(s) — (2,1) - C. H. of 4805 Wf(s) ----- (2,2) - C. H. of 4663 Wf(s) ----- (2,3) - C. H. of 4611 Wf(s) ----- (2,4) - C. H. of 4627 Wf(s) ----- (3.1) - C. H. of 4946 Wf(s) ----- (3,2) - C. H. of 5175 Wf(s) ----- (3,3) - C. H. of 5449 Wf(s) ----- (3,4) - C. H. of 5584 Wf(s) ----- (4,1) - C. H. of 5504 Wf(s) ----- (4.2) - C. H. of 5392 Wf(s) ----- (4,3) - C. H. of 5325 Wf(s) ----- (4,4) - C. H. of 5110 Wf(s) ----- (5,1) - C. H. of 4626 Wf(s) ----- (5,2) - C. H. of 4668 Wf(s) ----- (5,3) - C. H. of 4707 Wf(s) ----- (5,4) - C. H. of 4742 Wf(s) ----- (6,1) - C. H. of 5149 Wf(s) (6,2) - C. H. of 5297 Wf(s) ----- (6,3) - C. H. of 5592 Wf(s) ----- (6,4) - C. H. of 5633 Wf(s) ----- (7,1) - C. H. of 5614 Wf(s) ----- (7,2) - C. H. of 5545 Wf(s) ----- (7,3) - C. H. of 5445 Wf(s) ----- (7,4) - C. H. of 5275 Wf(s) ----- (8,1) - C. H. of 4734 Wf(s) ----- (8,2) - C. H. of 4764 Wf(s) ----- (8,3) - C. H. of 4920 Wf(s) ----- (8,4) - C. H. of 5073 Wf(s) (9,1) - C. H. of 5022 Wf(s) ----- (9,2) - C. H. of 4888 Wf(s) ----- (9,3) - C. H. of 4843 Wf(s) ----- (9,4) - C. H. of 4755 Wf(s) ----- (10,1) - C. H. of 4576 Wf(s) ----- (10,2) - C. H. of 4647 Wf(s) ----- (10,3) - C. H. of 4700 Wf(s) ----- (10,4) - C. H. of 4734 Wf(s)

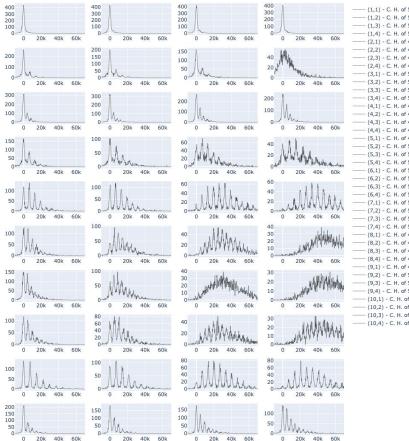
Run 27094 - apa_3



Run 27094 - apa_4

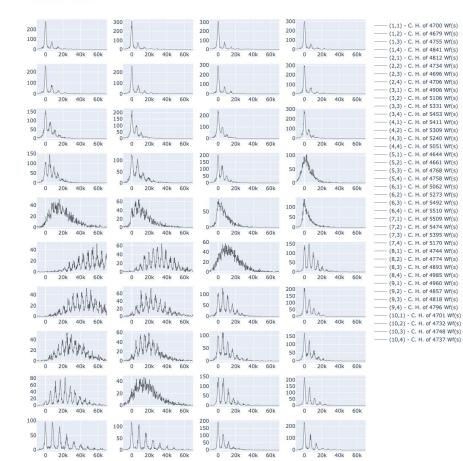


Run 27095 - apa_3

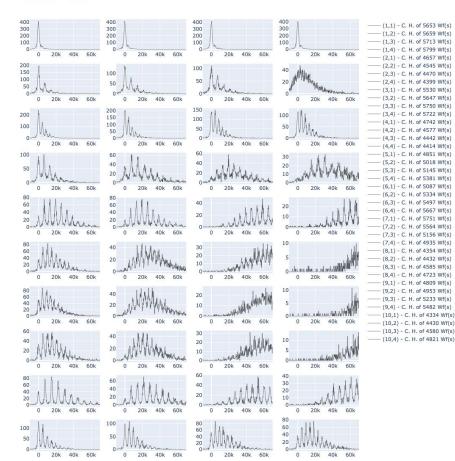


----- (1,1) - C. H. of 5668 Wf(s) ----- (1,2) - C. H. of 5667 Wf(s) ----- (1,3) - C. H. of 5713 Wf(s) — (1,4) - C. H. of 5688 Wf(s) - (2,1) - C. H. of 4524 Wf(s) ----- (2,2) - C. H. of 4416 Wf(s) ----- (2,3) - C. H. of 4384 Wf(s) ----- (2,4) - C. H. of 4389 Wf(s) - (3,1) - C. H. of 5600 Wf(s) ----- (3,2) - C. H. of 5710 Wf(s) ----- (3,3) - C. H. of 5728 Wf(s) ----- (3,4) - C. H. of 5694 Wf(s) - (4,1) - C, H, of 4637 Wf(s) - (4,2) - C, H, of 4441 Wf(s) ----- (4,3) - C. H. of 4399 Wf(s) - (4,4) - C, H, of 4373 Wf(s) - (5,1) - C. H. of 4881 Wf(s) - (5.2) - C. H. of 5106 Wf(s) ----- (5,3) - C. H. of 5179 Wf(s) - (5,4) - C. H. of 5400 Wf(s) - (6,1) - C. H. of 5081 Wf(s) (6,2) - C. H. of 5364 Wf(s) - (6,3) - C. H. of 5509 Wf(s) — (6,4) - C. H. of 5662 Wf(s) - (7,1) - C. H. of 5756 Wf(s) ----- (7,2) - C. H. of 5616 Wf(s) ----- (7,3) - C. H. of 5186 Wf(s) — (7,4) - C. H. of 5005 Wf(s) - (8,1) - C. H. of 4369 Wf(s) - (8,2) - C. H. of 4484 Wf(s) (8,3) - C. H. of 4640 Wf(s) - (8,4) - C. H. of 4826 Wf(s) - (9,1) - C. H. of 4787 Wf(s) (9,2) - C. H. of 5006 Wf(s) (9.3) - C. H. of 5282 Wf(s) - (9,4) - C. H. of 5509 Wf(s) ----- (10,1) - C, H, of 4301 Wf(s) ----- (10,2) - C. H. of 4434 Wf(s) - (10,3) - C. H. of 4702 Wf(s) - (10,4) - C. H. of 4880 Wf(s)

