January 5th Update

Includes:
fADC Mode 10
fADC yield

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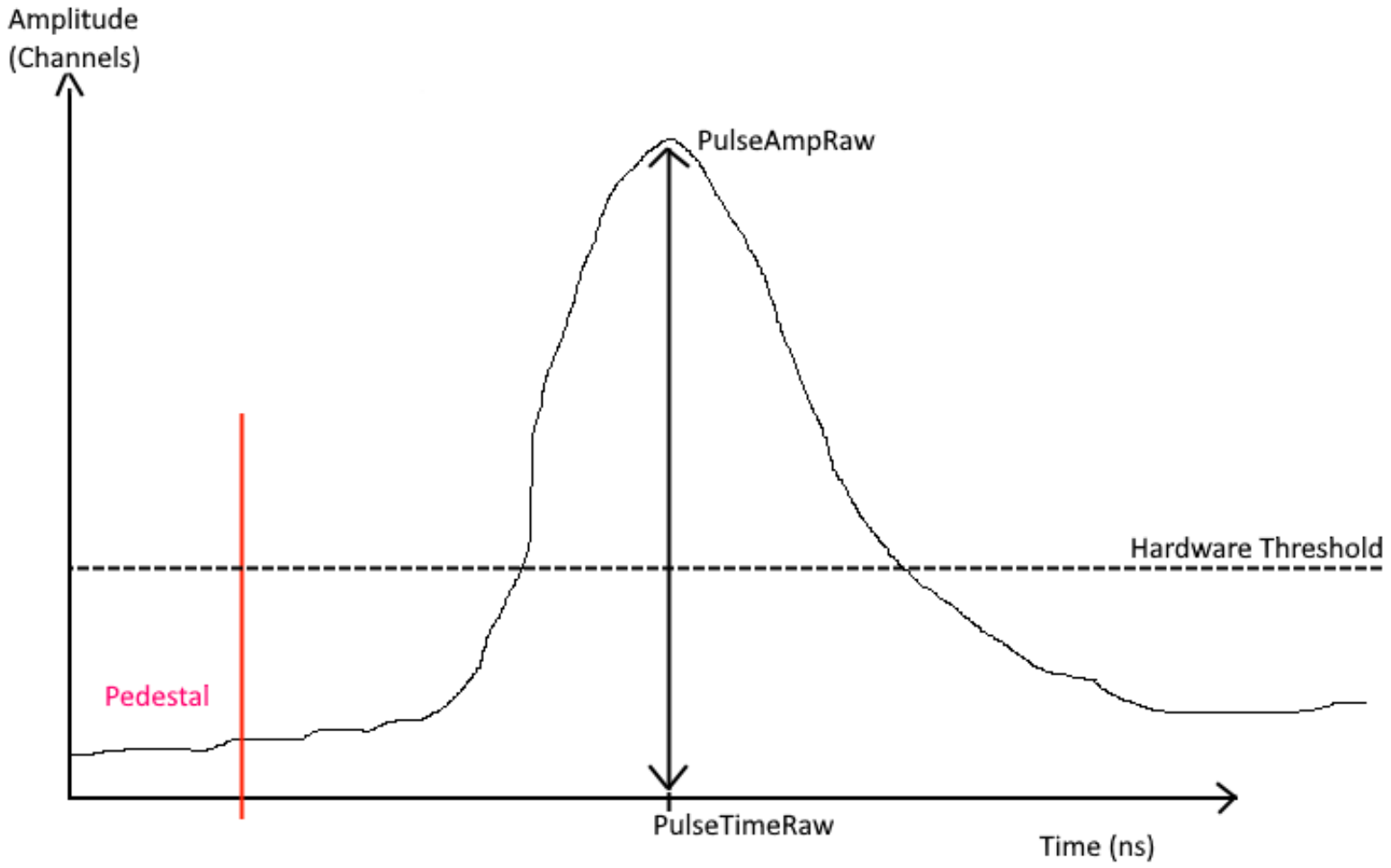
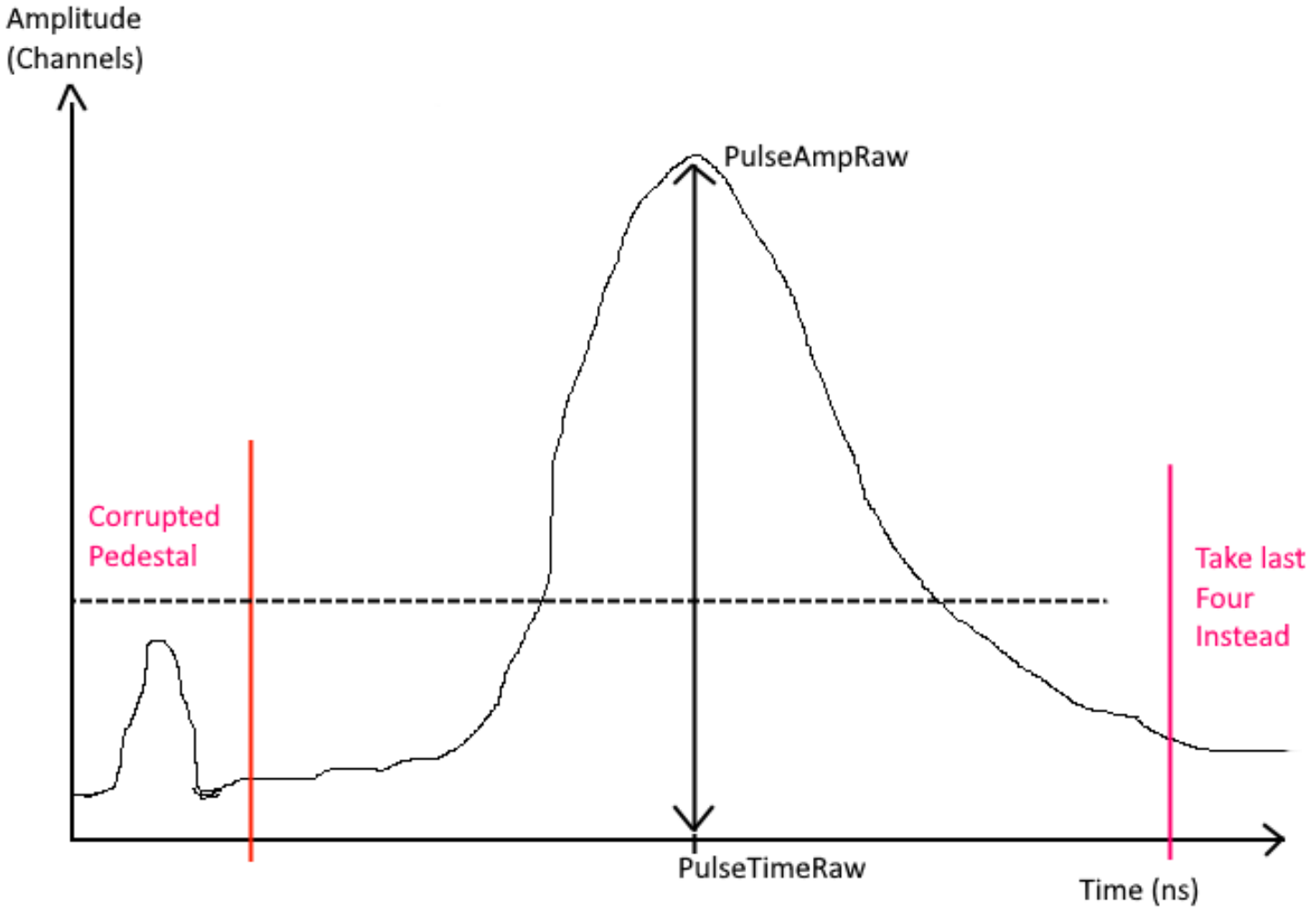
fADC Mode 10

