LYRA Dark Current and LED Measurements

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Introduction

For an estimation of expected dark currents and reactions to visual and/or ultraviolet LEDs, there are eight test runs from the 2006 BESSY campaigns that can be exploited. On 29 March (NI campaign) and on 17 March (GI campaign) there were several hours of tests performed with LEDs switched on and off together with the BESSY beam applied to selected channels. For a list of files with resulting data, see following page.

A first analysis was performed with aggregated data from channels with beam signals, together with longer observations to test the stability or drift (see *IED_20060920_LYRA_Signal.pdf*, "LYRA Signal Stability: Report", last revised version 04 Dec 2006). Then there was a comparison between pulsed visual LED tests with the BESSY tests mentioned above (see *IED_20070214_LYRA_Pulsed.pdf*, "LYRA Pulsed LED Tests: Data Analysis", last revised version 06 Mar 2007).

For this report, the raw files from the monitoring PC were used. These files have several advantages: (1) The temporal resolution is higher (500 ms). (2) All four channels of one LYRA head (sometimes even two heads) are monitored simultaneously, so not only the results of the channel with the beam signal can be observed, but also the other channels; this holds for the dark currents as well as the visual *and* ultraviolet LEDs. (3) While the ultraviolet LEDs are only switched on for one individual head, the visual LEDs are switched on for all heads simultaneously; therefore, when two heads are monitored in parallel (which is the case in five out of the eight test runs), the effect of the visual LEDs can be observed for both heads.

This report delivers the numerical values. They show the variation (or the stability) of the measurements, without giving an explanation, and they can build a basis for future ground and flight tests. The report can be extended to show the temporal developments, drifts etc., because these tests were performed in two consecutive sets, lasting several hours each. The tables for the twelve LYRA channels 1-1,...,3-4 follow on pages 3 to 14.

Additional results:

Some measurements are so sensitive that they show the switch-on and switch-off of the BESSY beam on a parallel channel. - One channel reacts with a *decrease* in counts to the switch-on of the ultraviolet LED. - In some channels, the reactions to visual and ultraviolet LEDs exactly add up, in others not. - Some channels show drifts or tails in dark currents and visual LED reactions. These can be different from the drifts or tails as reaction to the beam signal.

Unfortunately, there are only a few uv LED observations for head 1 and 2, and no such observations for head 3.

The result tables show, per channel, the different observations of dark current, vis LED, uv LED, and vis+uv LED, as well as some interesting parameters at the bottom. The measurements are shown in different units: counts, kHz, V, and nA, from left to right. Of the eight test runs, the first six were started on 29 Mar 2006 at 16:20, 17:01, 17:29, 18:15, 18:50, and 19:26. The other two were taken on 17 Mar 2006 at 16:04, and 19:15. The VFC parameters r0 and r1were calculated by a linear regression on the observed data, tension vs. frequency, i.e. the Voltage-Frequency-Converter was treated as a "black box". All LED values are *net* values, i.e. the dark currents are subtracted. All values are averages of 200 measurements, preferably in a "plateau" phase, i.e. directly before a change (LED switched on/off, BESSY beam switched on/off).

The relationship between the columns is as follows:

(frequency / kHz) = counts / (int.time / ms)
(tension / V) = r0 + r1*(frequency / kHz) [for dark current]
(tension / V) = r1*(frequency / kHz) [for all others, since all LED values are differences]
(current / nA) = (tension / V) / (resist. / GigaOhm)

All integration times happen to be 500 ms, whereas the resistance values are, of course, constant.