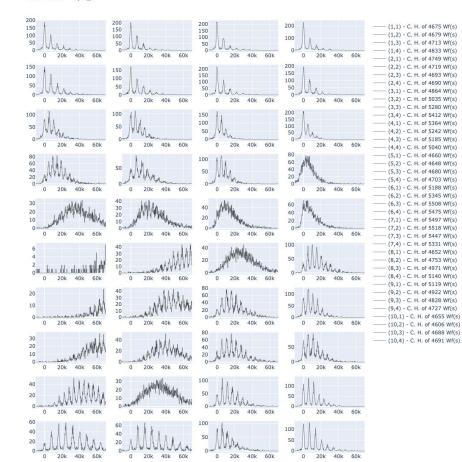
Run 27095 - apa_4



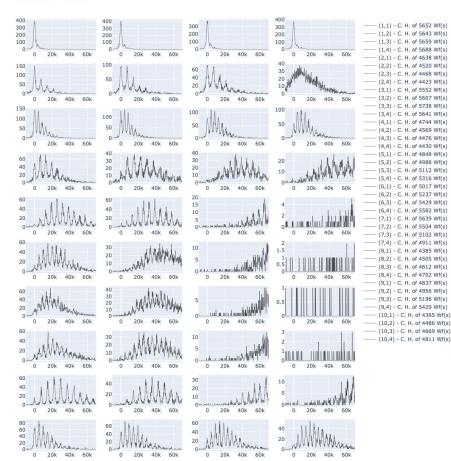
Run 27096 - apa_3



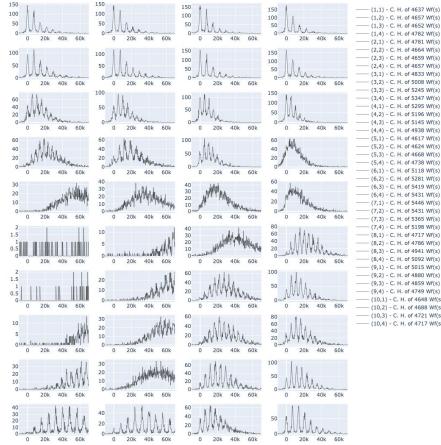
Run 27096 - apa_4



Run 27097 - apa_3

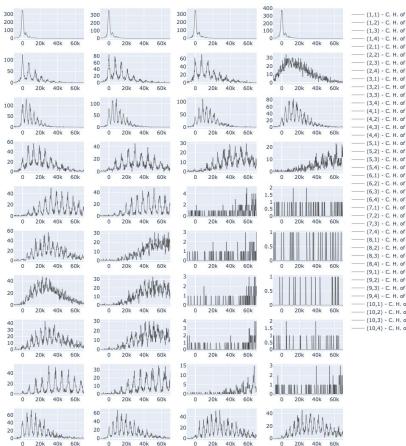


Run 27097 - apa_4



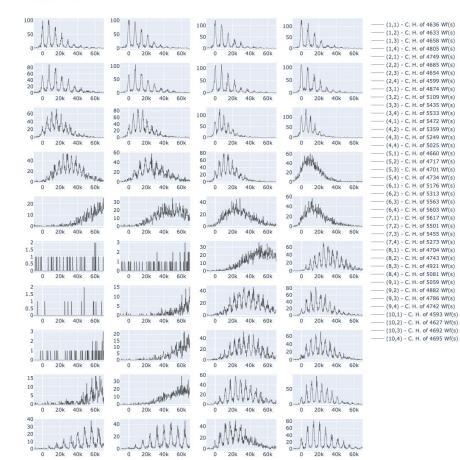
----- (1,2) - C. H. of 4657 Wf(s) (1,3) - C. H. of 4652 Wf(s) — (1,4) - C. H. of 4782 Wf(s) (2,1) - C. H. of 4781 Wf(s) ----- (2,2) - C. H. of 4664 Wf(s) ----- (2,3) - C. H. of 4659 Wf(s) ----- (2,4) - C. H. of 4657 Wf(s) — (3.1) - C. H. of 4833 Wf(s) ----- (3,2) - C. H. of 5008 Wf(s) ----- (3,3) - C. H. of 5245 Wf(s) ----- (3,4) - C. H. of 5347 Wf(s) ----- (4,1) - C. H. of 5295 Wf(s) ----- (4,2) - C. H. of 5196 Wf(s) ----- (4,3) - C. H. of 5145 Wf(s) ----- (4,4) - C. H. of 4938 Wf(s) ----- (5,1) - C. H. of 4617 Wf(s) ----- (5,2) - C. H. of 4624 Wf(s) ----- (5,3) - C. H. of 4668 Wf(s) ----- (5,4) - C. H. of 4738 Wf(s) — (6,1) - C. H. of 5118 Wf(s) (6,2) - C. H. of 5281 Wf(s) ----- (6,3) - C. H. of 5419 Wf(s) ----- (6,4) - C. H. of 5431 Wf(s) ----- (7,1) - C. H. of 5446 Wf(s) (7,2) - C. H. of 5431 Wf(s) ----- (7,3) - C. H. of 5365 Wf(s) (7,4) - C. H. of 5198 Wf(s) ----- (8,1) - C. H. of 4717 Wf(s) ----- (8,2) - C. H. of 4786 Wf(s) — (8,3) - C. H. of 4941 Wf(s) ----- (8,4) - C. H. of 5092 Wf(s) ----- (9,1) - C. H. of 5015 Wf(s) ----- (9,2) - C. H. of 4880 Wf(s) ----- (9,3) - C. H. of 4859 Wf(s) ----- (9,4) - C. H. of 4749 Wf(s) ----- (10,1) - C. H. of 4648 Wf(s) ----- (10,2) - C. H. of 4688 Wf(s) ----- (10,3) - C. H. of 4721 Wf(s) ----- (10,4) - C. H. of 4717 Wf(s)

