

DarkLight target tests, summer 2022

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1 Key information

1.1 Camera

No access via IP address. Can only be accessed via website or mobile app. Easiest is likely website.

- View feed at mydlink.com (has some browser dependency, but works for me in FireFox+Mac)
- Account login: username kpachal@triumf.ca, password “DarkLight_generic”

1.2 Remote control for target ladder

Remote control is upstairs on desk. Motor box will be down in the e-hall. Remote control was calibrated with 50m cables to a very linear 1.71 Volts per inch. Recall that lowermost position of ladder has been cut off so only 3 positions remain. Voltages corresponding to target positions are:

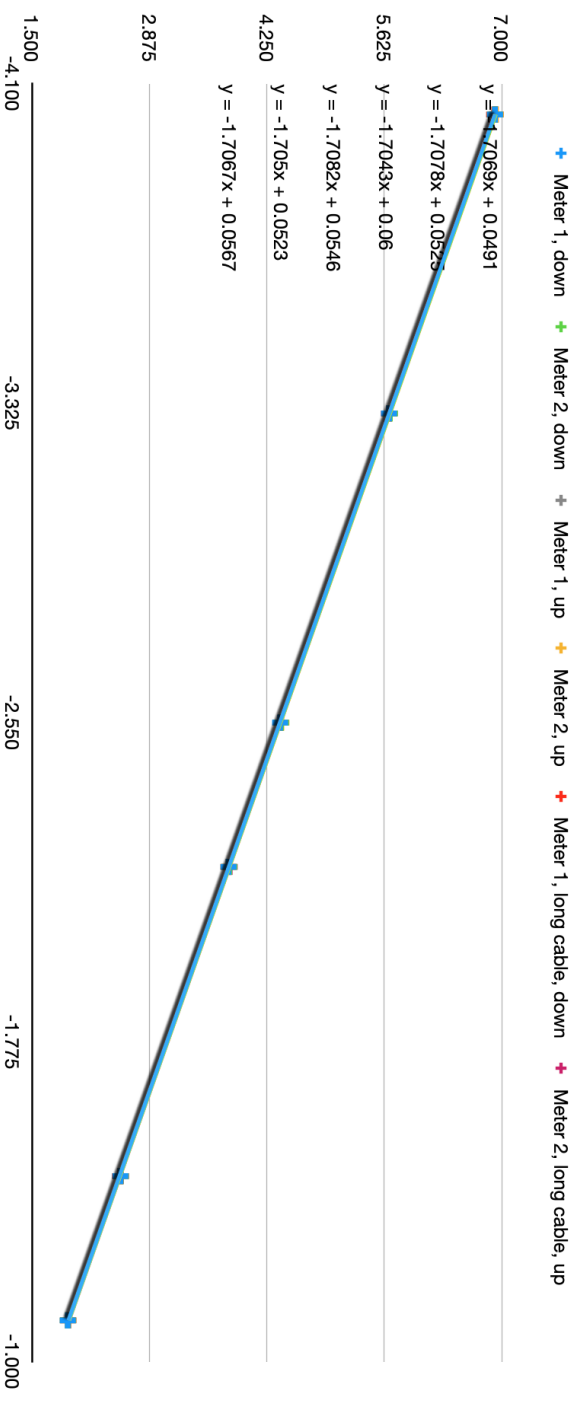
- Highest position of ladder (beam passing below bottom foil): 8.80 V
- Center of lower foil (10 μm): 5.05 V
- Center of BeO screen: 3.17 V
- Center of upper foil (1 μm): 1.29 V

2 Scintillators

Scintillator placement: 97 cms to first scintillator from the outside of the target chamber, in direct line from target (i.e. not perpendicular to beam pipe). Operate scintillators at -1700V ? Currently using -1600 .

Initial tests with source...