Files for LYRA Channels' LED tests

raw data	**1-1**	**1-2**	**1-3**	**1-4**	**2-1**	**2-2**	**2-3**	**2-4**	**3-1**	**3-2**	**3-3**	**3-4**
/projects/lyra/LYRA_Calibration_Data/BESSY_NI/Bessy_NI_March2006/PCSilvio/NI_Data/												
20060329_162004_ch1_1_led_test_121nm.txt	**u,v**	**u,v**	**u,v**	**u,v**								
20060329_170118_ch2_1_led_test_210nm.txt	**u,v**	**u,v**	**u,v**	**u,v**								
20060329_172945_ch1_2_led_test_121nm.txt	**v**	**v**	**v**	**v**	**u,v**	**u,v**	**u,v**	**u,v**				
20060329_181533_ch1_3_led_test_121nm.txt	**v**	**v**	**v**	**v**					**v**	**v**	**v**	**v**
20060329_185052_ch2_3_led_test_210nm.txt	**v**	**v**	**v**	**v**					**v**	**v**	**v**	**v**
20060329_191905_ch2_2_led_test_210nm.txt												
20060329_192252_ch2_2_led_test_210nm.txt												
20060329_192654_ch2_2_led_test_210nm.txt	**v**	**v**	**v**	**v**	**u,v**	**u,v**	**u,v**	**u,v**				
/projects/lyra/LYRA_Calibration_Data/BESSY_GI/Bessy_GI_March2006/PCSilvio/GI_Data_Silvio/												
20060317_160400_H2C3_VisLEDs.txt					**v**	**v**	**v**	**v**				
20060317_191513_H3C3_VisLEDs.txt					**v**	**v**	**v**	**v**	**v**	**v**	**v**	**v**

processed data	**1-1**	**1-2**	**1-3**	**1-4**	**2-1**	**2-2**	**2-3**	**2-4**	**3-1**	**3-2**	**3-3**	**3-4**
/projects/lyra/LYRA_Calibration_Data/BESSY_NI/Bessy_NI_March2006/CH1-1/LEDS/												
LEDs_1-1_121nm_IIU.asc	**u,v**											
/projects/lyra/LYRA_Calibration_Data/BESSY_NI/Bessy_NI_March2006/CH1-2/Leds/												
LEDs_1-2_210nm_IIU.asc		**u,v**										
/projects/lyra/LYRA_Calibration_Data/BESSY_GI/Bessy_GI_March2006/CH1-3/												
LYRA_1-3_Al_stability-short_with-visLEDs.txt			**v**									
/projects/lyra/LYRA_Calibration_Data/BESSY_NI/Bessy_NI_March2006/CH2-1/Leds/												
LEDs_2-1_121nm_IIU.asc					**u,v**							
/projects/lyra/LYRA_Calibration_Data/BESSY_NI/Bessy_NI_March2006/CH2-2/Leds/												
LEDs_2-2_210nm_IIU.asc						**u,v**						
/projects/lyra/LYRA_Calibration_Data/BESSY_GI/Bessy_GI_March2006/CH2-3/												
LYRA_2-3_Al_stability-friday-special-with-visLEDs.txt							**v**					
[/projects/lyra/LYRA_Calibration_Data/BESSY_NI/Bessy_NI_March2006/CH3-1/Leds/												
LEDs_3-1_121nm_IIU.asc – data fault! replaced by next file]												
/home/dammasch/lyracal/												
LEDs_3-1_121nm_IIU.asc									**v**			
/projects/lyra/LYRA_Calibration_Data/BESSY_NI/Bessy_NI_March2006/CH3-2/Leds/												
LEDs_3-2_210nm_IIU.asc										**v**		
/projects/lyra/LYRA_Calibration_Data/BESSY_GI/Bessy_GI_March2006/CH3-3/												
LYRA_3-3_Al_stability-friday-special-with-visLEDs.txt											**v**	

raw data = PC data, monitoring four or eight channels, in cnt, kHz, V
processed data = averaged and converted to A, only for channel with beam signal.
u = test with uvLED on
v = test with visLED on

Channel 1-1 : Ly XN + MSM12

dark current	counts	frequency / kHz	tension / V	current / nA
16:20	4609.90	9.21979	0.0103275	0.00102354
17:01	5542.75	11.0855	0.0180765	0.00179153
17:29	5275.33	10.5507	0.0158575	0.00157161
18:15	5298.88	10.5978	0.0160525	0.00159093
18:50	5365.36	10.7307	0.0166035	0.00164554
19:26	5403.81	10.8076	0.0169170	0.00167661
16:04				
19:15				

vis LED	counts	frequency / kHz	tension / V	current / nA
16:20	6733.48	13.4670	0.0559385	0.00554395
17:01	6324.92	12.6498	0.0525450	0.00520763
17:29	4379.58	8.75916	0.0363786	0.00360541
18:15	4239.33	8.47865	0.0352160	0.00349019
18:50	4010.56	8.02113	0.0333126	0.00330154
19:26	3853.51	7.70701	0.0320129	0.00317274
16:04				
19:15				

