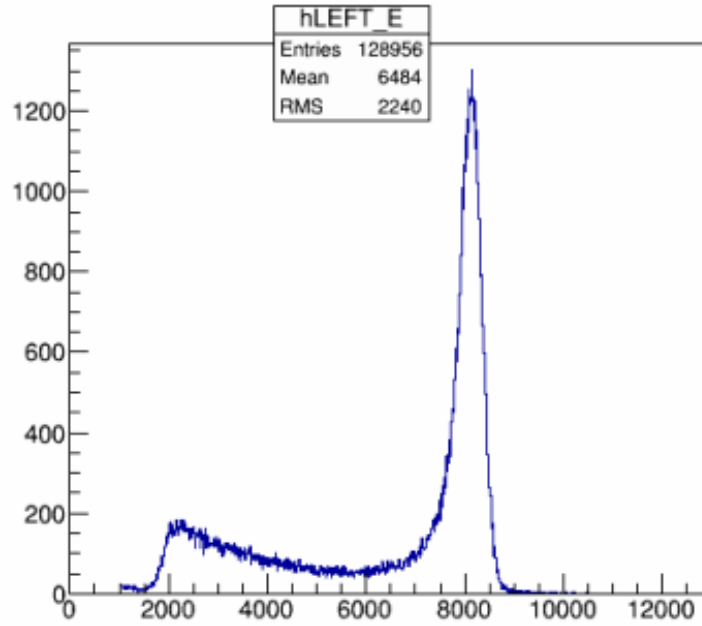


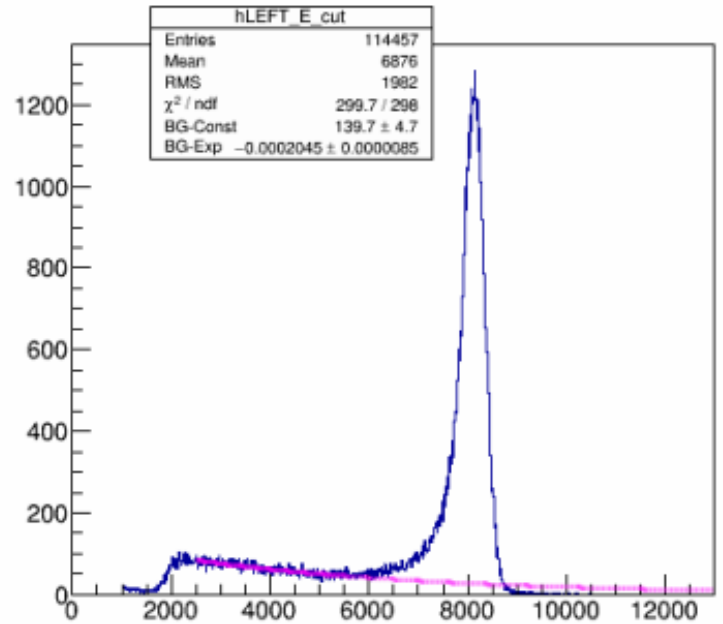
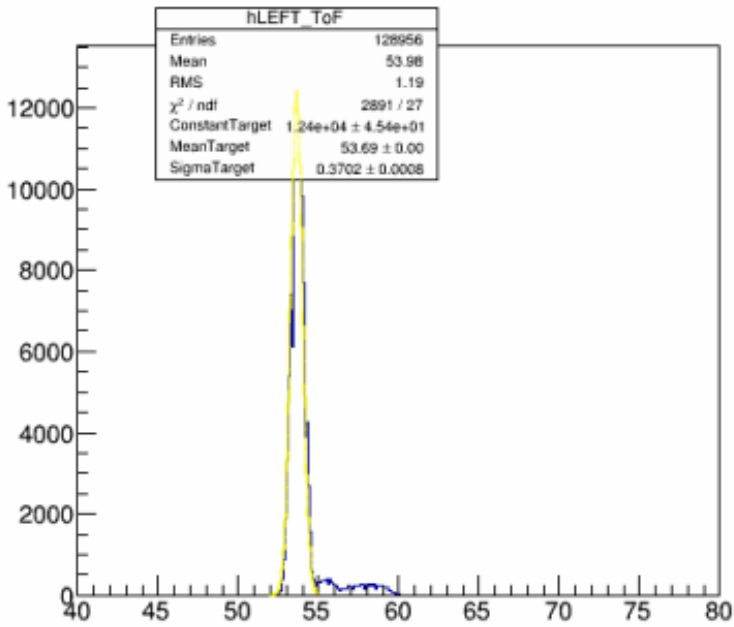
# Energy Spectra Background Fitting Approach