Run 27098 - apa_3



----- (1,1) - C. H. of 5633 Wf(s) ----- (1,2) - C. H. of 5709 Wf(s) ----- (1,3) - C. H. of 5681 Wf(s) - (1,4) - C. H. of 5732 Wf(s) (2,1) - C. H. of 4601 Wf(s) ----- (2,2) - C. H. of 4489 Wf(s) - (2,3) - C. H. of 4438 Wf(s) - (2,4) - C. H. of 4420 Wf(s) (3,1) - C. H. of 5515 Wf(s) (3,2) - C. H. of 5661 Wf(s) - (3,3) - C. H. of 5736 Wf(s) (3,4) - C. H. of 5732 Wf(s) (4,1) - C, H, of 4703 Wf(s) (4,2) - C, H, of 4528 Wf(s) - (4,3) - C. H. of 4403 Wf(s) (4,4) - C. H. of 4366 Wf(s) - (5,1) - C. H. of 4838 Wf(s) - (5.2) - C. H. of 4989 Wf(s) - (5,3) - C. H. of 5110 Wf(s) (5,4) - C. H. of 5335 Wf(s) - (6,1) - C. H. of 5140 Wf(s) (6,2) - C. H. of 5385 Wf(s) ----- (6,3) - C. H. of 5455 Wf(s) - (6,4) - C. H. of 5613 Wf(s) - (7,1) - C. H. of 5750 Wf(s) ----- (7,2) - C. H. of 5604 Wf(s) ----- (7,3) - C. H. of 5214 Wf(s) ----- (7,4) - C. H. of 5006 Wf(s) (8,1) - C. H. of 4371 Wf(s) (8,2) - C. H. of 4495 Wf(s) (8,3) - C. H. of 4622 Wf(s) - (8,4) - C. H. of 4824 Wf(s) - (9,1) - C. H. of 4796 Wf(s) (9,2) - C. H. of 4950 Wf(s) (9.3) - C. H. of 5228 Wf(s) (9,4) - C. H. of 5436 Wf(s) - (10,1) - C, H, of 4393 Wf(s) ----- (10,2) - C. H. of 4470 Wf(s) - (10,3) - C. H. of 4697 Wf(s) ----- (10,4) - C. H. of 4933 Wf(s)

Run 27098 - apa_4



APAs 3 & 4

Preliminary estimation of optimal pulse_bias_percent_270nm for calibration, per channel

APA 3

>>2200	>>2200	>>2200	>>2200
\gtrsim 2200	2000	2000	-
2000-2200	\lesssim 2000	1800	1800
1800	1600-1800	1400-1600	1400-1600
1600	1600	\gtrsim 1400	\gtrsim 1400
1600	1400-1600	\gtrsim 1400	\lesssim 1400
\gtrsim 1600	1400-1600	-	\lesssim 1400
\gtrsim 1600	\lesssim 1600	\gtrsim 1400	\gtrsim 1400
1600	\lesssim 1600	\gtrsim 1400	\gtrsim 1400
1800-2000	\lesssim 1800	1600-1800	\gtrsim 1600

APA 4

\lesssim 2200	\gtrsim 2200	\gtrsim 2200	\gtrsim 2200
2000	2000	\lesssim 2200	\gtrsim 2200
1600-1800	1800	2000	\gtrsim 2200
\lesssim 1600	\gtrsim 1600	\lesssim 1800	
1400-1600	<1600	1600	1600-1800
<1400	1400	-	\lesssim 1600
\lesssim 1400	>1400	\lesssim 1600	1600-1800
\gtrsim 1400	\gtrsim 1400	1600	1600-1800
\gtrsim 1400	-	\gtrsim 1600	1600-1800
1600	\gtrsim 1600	1600-1800	1800

These are the pulse_bias_percent_270nm which yield roughly the same amount of 0-PE and 1-PE events, but we could cope with worse (but viable) situations for the sake of reducing the amount of minimal LED configuration, p.e.:



LED tuning proposal for APAs 3 & 4

Run 27094 - apa 3

400 (1,1) - C. H. of 5527 Wf(s 300 300 200 - (1,2) - C. H. of 5595 Wf(s) 200 200 100 100 - (1,3) - C. H. of 5635 Wf(s - (1,4) - C. H. of 5638 Wf(s 60k 20k (2,1) - C. H. of 4557 Wf(s (2.2) - C. H. of 4455 Wf(s 200 - (2.3) - C. H. of 4440 Wf(s 100 100 100 - (2,4) - C, H, of 4347 Wf(s - (3.1) - C. H. of 5432 Wf/s (3.2) - C H of 5570 WH 40k 60k 20k 40k (3,3) - C. H. of 5654 Wf(s 400 400 400 (3.4) - C. H. of 5626 Wf(s 300 200 300 200 300 (4,1) - C. H. of 4669 Wf(s 200 (4.2) - C. H. of 4512 Wf(s 100 100 100 (4.3) - C. H. of 4408 Wf(s 404 604 60k 204 (4,4) - C. H. of 4360 Wf(s (5.1) - C. H. of 4840 Wf(s 150 200 150 100 - (5 2) - C H of 4994 Wf/s 100 100 50 - (5.3) - C. H. of 5111 Wf(s 50 (5.4) - C H of 5278 W//s (6.1) - C. H. of 5150 Wf(s 40k 60k 20k 60k 20k 40k 60k 20k 40k (6.2) - C. H. of 5437 Wf(s 300 300 200 150 100 150 (6,3) - C. H. of 5544 Wf(s 200 200 100 (6.4) - C. H. of 5638 Wf(s 100 100 50 (7,1) - C. H. of 5662 Wf(s · (7,2) - C. H. of 5595 Wf(s 20k 40k 60k 20k 40k 60k 20k 40k 60k 0 20k 40k 60k (7,3) - C. H. of 5272 Wf(s 300 300 - (7.4) - C. H. of 5022 Wf(s 150 200 (8.1) - C. H. of 4354 Wf(s 200 100 50 (8.2) - C H of 4515 Wf/s 100 100 50 (8.3) - C. H. of 4665 Wf(s (8,4) - C. H. of 4828 Wf(s 40k 60k 20k 60k 20k 40k 60k 0 20k 40k 40k 601 (9,1) - C. H. of 4754 Wf(s 300 (9,2) - C. H. of 4939 Wf(s 200 60 40 20 200 (9.3) - C. H. of 5178 Wf(s 50 100 100 (9.4) - C. H. of 5352 Wf(s (10,1) - C. H. of 4315 Wf(s) ANK 20k 40k 60k 20k 40k 60k 20k 40k 60k (10.2) - C. H. of 4440 Wf(s) (10 3) + C H of 4748 Wf(s) 150 (10,4) - C. H. of 4929 Wf(s) 200 100 50 100 100 50 20k 40k 20k 40k 200 150 100 50 300 300 200 200 200 100 100 40k 60k 20k 40k 60k 20k 40k 60k 20k 40k 400 300 300 300 200 200 200 200 100 100 100 100 40k 60k 20k 40k 60k 20k 40k 60k 20k 40k

- (1,1) - C. H. of 4624 Wf(s) 300 200 200 200 (1,2) - C. H. of 4633 Wf(s) 200 100 100 100 (1.3) - C. H. of 4704 Wf(s) (1,4) - C. H. of 4751 Wf(s 20k 60k (2,1) - C. H. of 4753 Wf(s) (2,2) - C. H. of 4669 Wf(s) 300 300 300 300 (2.3) - C. H. of 4671 Wf(s) 200 200 200 200 (2.4) - C. H. of 4613 Wf(s) 100 100 (3.1) - C. H. of 4834 Wf(s) (3.2) - C. H. of 5019 Wf(s) 20k 404 60k 20k 40k 60k 40k 60k (3,3) - C. H. of 5356 Wf(s) 300 300 (3,4) - C. H. of 5432 Wf(s) 200 200 200 200 (4,1) - C. H. of 5391 Wf(s) 100 100 100 100 (4,2) - C. H. of 5341 Wf(s) (4.3) - C. H. of 5175 Wf(s) 204 404 60k 60k 404 60k 204 204 (4,4) - C. H. of 4934 Wf(s) (5.1) - C. H. of 4614 Wf(s) 100 200 200 - (5 2) = C H of 4573 Wf(s) 200 100 100 100 50 (5.3) - C. H. of 4707 Wf(s) (5.4) - C H of 4760 Wf(s) (6.1) - C. H. of 5154 Wf(s) 20k 40k 60k 40k 60k 40k 60% 20k (6.2) - C. H. of 5364 Wf(s) (6,3) - C. H. of 5546 Wf(s) 100 150 150 150 100 (6.4) - C. H. of 5482 Wf(s) 100 50 (7,1) - C. H. of 5525 Wf(s) 50 (7,2) - C. H. of 5523 Wf(s) 20k 40k 60k 20k 40k 60k 20k 40k 60k 20k (7,3) - C, H, of 5477 Wf(s) 400 (7.4) - C. H. of 5336 Wf(s) 100 300 (8.1) - C. H. of 4652 Wf(s) 100 200 50 (8.2) - C H of 4761 Wf(s) 100 (8.3) - C. H. of 4943 Wf(s) (8,4) - C. H. of 5017 Wf(s) 20k 40k 60k 20k 40k 60k 40k 60k 20k (9,1) - C. H. of 5012 Wf(s) (9,2) - C, H, of 4943 Wf(s) 300 100 150 200 200 (9.3) - C. H. of 4851 Wf(s) 100 50 100 100 (9,4) - C. H. of 4744 Wf(s) 0 (10,1) - C. H. of 4615 Wf(s) 204 40k 60k 20k 40k 60k ADE 60k 204 (10.2) - C. H. of 4756 Wf(s) (10 3) - C H of 4629 Wf(s) 100 150 - (10.4) - C. H. of 4688 Wf(s) 200 200 100 50 100 100 50 204 20k 40k 60k 40k 60k 200 300 300 200 200 100 100 100 20k 40k 20k 40k 60k 20k 40k 60k 300 300 200 200 200 200

