

Commissioning Runs Dec '13

Goals:

- Turn Mott On.
- Take baseline data with tweaked DAQ
- Adjust HV to give good signals and deadtime
- Take data on all Z and d possible
- Take data w/ Al dump while we have it

Data Taking

Data were taken on Friday Dec. 13 and Sunday Dec. 15

- Friday focused on setting HV and DAQ configurations (and figuring out target ladder issues)
- Sunday was for taking data
- All data at 0.5 μA
- 499 MHz rep-rate \rightarrow No TOF separation
- Most data $p_z = 6.1 \text{ MeV}/c$
- NO POLARIZED BEAM = RATE INFO ONLY

DAQ Adjustments

- Fiddled with FADC Sample Delay and Window changed to reduce deadtime
 - Delay increased to be closer to actual pulse
 - Samples recorded reduced from 148 → 50
 - Tested on 5 μm Au reduced deadtime from 11%-8%
 - Scalers now exist for coincidence events in each detector on the monitoring screen.

HV Adjustments

- Adjusted on Friday to match pulse heights and scaler rates. Delta E down saw lower rates regardless.
- Some modification on Sunday to attempt scaler rate equalization.
- HV & Scaler POLOGs:
 - <https://cebaf.jlab.org/elog/entry/3262199>
 - <https://cebaf.jlab.org/elog/entry/3262209>
 - <https://cebaf.jlab.org/elog/entry/3262245>
- Pulse POLOGs:
 - <https://cebaf.jlab.org/elog/entry/3262224>
 - <https://cebaf.jlab.org/elog/entry/3262244>
- Take Aways: Down Delta E sees too little rate, Up Detectors see too much even after adjusting DAQ and HV.

Rate and Deadtime

Silver:

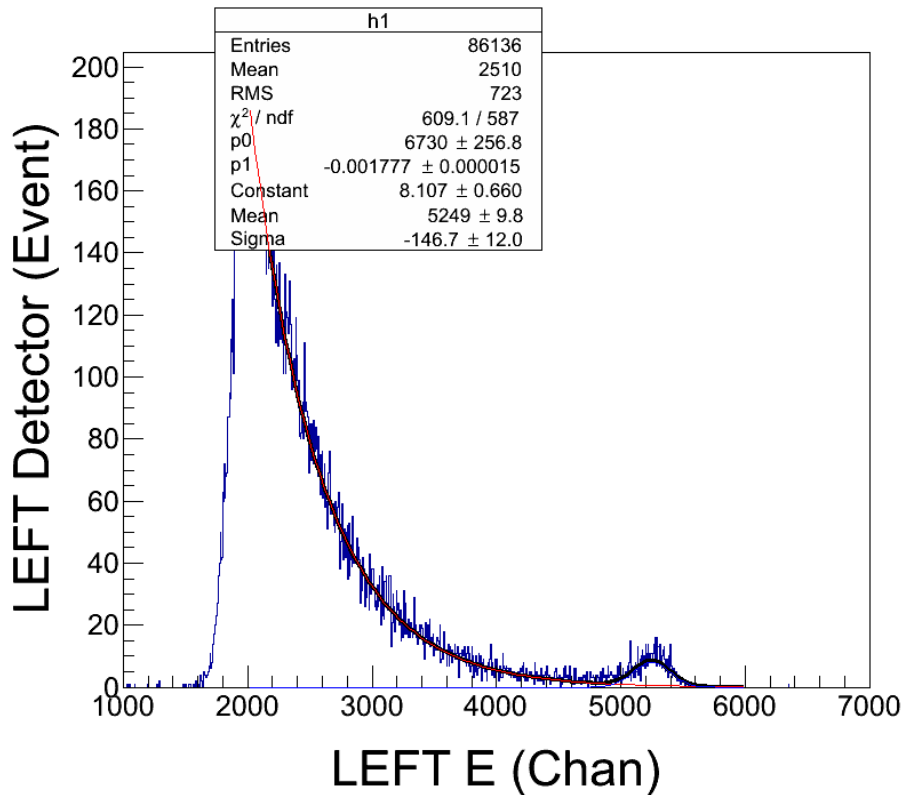
Target d (um)	Run #	Deadtime (%)	Rate (Hz/uA)
0.45	7228	<1	456
1.6	7227	1	506
4.5	7229	3	776
10	7230	4	1222

Copper:

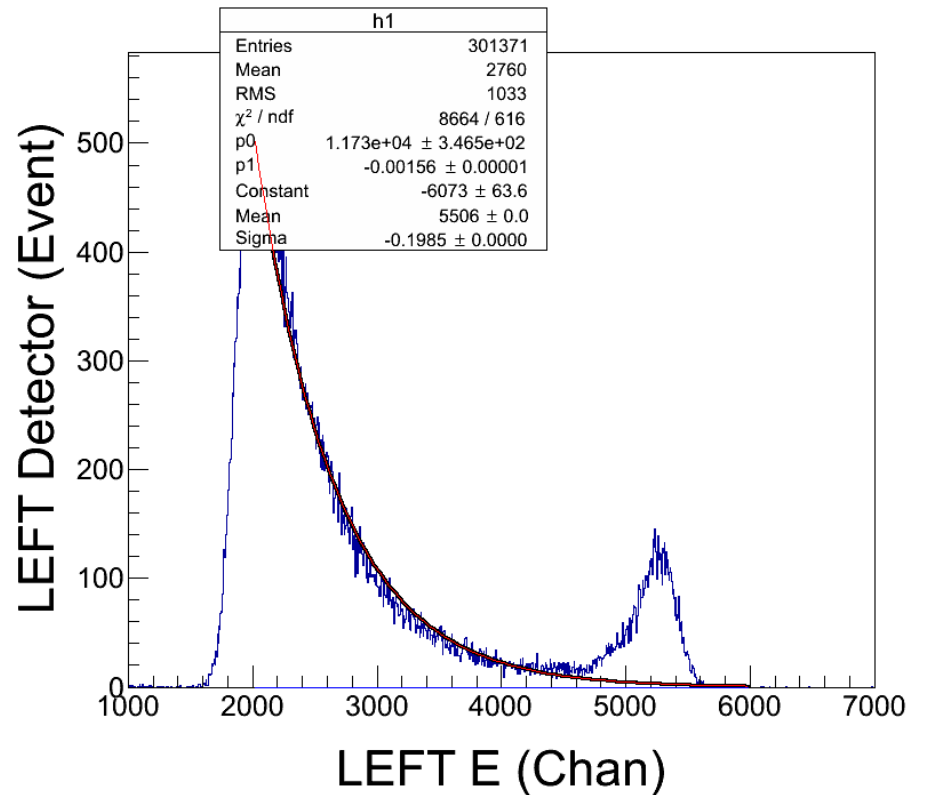
Target d (um)	Run #	Deadtime (%)	Rate (Hz/uA)
1.0	7232	<1	344
8.0	7231	2	656

1 um Au has 766 Hz and 2% deadtime
(Run 7226)