uv LED	counts	frequency / kHz	tension / V	current / nA
16:20	26047.2	52.0944	0.216387	0.0214457
17:01	25236.8	50.4736	0.209653	0.0207783
17:29				
18:15				
18:50				
19:26				
16:04				
19:15				

vis+uv LED	counts	frequency / kHz	tension / V	current / nA
16:20	29056.5	58.1130	0.241382	0.0239229
17:01	26423.3	52.8466	0.219508	0.0217550
17:29				
18:15				
18:50				
19:26				
16:04				
19:15				

parameters	int.time / ms	(VFC) r0	(VFC) r1	resist. / GigaOhm
16:20	500	-0.0279477	0.00415280	1.009*10
17:01	500	-0.0279700	0.00415371	1.009*10
17:29	500	-0.0279705	0.00415372	1.009*10
18:15	500	-0.0279677	0.00415357	1.009*10
18:50	500	-0.0279663	0.00415347	1.009*10
19:26	500	-0.0279695	0.00415358	1.009*10
16:04				
19:15				

Channel 1-2 : Herzberg + PIN10

dark current	counts	frequency / kHz	tension / V	current / nA
16:20	3298.25	6.59649	0.000081999	0.000412060
17:01	3224.17	6.44833	-0.000540001	-0.00271357
17:29	3329.63	6.65926	0.000305501	0.00153518
18:15	3327.76	6.65552	0.000291500	0.00146483
18:50	3334.86	6.66972	0.000379999	0.00190955
19:26	3335.56	6.67113	0.000392999	0.00197487
16:04				
19:15				

vis LED	counts	frequency / kHz	tension / V	current / nA
16:20	120.565	0.241136	0.000987502	0.00496232
17:01	113.925	0.227855	0.000940000	0.00472362
17:29	118.425	0.236856	0.000995503	0.00500253
18:15	132.830	0.265661	0.00111150	0.00558541
18:50	125.685	0.251375	0.00102850	0.00516833
19:26	112.170	0.224339	0.000908504	0.00456535
16:04				
19:15				

uv LED	counts	frequency / kHz	tension / V	current / nA
16:20	335.360	0.670720	0.00276100	0.0138744
17:01	316.910	0.633823	0.00262150	0.0131734
17:29				
18:15				
18:50				
19:26				
16:04				
19:15				

vis+uv LED	counts	frequency / kHz	tension / V	current / nA
16:20	401.140	0.802286	0.00329900	0.0165779
17:01	379.685	0.759374	0.00314001	0.0157789
17:29				
18:15				
18:50				
19:26				
16:04				
19:15				

parameters	int.time / ms	(VFC) r0	(VFC) r1	resist. / GigaOhm
16:20	500	-0.0272666	0.00414358	0.199
17:01	500	-0.0272998	0.00414942	0.199
17:29	500	-0.0273967	0.00416192	0.199
18:15	500	-0.0274266	0.00416615	0.199
18:50	500	-0.0275040	0.00417761	0.199
19:26	500	-0.0273004	0.00414901	0.199
16:04				
19:15				

Channel 1-3 : Aluminium + MSM11

dark current	counts	frequency / kHz	tension / V	current / nA
16:20	3362.78	6.72557	0.000530501	0.000528914
17:01	3390.87	6.78174	0.000795999	0.000793618
17:29	3413.42	6.82683	0.000977001	0.000974078
18:15	3433.22	6.86644	0.00113200	0.00112862
18:50	3478.12	6.95624	0.00150850	0.00150399
19:26	3478.22	6.95644	0.00150500	0.00150050
16:04				
19:15				

vis LED	counts	frequency / kHz	tension / V	current / nA
16:20	9776.53	19.5531	0.0812127	0.0809698
17:01	9919.74	19.8394	0.0823672	0.0821208
17:29	9836.94	19.6739	0.0816798	0.0814355
18:15	9790.05	19.5801	0.0813061	0.0810629
18:50	9719.32	19.4386	0.0807215	0.0804801
19:26	9692.36	19.3847	0.0805029	0.0802621
16:04				
19:15				

uv LED	counts	frequency / kHz	tension / V	current / nA
16:20	37631.0	75.2620	0.312547	0.311612
17:01	37797.1	75.5941	0.313891	0.312952
17:29				
18:15				
18:50				
19:26				
16:04				
19:15				