100

20k 40k 60k

100

Run 27094 - apa 4

100

20k 40k 60k

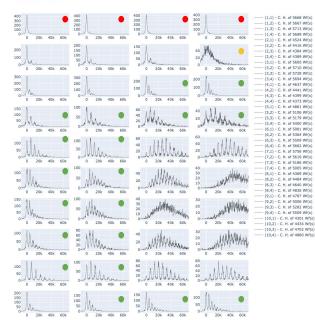
100

20k 40k 60k

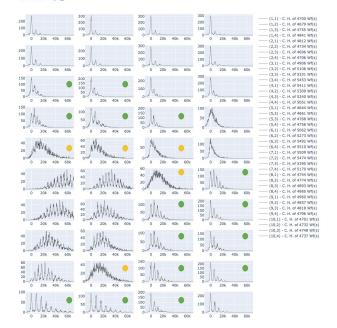
These are the pulse_bias_percent_270nm which yield roughly the same amount of 0-PE and 1-PE events, but we could cope with worse (but viable) situations for the sake of reducing the amount of minimal LED configuration, p.e.:



LED tuning proposal for APAs 3 & 4



Run 27095 - apa_3

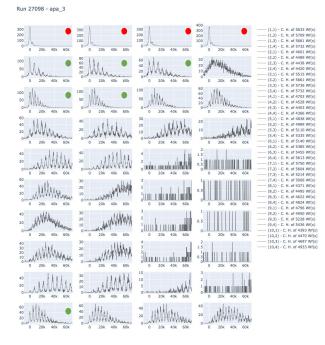


Run 27095 - apa 4

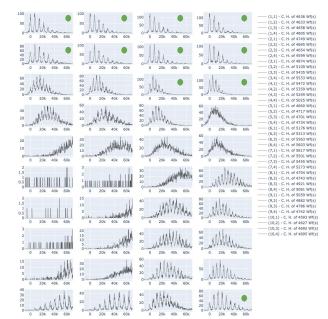
These are the pulse_bias_percent_270nm which yield roughly the same amount of O-PE and 1-PE events, but we could cope with worse (but viable) situations for the sake of reducing the amount of minimal LED configuration, p.e.:



LED tuning proposal for APAs 3 & 4



Run 27098 - apa_4



These are the pulse_bias_percent_270nm which yield roughly the same amount of 0-PE and 1-PE events, but we could cope with worse (but viable) situations for the sake of reducing the amount of minimal LED configuration, p.e.:



APA 2

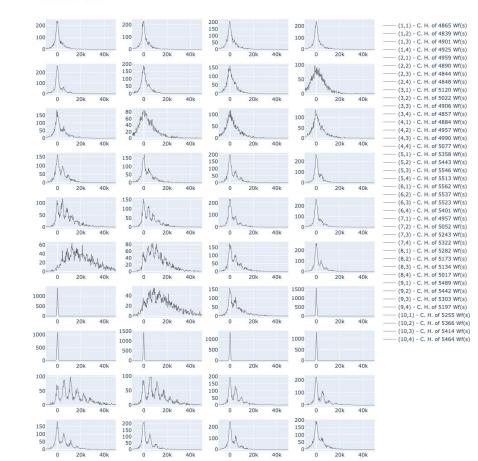
- A preliminary analysis of the data for **11 runs** with endpoint 109 (**APA 2**) taken on 17/06/2024 has been performed
 - Light was pointing to the center of APAs 1 & 2 plane (channel_mask = 1)
 - LED coupled to <u>tefzel</u> fiber ticks_width = 5 (20 ns)
 - **11** runs in total (27120–27130) 90 seconds each
 - Scanning pulse_bias_percent_270nmfrom 3090 to 4090 in steps of 100
 - 0 10 Hz DAQ trigger rate
 - 6250 Hz trigger ad-hoc 0x7
 - ~5000 waveforms per channel and per run
- We found almost no changes between different LED configurations tefzel fiber might be attenuating the 270 nm LED light

Run number	Date	Start time	End/run time	Shifter	PDS expert	Active Endpoints	# triggers	type	Configuration			1bR		1aR
27120	17/06/2024	17:23	90 s	lperez		109		LED	LED run. APA2. Tests 270nm: SSP_config. pulse_mode: single, pulse_bias_percent_270nm: 3090. Ch_mask: 16. pulse1_width_ticks: 5. Bias DCS: 30V. Trigger ad-hoc 0x7 set to 6250Hz. 10Hz daq trigger rate. runtime 90 s.			-		
27121	17/06/2024		90 s	lperez		109		LED	Pulse_bias_percent_270nm: 3190					-
27122	17/06/2024		90 s	lperez		109		LED	Pulse_bias_percent_270nm: 3290					
27123	17/06/2024		90 s	lperez		109		LED	Pulse_bias_percent_270nm: 3390		Beam		2R	
27124	17/06/2024		90 s	lperez		109		LED	Pulse_bias_percent_270nm: 3490	1		1		
27125	17/06/2024		90 s	lperez		109		LED	Pulse_bias_percent_270nm: 3590					
27126	17/06/2024		90 s	lperez		109		LED	Pulse_bias_percent_270nm: 3690					
27127	17/06/2024		90 s	lperez		109		LED	Pulse_bias_percent_270nm: 3790					
27128	17/06/2024		90 s	lperez		109		LED	Pulse_bias_percent_270nm: 3890			3bR		3aR
27129	17/06/2024		90 s	lperez		109		LED	Pulse_bias_percent_270nm: 3990					
27130	17/06/2024		90 s	lperez		109		LED	Pulse_bias_percent_270nm: 4090				APA 1 & 2	