Run 8485 – 1 micron foil  
Raw Energy Detector Spectra

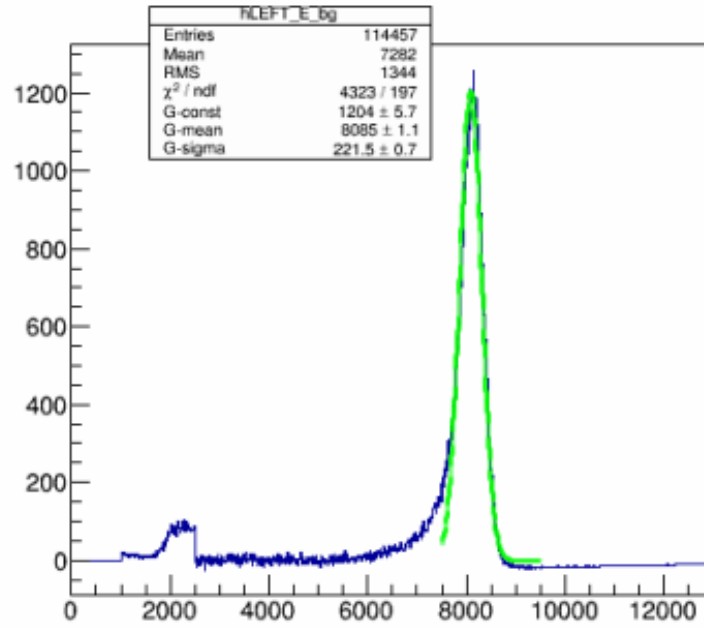


Time-of-flight cut (-2 to +2 sigma)

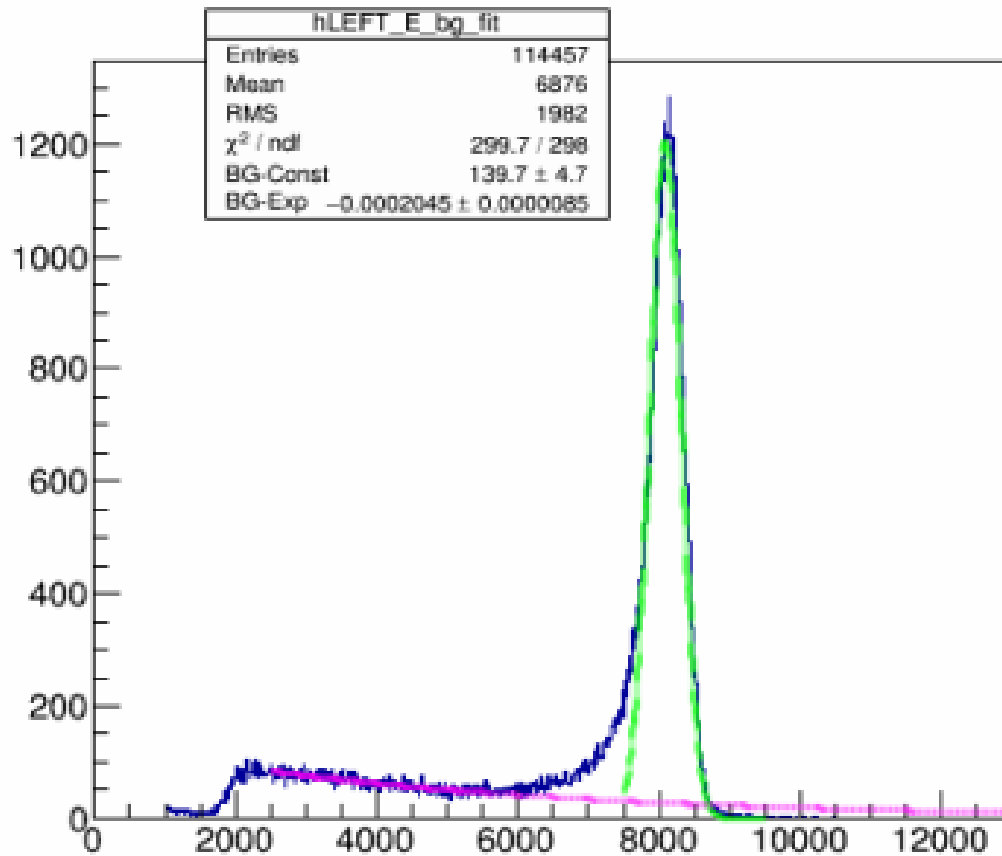
Background fit with exponential, range 2500 to 5500,  
Extrapolated to range 2500 to 13000