vis+uv LED	counts	frequency / kHz	tension / V	current / nA
16:20	46806.0	93.6120	0.388732	0.387569
17:01	46796.5	93.5930	0.388626	0.387464
17:29				
18:15				
18:50				
19:26				
16:04				
19:15				

parameters	int.time / ms	(VFC) r0	(VFC) r1	resist. / GigaOhm
16:20	500	-0.0273880	0.00415258	1.003
17:01	500	-0.0273817	0.00415251	1.003
17:29	500	-0.0273776	0.00415225	1.003
18:15	500	-0.0273820	0.00415244	1.003
18:50	500	-0.0273833	0.00415272	1.003
19:26	500	-0.0273824	0.00415260	1.003
16:04				
19:15				

Channel 1-4 : Zr (300nm) + AXUV20D

dark current	counts	frequency / kHz	tension / V	current / nA
16:20	3675.75	7.35151	0.00262950	0.00254304
17:01	3696.00	7.39201	0.00280149	0.00270938
17:29	3720.31	7.44062	0.00300400	0.00290522
18:15	3716.31	7.43263	0.00297900	0.00288104
18:50	3723.89	7.44777	0.00303550	0.00293569
19:26	3730.53	7.46107	0.00310000	0.00299806
16:04				
19:15				

vis LED	counts	frequency / kHz	tension / V	current / nA
16:20	133630.	267.259	1.10986	1.07337
17:01	133285.	266.571	1.10700	1.07060
17:29	133174.	266.348	1.10607	1.06970
18:15	133152.	266.303	1.10588	1.06951
18:50	133068.	266.136	1.10519	1.06885
19:26	132928.	265.856	1.10402	1.06772
16:04				
19:15				

uv LED	counts	frequency / kHz	tension / V	current / nA
16:20	66480.2	132.960	0.552193	0.534036
17:01	66493.1	132.986	0.552296	0.534136
17:29				
18:15				
18:50				
19:26				
16:04				
19:15				

vis+uv LED	counts	frequency / kHz	tension / V	current / nA
16:20	199641.	399.282	1.65800	1.60348
17:01	199432.	398.865	1.65626	1.60180
17:29				
18:15				
18:50				
19:26				
16:04				
19:15				

parameters	int.time / ms	(VFC) r0	(VFC) r1	resist. / GigaOhm
16:20	500	-0.0278783	0.00415251	1.034
17:01	500	-0.0278731	0.00415250	1.034
17:29	500	-0.0278935	0.00415271	1.034
18:15	500	-0.0278772	0.00415266	1.034
18:50	500	-0.0278971	0.00415273	1.034
19:26	500	-0.0278809	0.00415267	1.034
16:04				
19:15				

Channel 2-1 : Ly XN + MSM21

dark current	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29	4670.84	9.34168	0.0110600	0.00106654
18:15				
18:50				
19:26	6469.98	12.9400	0.0259555	0.00250294
16:04	7453.23	14.9065	0.0340335	0.00328192
19:15	7631.53	15.2631	0.0355165	0.00342493

vis LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29	15358.1	30.7162	0.127542	0.0122991
18:15				
18:50				
19:26	14979.4	29.9588	0.124394	0.0119956
16:04	12503.3	25.0066	0.104055	0.0100343
19:15	12616.0	25.2320	0.104992	0.0101246

uv LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29	27633.1	55.2662	0.229481	0.0221293
18:15				
18:50				
19:26	23941.2	47.8824	0.198815	0.0191721
16:04				
19:15				

vis+uv LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29	42980.3	85.9606	0.356922	0.0344187
18:15				
18:50				
19:26	36921.7	73.8433	0.306610	0.0295670
16:04				
19:15				

parameters	int.time / ms	(VFC) r0	(VFC) r1	resist. / GigaOhm
16:20	500			1.037*10
17:01	500			1.037*10
17:29	500	-0.0276313	0.00414983	1.037*10
18:15	500			1.037*10
18:50	500			1.037*10
19:26	500	-0.0276475	0.00414849	1.037*10
16:04	500	-0.0279944	0.00416116	1.037*10
19:15	500	-0.0279919	0.00416101	1.037*10