- Hardware was changed to allow for waveform data to be saved.
- Due to some miscommunication when fADC finds corrupted pedestal, it now only saves the waveform, instead of pulse information.
- Mark has been doing some work on hcana to allow for processing of mode 10, he has it working for the cherenkovs and has asked me to check that there are not any subtle bugs before moving on.
- He pushed his updates to the “firmware_update” branch of hcana, and I have been trying to compile them.

New variables mimic the behaviour of fADC's



Except when pedestal is corrupted, then we take the last four channels instead



Mode 10 updates

- Raw waveform information is not yet being saved out
- The following variables were added to hcana:
  - PulseAmpRawSamp - the amplitude in ADC channels
  - PulseTimeRawSamp - time in ns
  - PulseIntRawSamp – Integral in ADC channels
  - PulseAmpSamp - the pedestal subtracted amplitude in mV
  - PulseTimeRawSamp - reference time subtracted Adc time in ns
  - PulseIntSamp - the pedestal subtracted integral in pC

Note that these are not the exact names.

fADC yield

- I’ve been working on the fADC deadtime studies aswell.
- Things are looking okay, but there is still work to do.
- Next step is to insure that the physics PID cuts are not causing a rate dependence

This is data from the first set, runs 12200 – 12217.

I have implemented
PID cuts, current cuts, and timing cuts.

The strange behaviour in the coin scalars is expected:

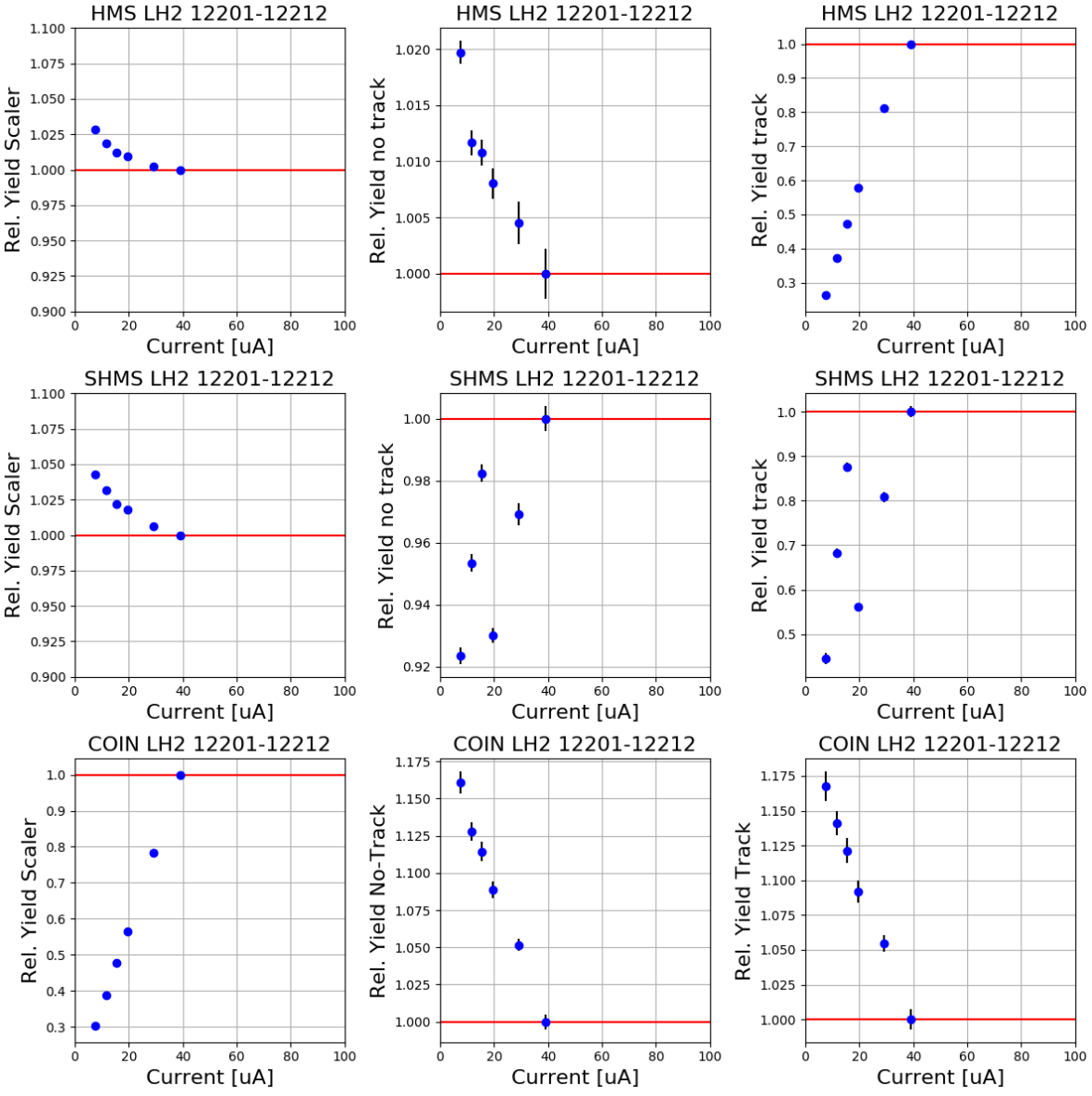
(Total events) = $t*I*\sigma_{real} + t*I^2*\sigma_{random}$