Background subtracted, elastic peak fit with Gaussian in range 7500 to 9500

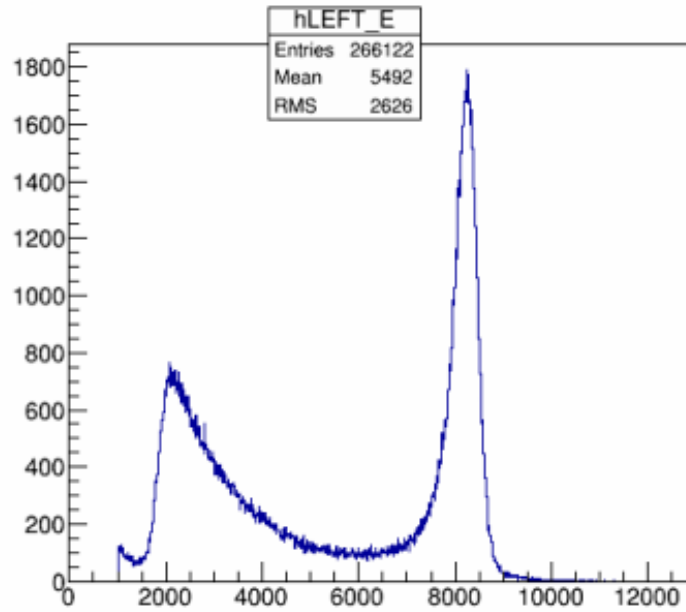


For display purposes, fit of elastic peak and background-fit-extrapolated shown on only ToF-cut spectra