- coincidence rate between 1 and 2 kHz with Sr-90 source
- coincidence without source 3-4 Hz



	Location (inches)	Meter 1, down	Meter 2, down	Meter 1, up	Meter 2, up	Meter 1, long cable, down	Meter 2, long cable, up
Cross	-4.025	6.920	6.920	6.920	6.930	6.910	6.930
Bottom of lower circle	-3.300	5.680	5.690	5.680	5.690	5.680	5.680
Top of lower circle	-2.550	4.405	4.415	4.410	4.420	4.410	4.410
Bottom of middle circle	-2.200	3.800	3.810	3.808	3.800	3.800	3.815
Top of middle circle	-1.450	2.535	2.536	2.542	2.543	2.530	2.540
Bottom of upper circle	-1.100	1.919	1.920	1.925	1.927	1.920	1.926
Top of upper circle	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Highest position of ladder	-4.550			8.800		8.80	8.871

3 Log book

Add log notes here!

3.1 August 3rd

Scintillators in original placement: 97cm from outside of target chamber to first scintillator and 10cm between scintillators.

Current	Target	Rate	Width	Volt. (ch1)	Volt. (ch2)	Duty	Thresh. (ch1)	Thresh. (ch2)
35 uA	1 um	120 kHz	30 ns	1600 V	1300 V	0.05	45 mV	90 mV
75 uA	1 um	120 kHz	30 ns	1600 V	1300 V	0.05	45 mV	90 mV
75 uA	10 um	107 kHz	30 ns	1600 V	1300 V	0.04	45 mV	90 mV

Beam off and access to e-hall to move scintillators behind cement block (to shield from x-rays from 2nd frequency cavity). New position of scintillators: 83" = 210.8cm from Target to Front scintillator. The Back scintillator is 10 cm further away. We found that the front scint was 2 when we re-entered the area around 5pm. They must have become switched when we moved the cables to allow us to shield them more by placing them further from the target

Current	Target	Rate	Width	Volt. (ch1)	Volt. (ch2)	Duty	Thresh. (ch1)	Thresh. (ch2)
75 uA	10 um	107 kHz	30 ns	1600 V	1300 V	0.04	40 mV	40 mV
75 uA	10 um	150 kHz	30 ns	1600 V	1300 V	0.04	40 mV	40 mV
75 uA	10 um	170 kHz	30 ns	1600 V	1300 V	0.04	40 mV	40 mV
75 uA	10 um	245 kHz	30 ns	1600 V	1300 V	0.04	40 mV	40 mV
75 uA	10 um	215 kHz	30 ns	1600 V	1300 V	0.04	40 mV	40 mV
100 uA	1 um	200 kHz	30 ns	1600 V	1300 V	0.05	40 mV	40 mV
100 uA	1 um	208 kHz	30 ns	1600 V	1300 V	0.05	40 mV	40 mV
100 uA	BeO	350 kHz	30 ns	1600 V	1300 V	0.05	40 mV	40 mV
85 uA	none	140 kHz	30 ns	1600 V	1300 V	0.05	40 mV	40 mV
85 uA	none	385 kHz	30 ns	1600 V	1300 V	0.05	40 mV	40 mV
85 uA	none	15 kHz	30 ns	1600 V	1300 V	0.05	100 mV	100 mV
85 uA	BeO	60 kHz	30 ns	1600 V	1300 V	0.05	100 mV	100 mV
85 uA	BeO	50 kHz	30 ns	1600 V	1300 V	0.05	100 mV	100 mV

Set HV-1 to 1800V. Sr-90 Source signal up to 600 mV.

Set HV-2 to 1300V. Sr-90 Source signal up to 400mV. Raise HV-2 to 1700 V. Set both thresholds to 50 mV. Measure singles and coincidence rates w Sr-90 source.

Front Scint position = 96.75" = 245.8 cm from Target. S1-rate = 17 kHz, S2-rate = 320 Hz S1*S2-rate = 320 Hz.

Lower HV-1 to 1700 V. Coincid rate = 4 Hz.

Raise HV-1 to 1800 V. Amplitudes = 800 mV (S1) and 3.0 V (S2).

S1-rate = 16.5 kHz, S1*S2 coinc rate = 300 Hz Source hits S1 first.

Move source so it hits S2 first.

S1-rate = 320 Hz, S2-rate = 45 kHz, S1*S2-rate = 325 Hz.

Added 10 sheets of paper between source and first counter (currently S2),

Now the S2-rate = 30.5 kHz, S1*S2-rate = 130 Hz.

Thurs Aug 4 – move counters so that Front scint (#2) is now 98.25" = 249.6 cms from Target. They are also rotated to be exactly perpendicular to the radial line to the target. We also added lead bricks to form a 3" = 7.6cm vertical slot in front of S2 (see Figures 1 and 2).