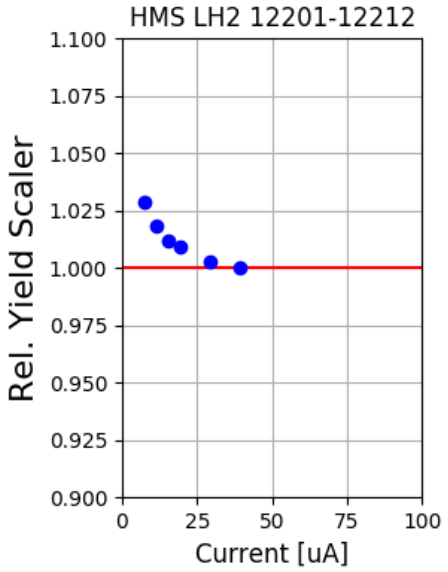
Yield = $(t/C)*I*\sigma_{real} + (t/C)*I\text{^}2*\sigma_{random}$

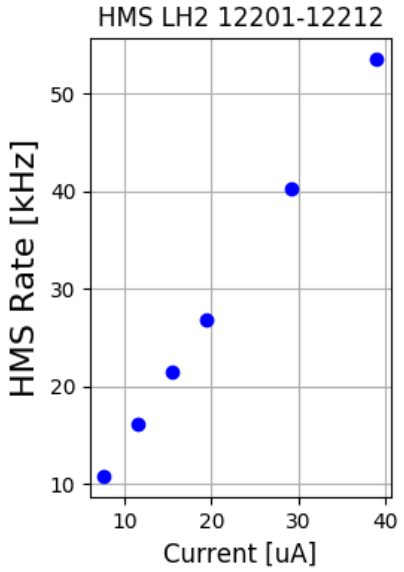
Yield = $\sigma_{real} + I*\sigma_{random}$

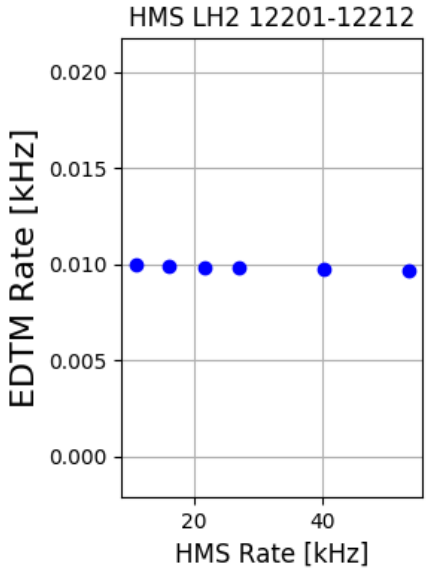
For full details see my log posts:

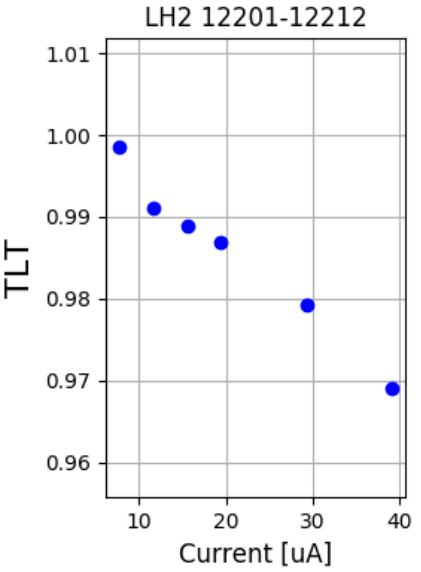
- https://logbooks.jlab.org/entry/3957370
- https://logbooks.jlab.org/entry/3943594
- https://logbooks.jlab.org/entry/3943621

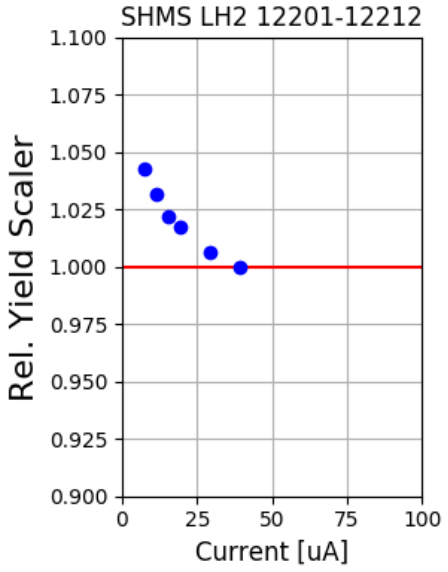


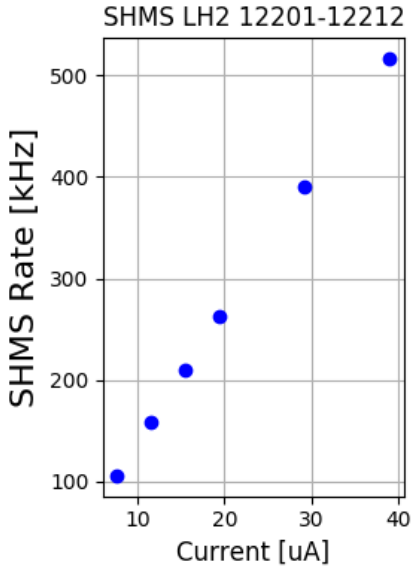

HMS LH2 12201-12212
Rel. Yield Scaler
Current [uA]

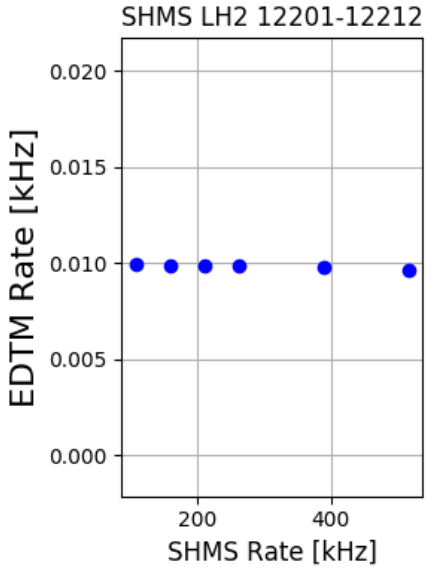

HMS LH2 12201-12212
HMS Rate [kHz]
Current [uA]