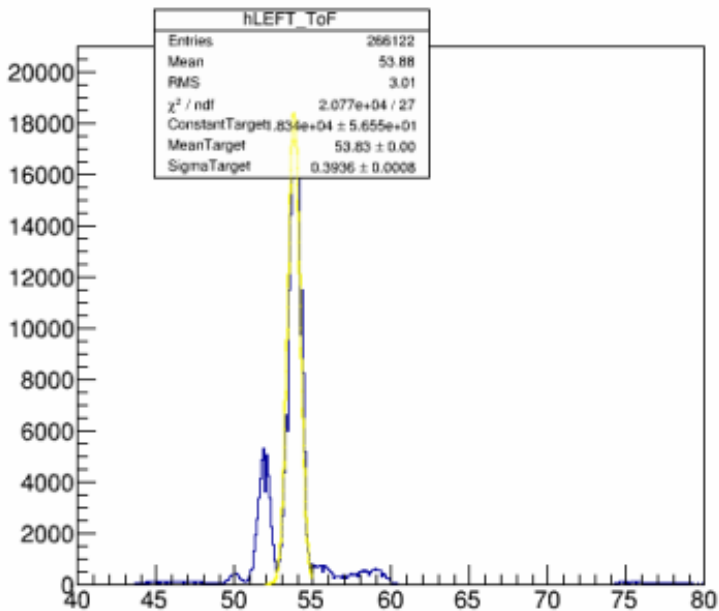


Run 8536 – 50 nm foil TL #12

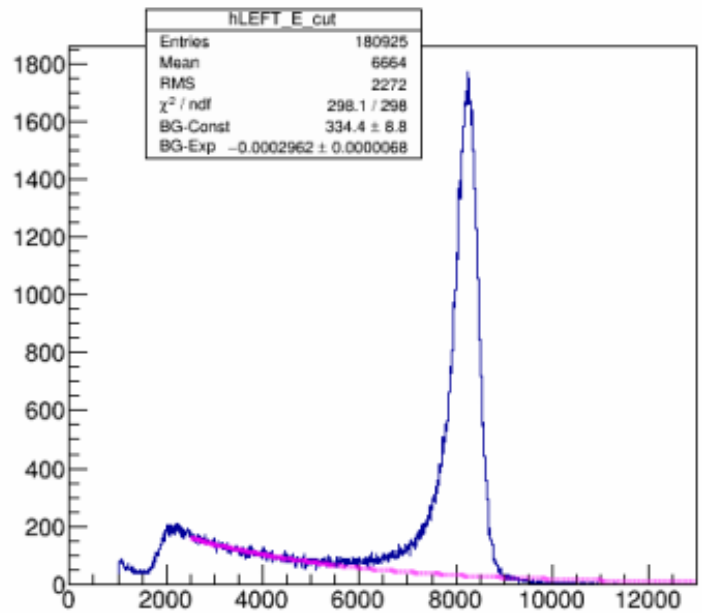
Raw Energy Detector Spectra



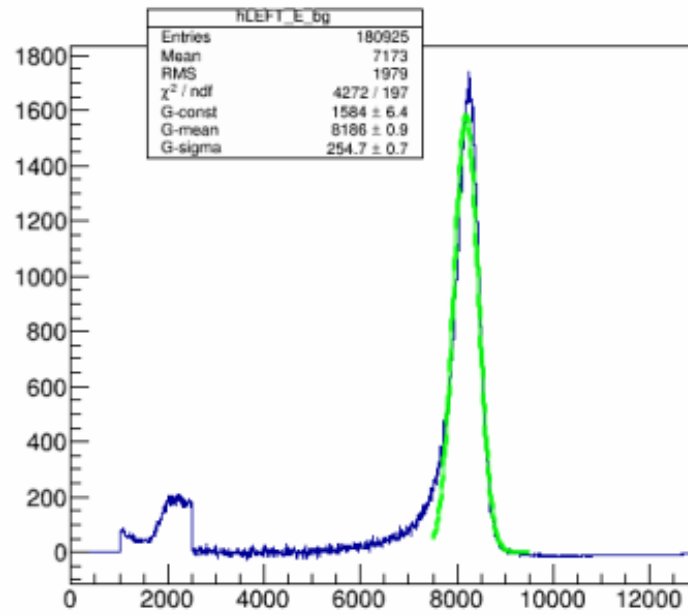
Time-of-flight cut (-2 to +2 sigma)



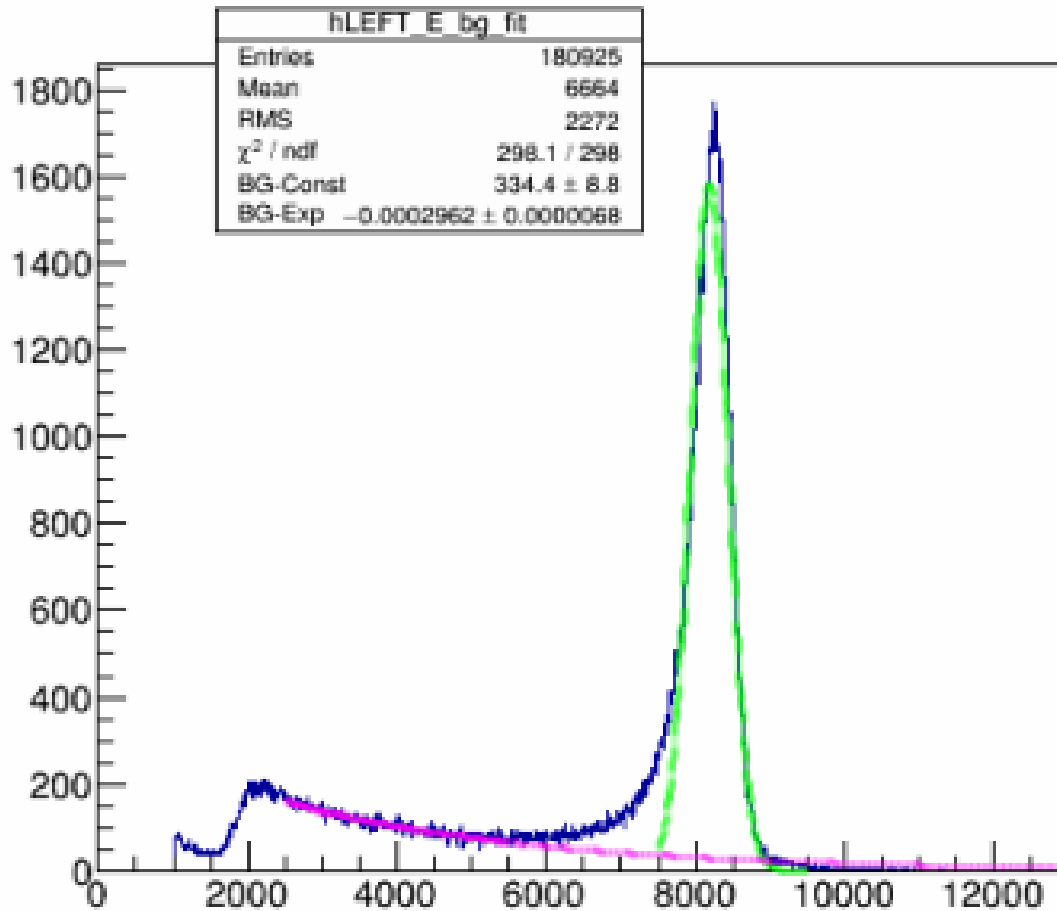
Background fit with exponential, range 2500 to 5500,  
Extrapolated to range 2500 to 13000