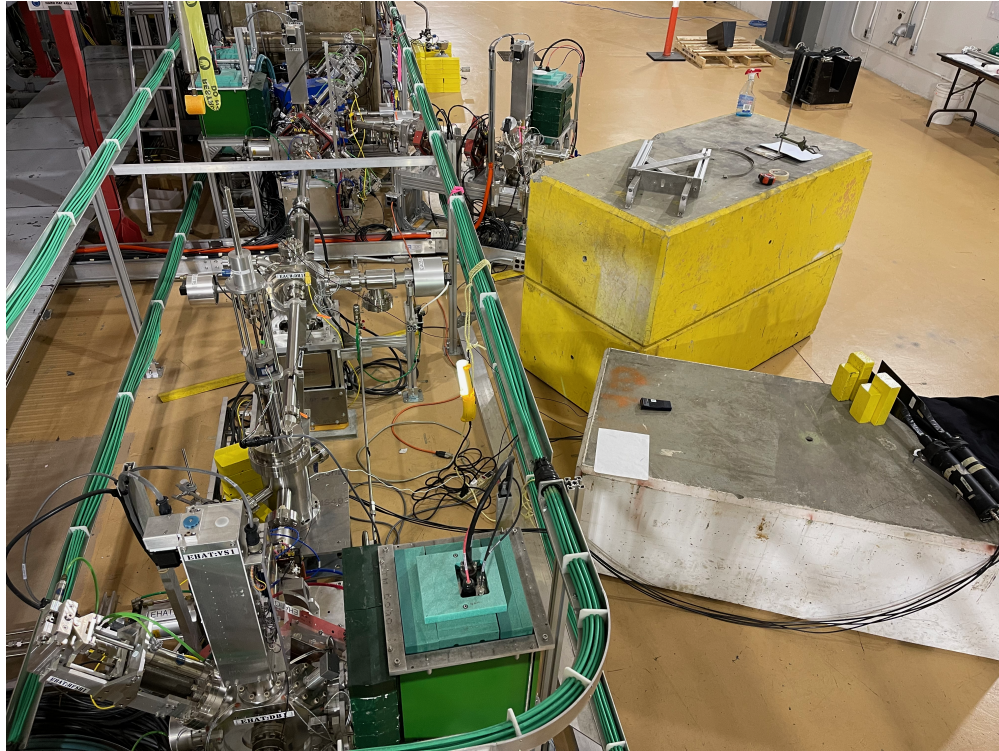


Figure 1: Overview of current test setup.

3.2 August 5th

Doug's Notes: 11:32 am

- beam on into FC
- HV1 - 1800 V
- HV2 - 1700 V
- sig 1 - 0 up to 4V , 40 ns width
- sig 2 - 0 up to 15V , 40 ns width
- set HV2 to 1600 V - sig 2 down to 10 V
- set point was set to 1400 (for the morning)

Set Point (corresponds to beam energy)	Coincidence Rate (events/sec)
0	20 Hz
900	16 Hz
1000	21 Hz
1100	95 Hz
1200	2000 Hz
1300	2700 Hz
1400	12000 Hz
1500	130000 Hz

2:21 pm

Background measurement:



Figure 2: View of current test setup looking from behind the two scintillator bars, through the lead collimators, to the target chamber.

Current	Target	Duty	Rate of Coincidence
100 μ A	none	0.05	175 kHz
100 μ A	none	0.05	180 kHz
100 μ A	none	0.05	178 kHz
beam off	none	beam off	190 kHz
beam off	1 μ m	beam off	222 kHz
beam off	1 μ m	beam off	222 kHz
100 μ A	1 μ m	0.05	319 kHz
100 μ A	1 μ m	0.05	290 kHz
100 μ A	1 μ m	0.05	311 kHz
beam off	10 μ m	beam off	363 kHz
beam off	10 μ m	beam off	375 kHz
70 μ A	10 μ m	0.05	366 kHz
70 μ A	10 μ m	0.05	375 kHz

With 1 micron foil and beam on at 100 μ A (0.05 duty), only 10% of beam reaching the beam dump (10 μ A)