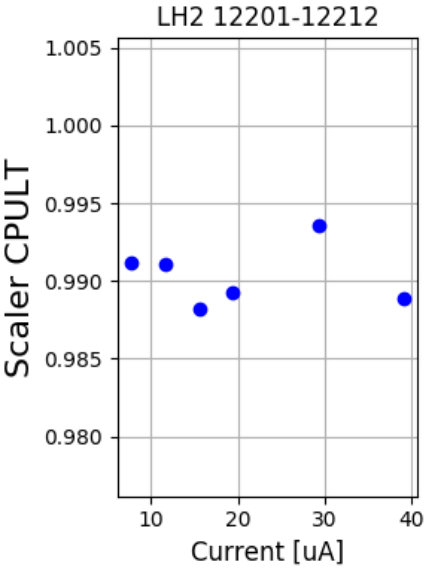

HMS LH2 12201-12212
EDTM Rate [kHz]
HMS Rate [kHz]

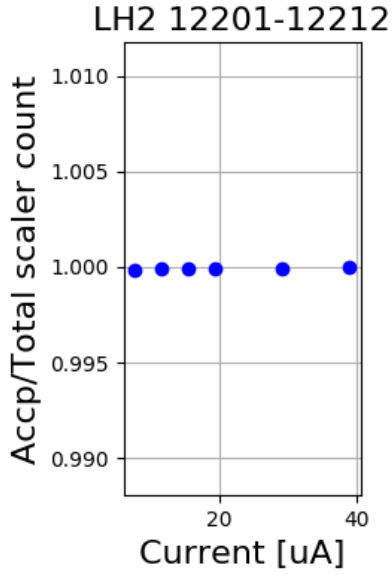

LH2 12201-12212
TLT
Current [uA]

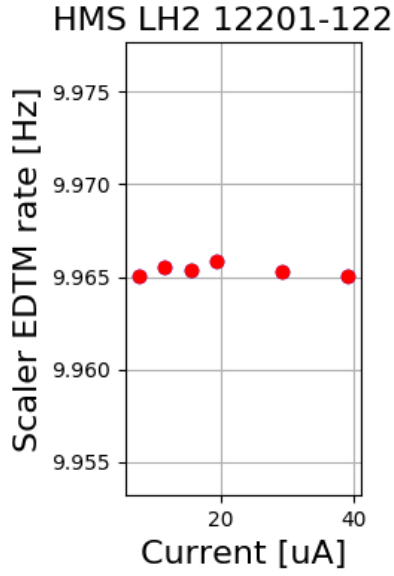

SHMS LH2 12201-12212
Rel. Yield Scaler
Current [uA]

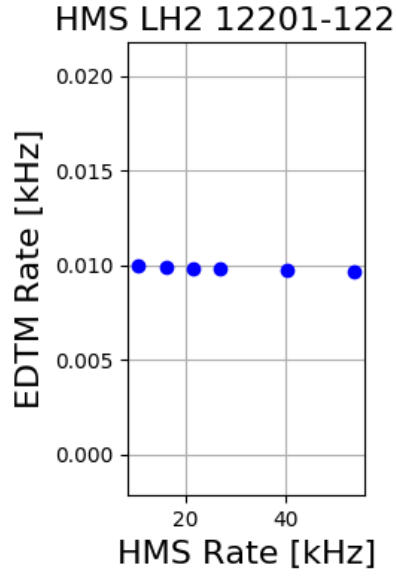

SHMS LH2 12201-12212
SHMS Rate [kHz]
Current [uA]

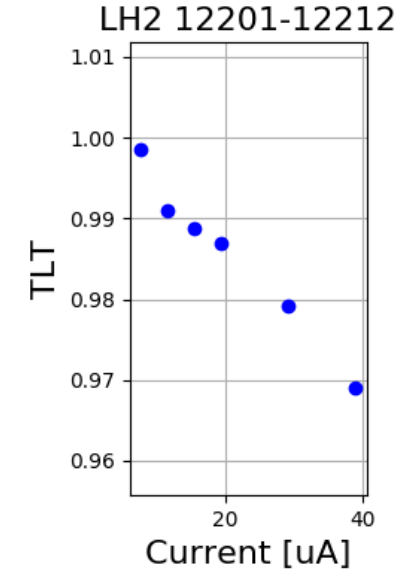

SHMS LH2 12201-12212
EDTM Rate [kHz]
SHMS Rate [kHz]