Background subtracted, elastic peak fit with Gaussian in range 7500 to 9500



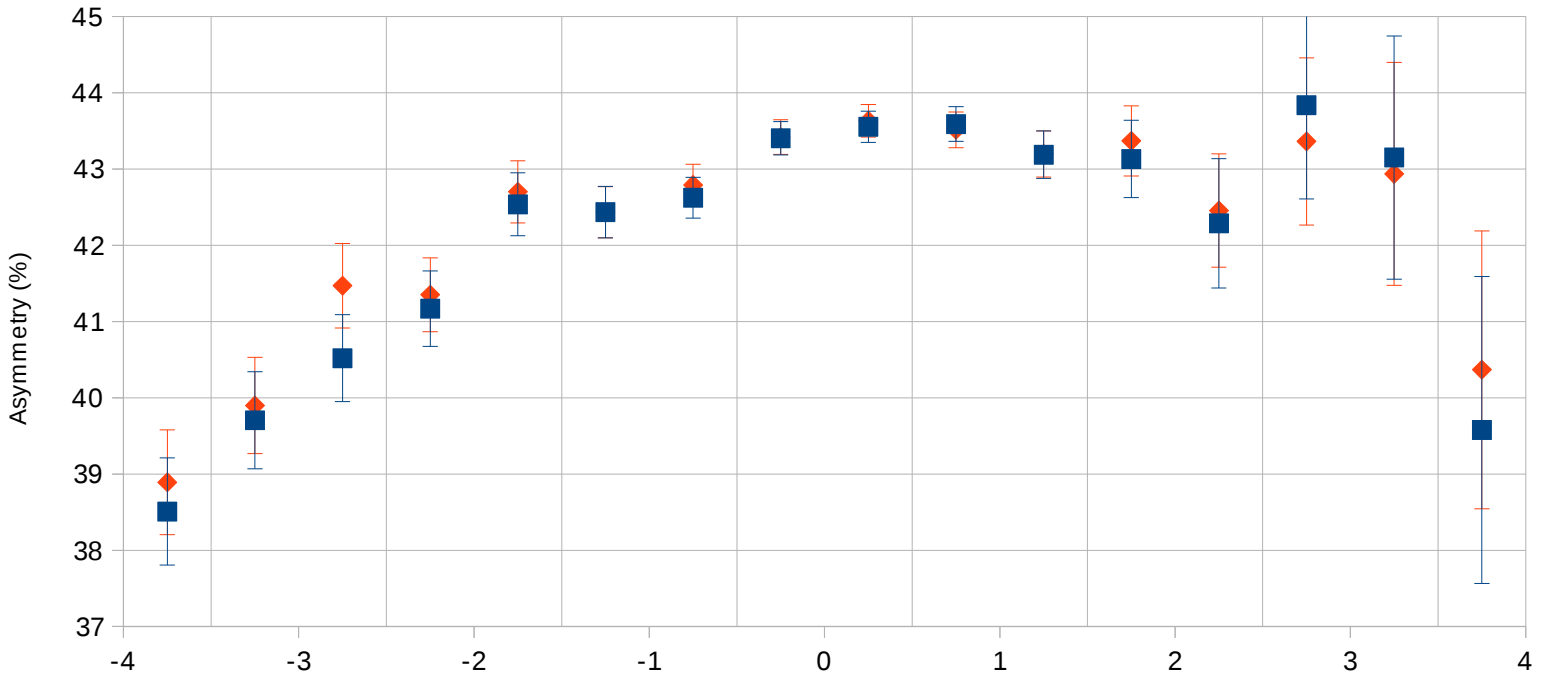
For display purposes, fit of elastic peak and background-fit-extrapolated shown on only ToF-cut spectra