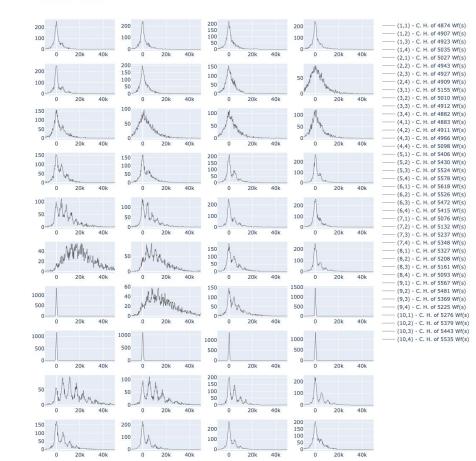




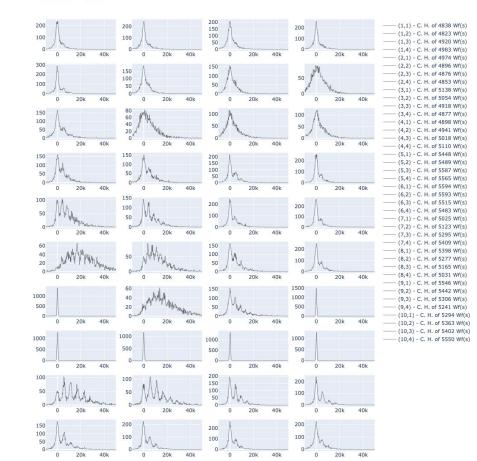
Run 27120 - apa_2



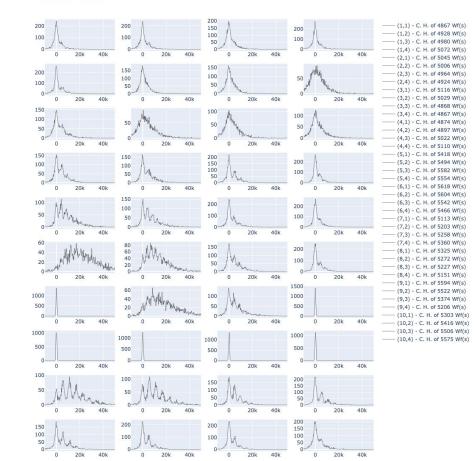
Run 27121 - apa_2



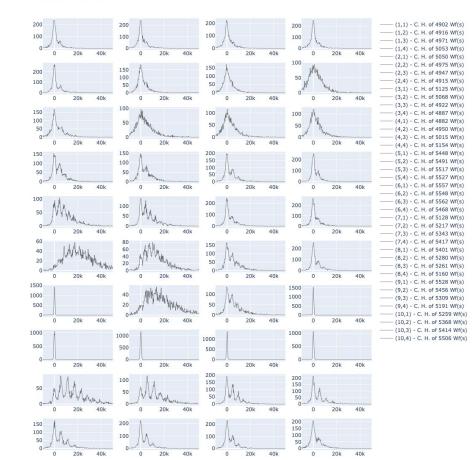
Run 27122 - apa_2



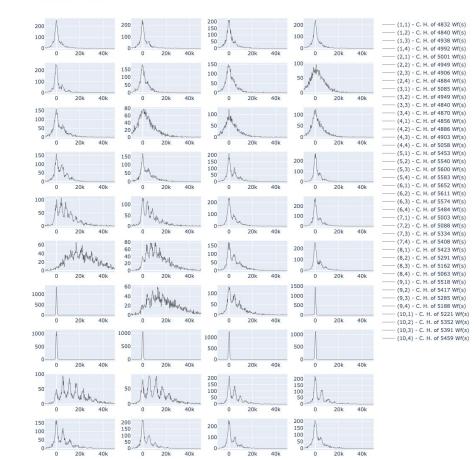
Run 27123 - apa_2



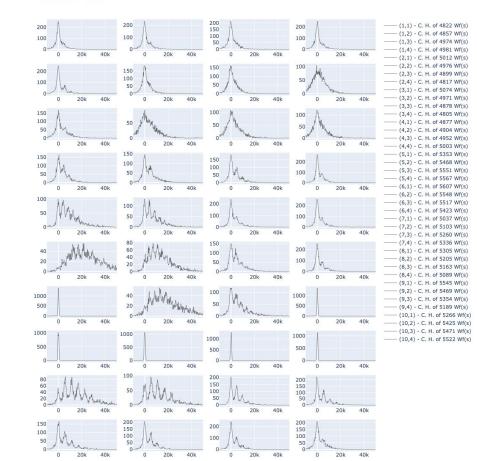
Run 27124 - apa_2



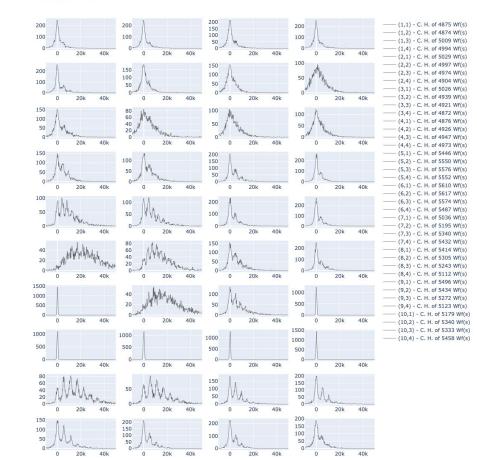
Run 27125 - apa_2



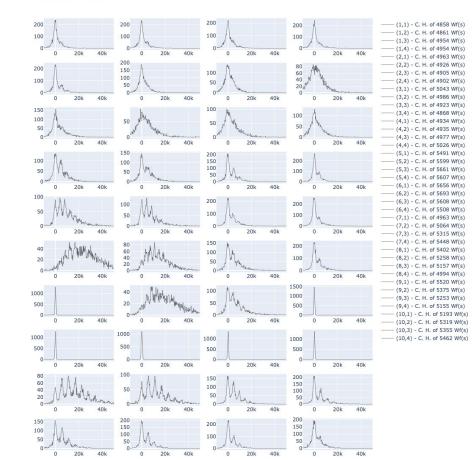
Run 27126 - apa_2



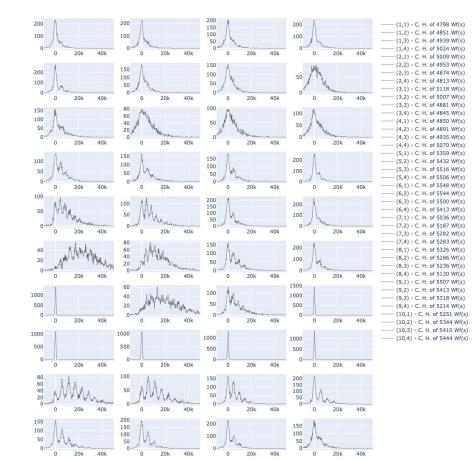
Run 27127 - apa_2



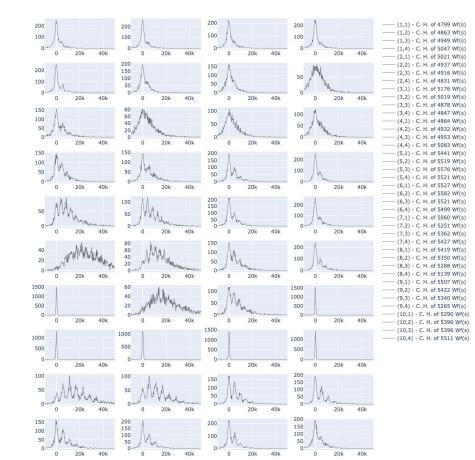
Run 27128 - apa_2



Run 27129 - apa_2

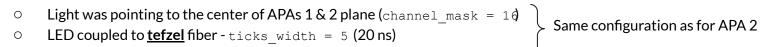


Run 27130 - apa_2



APA 1