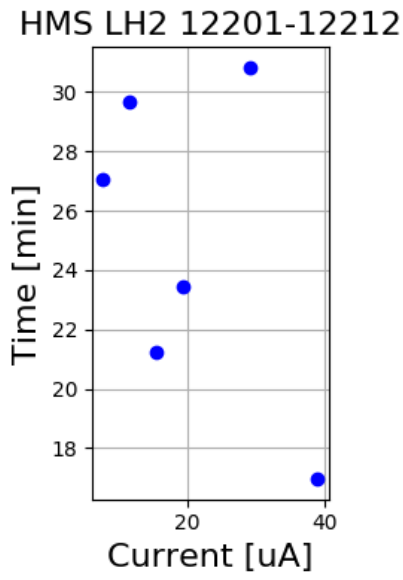

LH2 12201-12212
Scaler CPULT
Current [uA]

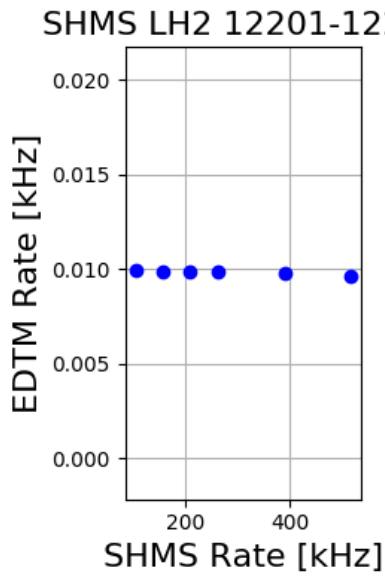

LH2 12201-12212
Accp/Total scaler count
1.010
1.005
1.000
0.995
0.990
20
40
Current [uA]

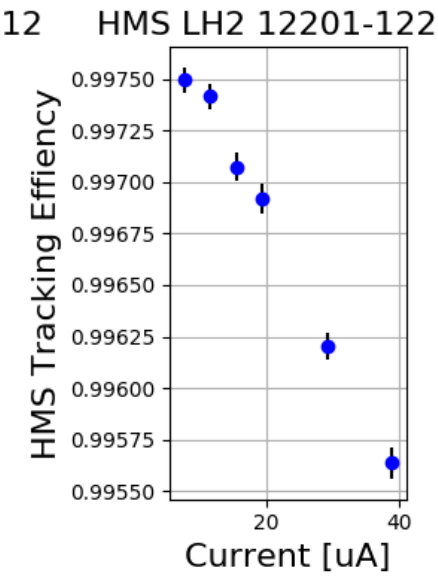

HMS LH2 12201-12212
Scaler EDTM rate [Hz]
9.975
9.970
9.965
9.960
9.955
20
40
Current [uA]

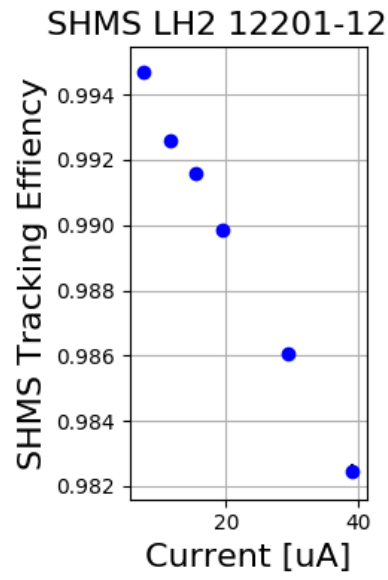

HMS LH2 12201-12212
EDTM Rate [kHz]
0.020
0.015
0.010
0.005
0.000
20
40
HMS Rate [kHz]


LH2 12201-12212
TLT
1.01
1.00
0.99
0.98
0.97
0.96
20
40
Current [uA]


HMS LH2 12201-12212
Time [min]
30
28
26
24
22
20
18
20
40
Current [uA]