# Comparison of Background Subtracted versus No Background Subtraction by Half-Sigma Energy Slice – Run II Data

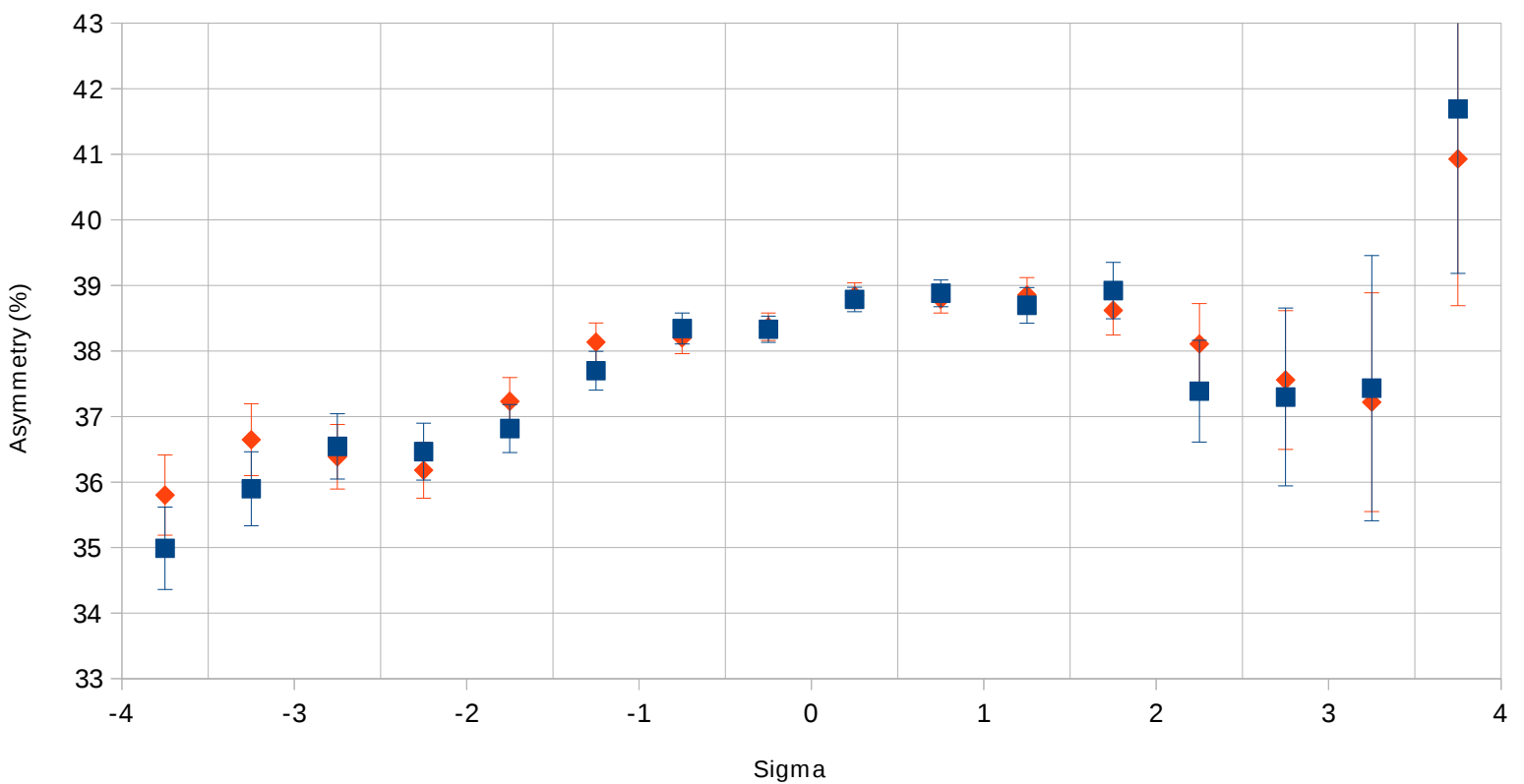