Copper and Silver Spectra

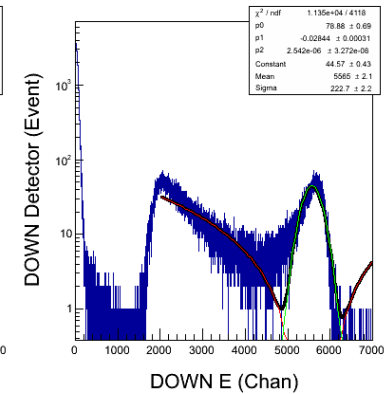
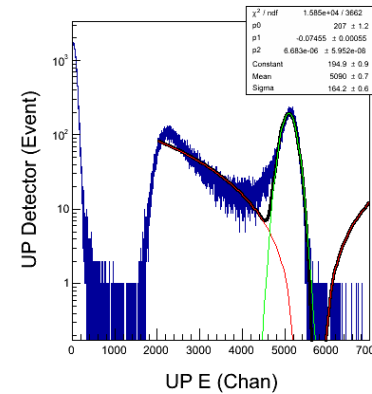
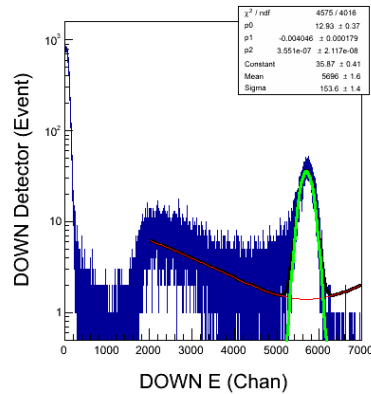
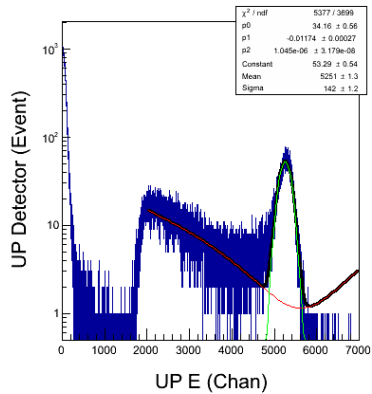
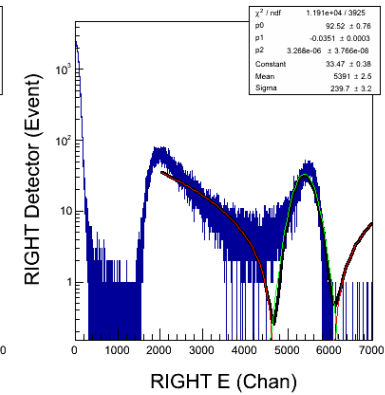
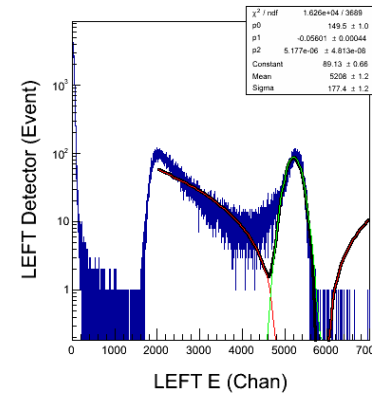
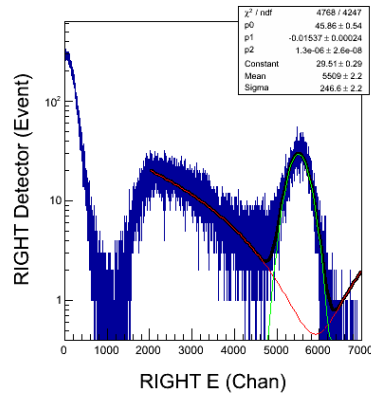
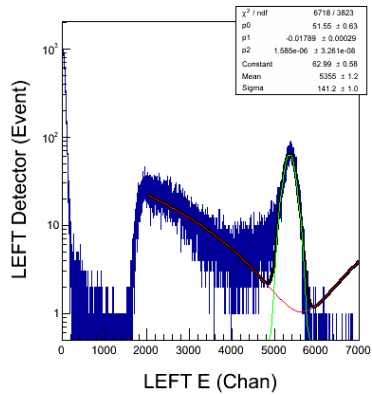


Cu 1.0 μm



Ag 1.6 μm

Spectra 2012 vs. 2013



Old Au 1.0 μm

New Au 1.0 μm

Asymmetries 2012 vs. 2013

Mott Asym UD (%) = -33.95 +/- 0.639439

Mott Asym LR (%) = 0.880706 +/- 0.612657

UD Instrumental (Detector Efficiency and Solid Angle)
A1x (%) = -14.6279 +/- 0.707278

LR Instrumental (Detector Efficiency and Solid Angle)
A1y (%) = -10.443 +/- 0.606023

UD Instrumental (Beam Current and Target Thickness)
A2x (%) = 0.920625 +/- 0.722681

LR Instrumental (Beam Current and Target Thickness)
A2y (%) = 2.68701 +/- 0.612262

Mott Px (%) = -0.900808 +/- 1.12212

Mott Py (%) = -0.702159 +/- 1.33895

UD Instrumental (Detector Efficiency and Solid Angle)
A1x (%) = -49.7533 +/- 0.338253

LR Instrumental (Detector Efficiency and Solid Angle)
A1y (%) = -29.0229 +/- 0.491204

UD Instrumental (Beam Current and Target Thickness)
A2x (%) = -0.129364 +/- 0.449528

LR Instrumental (Beam Current and Target Thickness)
A2y (%) = 0.800946 +/- 0.536351

Large detector asymmetries were common to all targets. No Transverse asymmetry was measured.

Future Work/Issues

- Diagnose Asym UD (geom.) issue, seems to be a) Down Delta E & coincidence or b) Up too high rate.
- Determine ideal HV settings
- Get access to all files/Figure out good system so all analysis is in one location
- (Marty) Get more robust method of calculating asymetries (fits fail on thin/low-Z targets all the time and need massaging of parameters to work)
- More background this run.