Channel 2-2 : Herzberg + PIN11

dark current	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29	3251.08	6.50217	-0.000300001	-0.00152362
18:15				
18:50				
19:26	3146.11	6.29222	-0.00121550	-0.00617320
16:04	3592.89	7.18578	0.00250000	0.0126968
19:15	3627.77	7.25554	0.00279999	0.0142204

vis LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29	353.210	0.706418	0.00291951	0.0148274
18:15				
18:50				
19:26	349.410	0.698822	0.00290951	0.0147766
16:04	342.880	0.685761	0.00283099	0.0143778
19:15	356.900	0.713791	0.00295351	0.0150000

uv LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29	-22.5500	-0.0451031	-0.000199500	-0.00101320
18:15				
18:50				
19:26	-39.9702	-0.0799341	-0.000360997	-0.00183340
16:04				
19:15				

vis+uv LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29	328.490	0.656973	0.00270001	0.0137126
18:15				
18:50				
19:26	320.605	0.641215	0.00263800	0.0133977
16:04				
19:15				

parameters	int.time / ms	(VFC) r0	(VFC) r1	resist. / GigaOhm
16:20	500			0.1969
17:01	500			0.1969
17:29	500	-0.0272914	0.00414996	0.1969
18:15	500			0.1969
18:50	500			0.1969
19:26	500	-0.0272991	0.00415019	0.1969
16:04	500	-0.0273338	0.00415095	0.1969
19:15	500	-0.0272834	0.00414369	0.1969

Channel 2-3 : Aluminium + MSM15

dark current	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29	3281.89	6.56379	-0.000203500	-0.000200295
18:15				
18:50				
19:26	3304.67	6.60933	-0.000097999	-0.000096456
16:04	2730.75	5.46150	-0.00460099	-0.00452854
19:15	3661.82	7.32365	0.00313550	0.00308612

vis LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29	1075.96	2.15191	0.00890351	0.00876330
18:15				
18:50				
19:26	984.965	1.96993	0.00819801	0.00806890
16:04	1905.88	3.81175	0.0158535	0.0156038
19:15	1307.89	2.61578	0.0108975	0.0107259

uv LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29	5040.03	10.0801	0.0418065	0.0411481
18:15				
18:50				
19:26	4692.54	9.38506	0.0389809	0.0383671
16:04				
19:15				

vis+uv LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29	5987.04	11.9741	0.0496735	0.0488913
18:15				
18:50				
19:26	5723.22	11.4464	0.0475225	0.0467741
16:04				
19:15				

parameters	int.time / ms	(VFC) r0	(VFC) r1	resist. / GigaOhm
16:20	500			1.016
17:01	500			1.016
17:29	500	-0.0274324	0.00414663	1.016
18:15	500			1.016
18:50	500			1.016
19:26	500	-0.0274783	0.00414664	1.016
16:04	500	-0.0273108	0.00415768	1.016
19:15	500	-0.0273191	0.00415954	1.016

Channel 2-4 : Zr (150nm) + MSM19

dark current	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29	4908.15	9.81631	0.0130030	0.00126243
18:15				
18:50				
19:26	5132.42	10.2648	0.0148240	0.00143922
16:04	7427.10	14.8542	0.0340801	0.00330874
19:15	7577.12	15.1542	0.0353304	0.00343014

vis LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29	7024.79	14.0496	0.0583174	0.00566188
18:15				
18:50				
19:26	6586.08	13.1722	0.0546680	0.00530757
16:04	8880.53	17.7611	0.0738880	0.00717359
19:15	7778.35	15.5567	0.0647101	0.00628253

uv LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29	29096.5	58.1930	0.241515	0.0234481
18:15				
18:50				
19:26	27806.0	55.6119	0.230791	0.0224069
16:04				
19:15				

vis+uv LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29	36623.1	73.2461	0.303984	0.0295131
18:15				
18:50				
19:26	35438.6	70.8773	0.294141	0.0285573
16:04				
19:15				

parameters	int.time / ms	(VFC) r0	(VFC) r1	resist. / GigaOhm
16:20	500			1.030*10
17:01	500			1.030*10
17:29	500	-0.0276325	0.00414608	1.030*10
18:15	500			1.030*10
18:50	500			1.030*10
19:26	500	-0.0276542	0.00414597	1.030*10
16:04	500	-0.0277084	0.00415977	1.030*10
19:15	500	-0.0277099	0.00415987	1.030*10