50 nm Foil TL #13 versus Energy Slice

■ No Background Subtraction    ◆ Background Subtracted

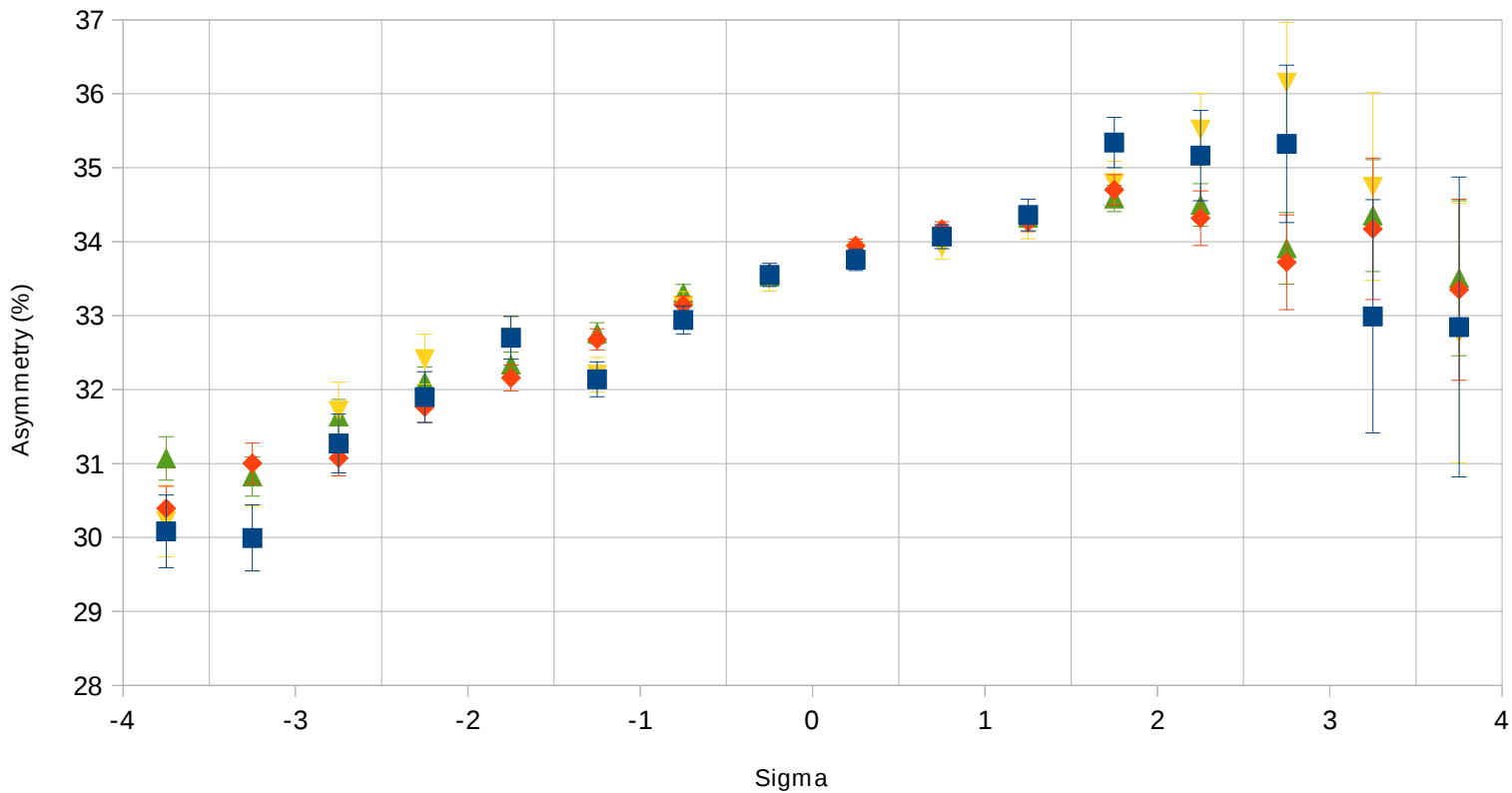


500 nm TL #5 versus Energy Slice

