Mott Run 1 Analysis Update

What I am working on...

- Automating analysis and averaging of sets of runs
 - .short vs .long output (complete)
 - averaging script (in progress)
- Passing code user-inputted Time-of-Flight cuts (in progress)
 - Same T1 T2 range for all detectors
 - Fixed delta-T (= T2 T1), detector-dependent T1, T2
- Passing code user-inputted Energy cuts

Automating Analysis

- FullAnalysis --> .long and .short textfiles, un-cut plots
 - Sample for run 7999, Foil 15, 1.00 um, Low detector threshold on wiki
- .bash files used to run FullAnalysis on multiple runs
- Averager script takes .short files from command line specified runs --> weighted averages of asymmetries and error

Thickness Study ~80 runs total ~2 hours to analyze all 80 ~2 minutes a run

Sample Full Study Analysis : Thickness

- 10 different foils, 8 unique thicknesses, ~80 runs
- Time of Flight cuts hardcoded 48 ns to 58 ns, same for all



Sample Full Study Analysis : Thickness

- Energy cuts determined from fit of exponential + gaussian (ie background + gaussian) to un-cut energy spectra data
- For low-threshold fit in range of 2000:12000; hi- 4500:12000

Run 7999 – Foil 15, 1 um, Low **R**

Run 8059 – Foil 15, 1um, High

Run 8059 – Foil 15, 1 um, Low



Sample Full Study Analysis : Thickness

- Geometric weighted average for physics asymmetry sign corrected based on Half-Wave Plate (In = 1, Out = -1)
- 3 runs failed peak-finding in Energy spectra fits all three hi-threshold 0.05 um foil running (2 for foil 12, 1 for 13)
- ~10 runs failed to fit background (still used in averaging)



Foil #	Thick ness (um)	# of Runs	Detec tor Thres hold	Up/Down Mott Asymmetry	Up/Down Detector Asymmetry	Up/Down Beam Asymmetry	Left/Right Mott Asymmetry	Left/Right Detector Asymmetry	Left/Right Beam Asymmetry
15	1.00	6	Low	33.765 ± 0.0803	-0.308 ± 0.0907	0.097 ± 0.0907	0.508 ± 0.0859	1.343 ± 0.0859	0.012 ± 0.0859
3	0.87	6	Low	34.584 ± 0.0784	-0.087 ± 0.0891	-0.099 ± 0.0891	0.716 ± 0.0841	0.678 ± 0.0841	0.029 ± 0.0841
4	0.75	6	Low						
2	0.625	6	Low						
5	0.50	6	Low						
14	0.35	6	Low						
8	0.35	4	Hi	39.183 ± 0.0836	0.162 ± 0.0987	0.042 ± 0.0987	0.590 ± 0.0914	1.348 ± 0.0914	-0.064 ± 0.0914
1	0.225	6	Hi	40.965 ± 0.0730	0.469 ± 0.0877	-0.011 ± 0.0877	0.583 ± 0.0812	-0.596 ± 0.0812	0.081 ± 0.0812
12	0.05	6	Hi	*originally 8 runs, discarded 2					
13	0.05	7	Hi	*originally 8 runs, discarded 1					
15	1.00	10	Hi	33.686 ± 0.0519	0.401 ± 0.0585	0.040 ± 0.0585	0.557 ± 0.0554	2.445 ± 0.0554	-0.023 ± 0.0554
15	1.00	10	Low	33.634 ± 0.0616	-0.477 ± 0.0694	-0.099 ± 0.0694	0.483 ± 0.0659	1.391 ± 0.0659	0.020 ± 0.0659

• Last two rows are the "stability" runs on foil 15, split between hi and low threshold and averaged together