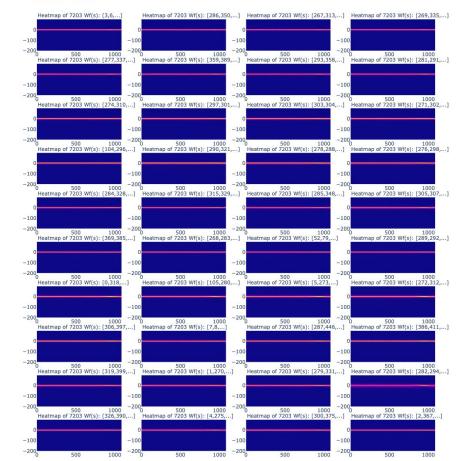
• Ongoing analysis of the data for some runs with endpoints 104, 105 & 107 (APA 1) taken on 17-18/06/2024



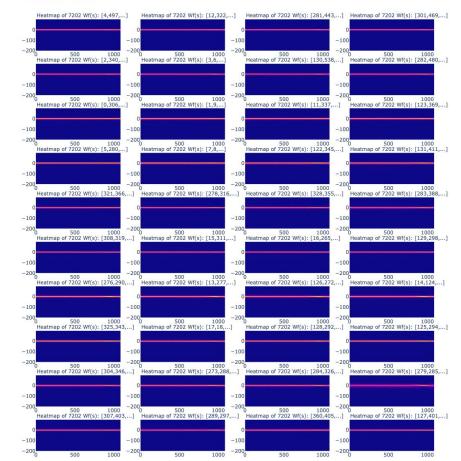
- There are ~30 available runs 180 seconds each
- Scanning pulse_bias_percent_270nm from 500 to 4045 ------- But wider scan wrt APA 2
- 20 Hz DAQ trigger rate
- 20 Hz trigger ad-hoc 0x7
- ~7000 waveforms per channel and per run
- Preliminary plots show that the detected amount of light
 - increases in the [1000, 3045] range of pulse_bias_percent_270nm,
 - but stays roughly the same in the [3045, 4095]
- The data seems *suitable* for calibration analysis, but the waveforms need to be aligned