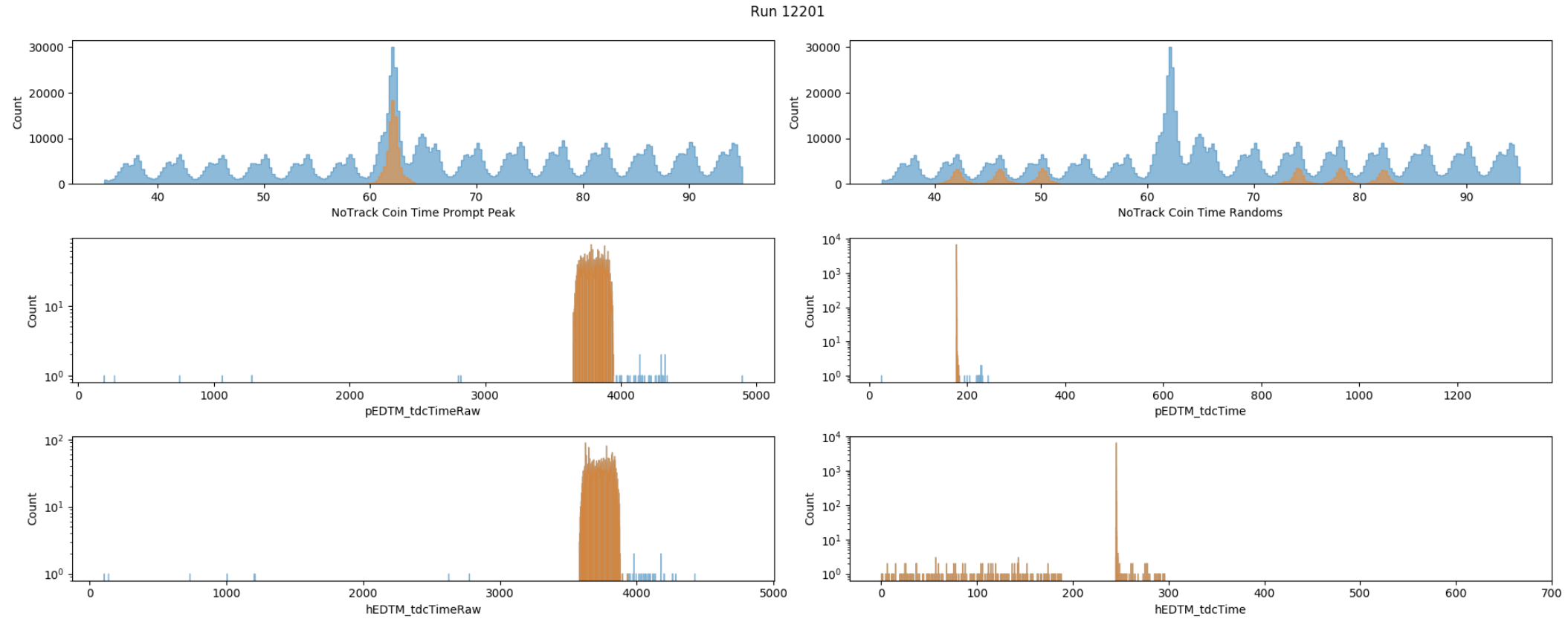

SHMS LH2 12201-12212
EDTM Rate [kHz]
0.020
0.015
0.010
0.005
0.000
200
400
SHMS Rate [kHz]


HMS LH2 12201-12212
HMS Tracking Effiency
0.99750
0.99725
0.99700
0.99675
0.99650
0.99625
0.99600
0.99575
0.99550
20
40
Current [uA]


SHMS LH2 12201-12212
SHMS Tracking Effiency
0.994
0.992
0.990
0.988
0.986
0.984
0.982
20
40
Current [uA]

I implemented a notrack coin time cut

EDTM Timing cuts are based on Jacob's study



These Pid plots are from the highest rate run (12201),
As you can see these cuts are a little tight