Channel 3-1 : Ly N+XN + AXUV20A

dark current	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29				
18:15	6062.85	12.1257	0.0225530	0.00217483
18:50	6547.00	13.0940	0.0265760	0.00256278
19:26				
16:04				
19:15	9906.78	19.8135	0.0521550	0.00502942

vis LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29				
18:15	125267.	250.535	1.04006	0.100295
18:50	125074.	250.148	1.03845	0.100140
19:26				
16:04				
19:15	123078.	246.156	1.02315	0.0986643

uv LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29				
18:15				
18:50				
19:26				
16:04				
19:15				

vis+uv LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29				
18:15				
18:50				
19:26				
16:04				
19:15				

parameters	int.time / ms	(VFC) r0	(VFC) r1	resist. / GigaOhm
16:20	500			1.037*10
17:01	500			1.037*10
17:29	500			1.037*10
18:15	500	-0.0277332	0.00414971	1.037*10
18:50	500	-0.0277035	0.00415041	1.037*10
19:26	500			1.037*10
16:04	500			1.037*10
19:15	500	-0.0302080	0.00415654	1.037*10

Channel 3-2 : Herzberg + PIN12

dark current	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29				
18:15	3211.36	6.42273	-0.000718999	-0.00363498
18:50	3120.88	6.24176	-0.00145950	-0.00737867
19:26				
16:04				
19:15	3537.53	7.07506	-0.000101500	-0.000513144

vis LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29				
18:15	177.960	0.355920	0.00150750	0.00762132
18:50	160.370	0.320741	0.00134850	0.00681749
19:26				
16:04				
19:15	167.890	0.335773	0.00139000	0.00702732

uv LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29				
18:15				
18:50				
19:26				
16:04				
19:15				

vis+uv LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29				
18:15				
18:50				
19:26				
16:04				
19:15				

parameters	int.time / ms	(VFC) r0	(VFC) r1	resist. / GigaOhm
16:20	500			0.1978
17:01	500			0.1978
17:29	500			0.1978
18:15	500	-0.0273193	0.00414489	0.1978
18:50	500	-0.0273370	0.00415027	0.1978
19:26	500			0.1978
16:04	500			0.1978
19:15	500	-0.0293365	0.00412913	0.1978

Channel 3-3 : Aluminium + AXUV20B

dark current	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29				
18:15	3145.19	6.29037	-0.00142400	-0.00142972
18:50	3141.06	6.28213	-0.00148850	-0.00149448
19:26				
16:04				
19:15	2469.39	4.93877	-0.00909149	-0.00912800

vis LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29				
18:15	123662.	247.325	1.02632	1.03044
18:50	123446.	246.892	1.02455	1.02867
19:26				
16:04				
19:15	121690.	243.380	1.01141	1.01547

uv LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29				
18:15				
18:50				
19:26				
16:04				
19:15				

vis+uv LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29				
18:15				
18:50				
19:26				
16:04				
19:15				

parameters	int.time / ms	(VFC) r0	(VFC) r1	resist. / GigaOhm
16:20	500			0.996
17:01	500			0.996
17:29	500			0.996
18:15	500	-0.0275226	0.00414965	0.996
18:50	500	-0.0274803	0.00414880	0.996
19:26	500			0.996
16:04	500			0.996
19:15	500	-0.0293168	0.00415233	0.996

Channel 3-4 : Zr (300nm) + AXUV20C

dark current	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29				
18:15	2969.62	5.93924	-0.00313500	-0.00314443
18:50	2963.96	5.92792	-0.00320000	-0.00320962
19:26				
16:04				
19:15	3068.70	6.13740	-0.00459049	-0.00460430

vis LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29				
18:15	134278.	268.556	1.11427	1.11763
18:50	134110.	268.221	1.11291	1.11625
19:26				
16:04				
19:15	132948.	265.896	1.10509	1.10841

uv LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29				
18:15				
18:50				
19:26				
16:04				
19:15				

vis+uv LED	counts	frequency / kHz	tension / V	current / nA
16:20				
17:01				
17:29				
18:15				
18:50				
19:26				
16:04				
19:15				

parameters	int.time / ms	(VFC) r0	(VFC) r1	resist. / GigaOhm
16:20	500			0.997
17:01	500			0.997
17:29	500			0.997
18:15	500	-0.0277757	0.00414913	0.997
18:50	500	-0.0277222	0.00414825	0.997
19:26	500			0.997
16:04	500			0.997
19:15	500	-0.0300860	0.00415604	0.997