Run number	Date	Start time	End/run time	Shifter	PDS expert	Active Endpoints	# triggers	type	Configuration				1bR		1aR
27210	17/06/2024		180s	marroyav		104,105,107		LED	Calibration Run. Bias DCS:30V. Tests 270nm: SSP_config. pulse_mode:single, mask_channel:16, ticks_width:5, Pulse_bias_percent_270nm:4095. Trigger_ad-hoc 0x7:20Hz. 20Hz daq triger_rate.						-
27211	17/06/2024	-	180s	marroyav		104,105,107		LED	4045						
27212	17/06/2024		180s	marroyav		104,105,107		LED	3995						-
27213	17/06/2024		180s	marroyav		104,105,107		LED	3945	-					
27214	17/06/2024		180s	marroyav		104,105,107		LED	3895	-	Beam	\rightarrow		2R	
27215	17/06/2024		180s	marroyav		104,105,107		LED	3845	-					
27216	17/06/2024		180s	marroyav		104,105,107		LED	3795						
27217	17/06/2024		180s	marroyav		104,105,107		LED	3745						
27218	17/06/2024		180s	marroyav		104,105,107		LED	3695						
27219	17/06/2024		180s	marroyav		104,105,107		LED	3645				3bR		3aR
27220	17/06/2024		180s	marroyav		104,105,107		LED	3595						
27221	17/06/2024		180s	marroyav		104,105,107		LED	3545					APA 1 & 2	

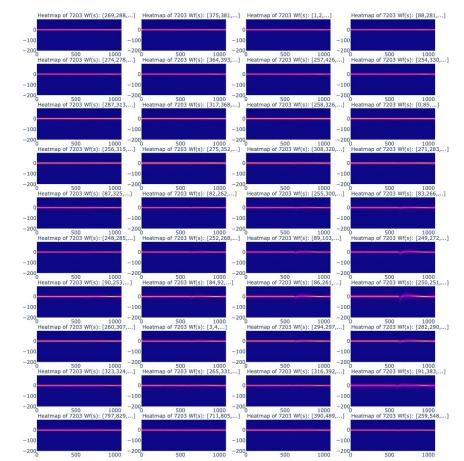
Run 27293 - apa_1



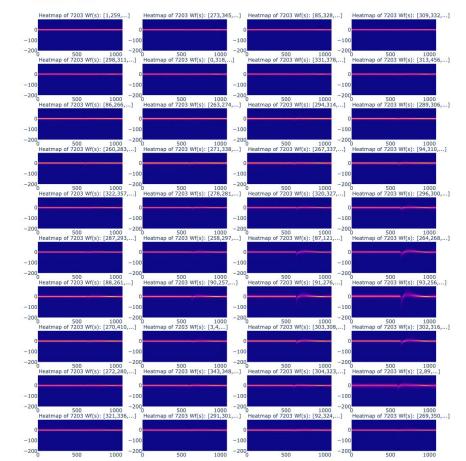
Run 27292 - apa_1



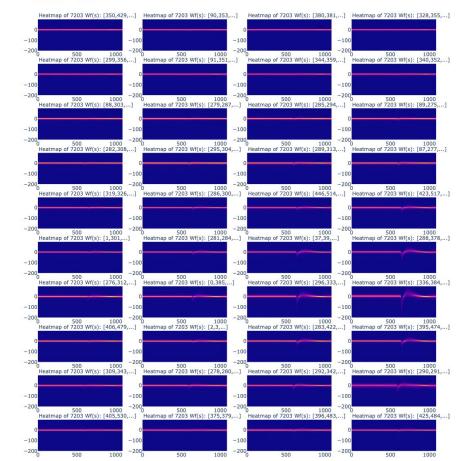
Run 27291 - apa_1



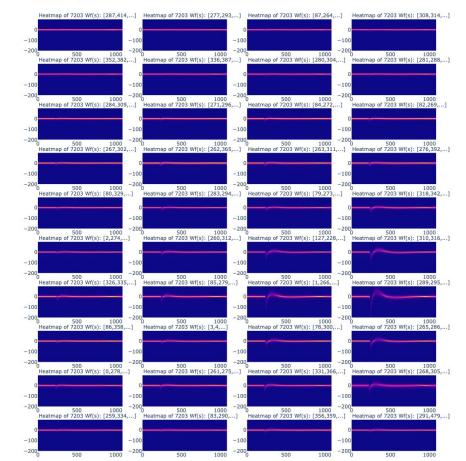
Run 27290 - apa_1



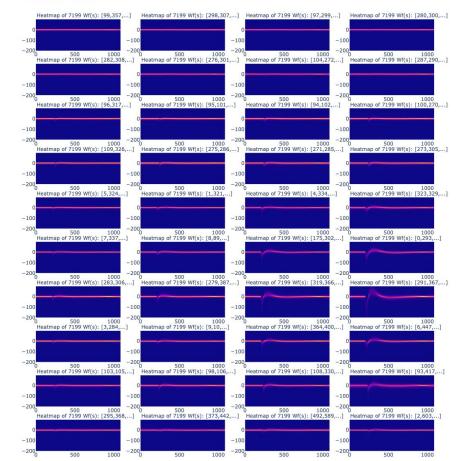
Run 27288 - apa_1



Run 27222 - apa_1



Run 27210 - apa_1



Conclusions

- APAs 3 & 4
 - We have almost all the data we require to tune the LED for APAs 3 & 4 calibration
- APAs 1 & 2
 - With the centered <u>tefzel</u> fiber we seem to have reached a plateau of the detected light wrt the pulse_bias_percent_270nm
 - increasing ticks_width beyond 5 (20 ns) we may detect more light (indeed, we needed to increase it from 1 to 5 in the past to see some light in APA 2)
 - This plateau configuration for the centered fiber seems OK to calibrate some of the channels APAs 1 & 2, but we will need to use other LED/fiber to calibrate channels placed at some corners of the APAs
 - APA 1 waveform alignment is a pending task (offline analysis)