■ No Background Subtraction    ◆ Background Subtracted

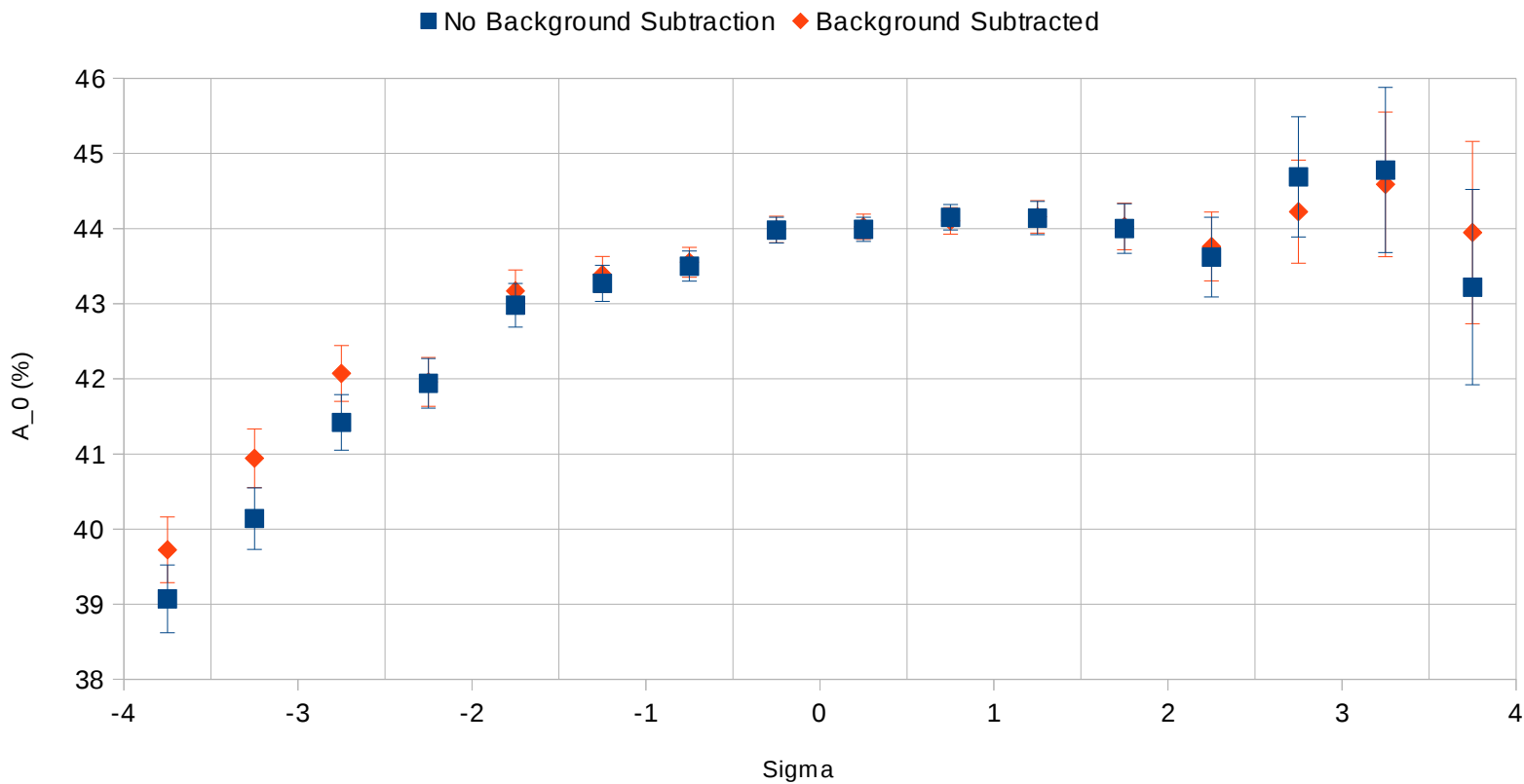


# 1000 nm Foil vs Energy Slice



## A<sub>0</sub> versus Energy Slice

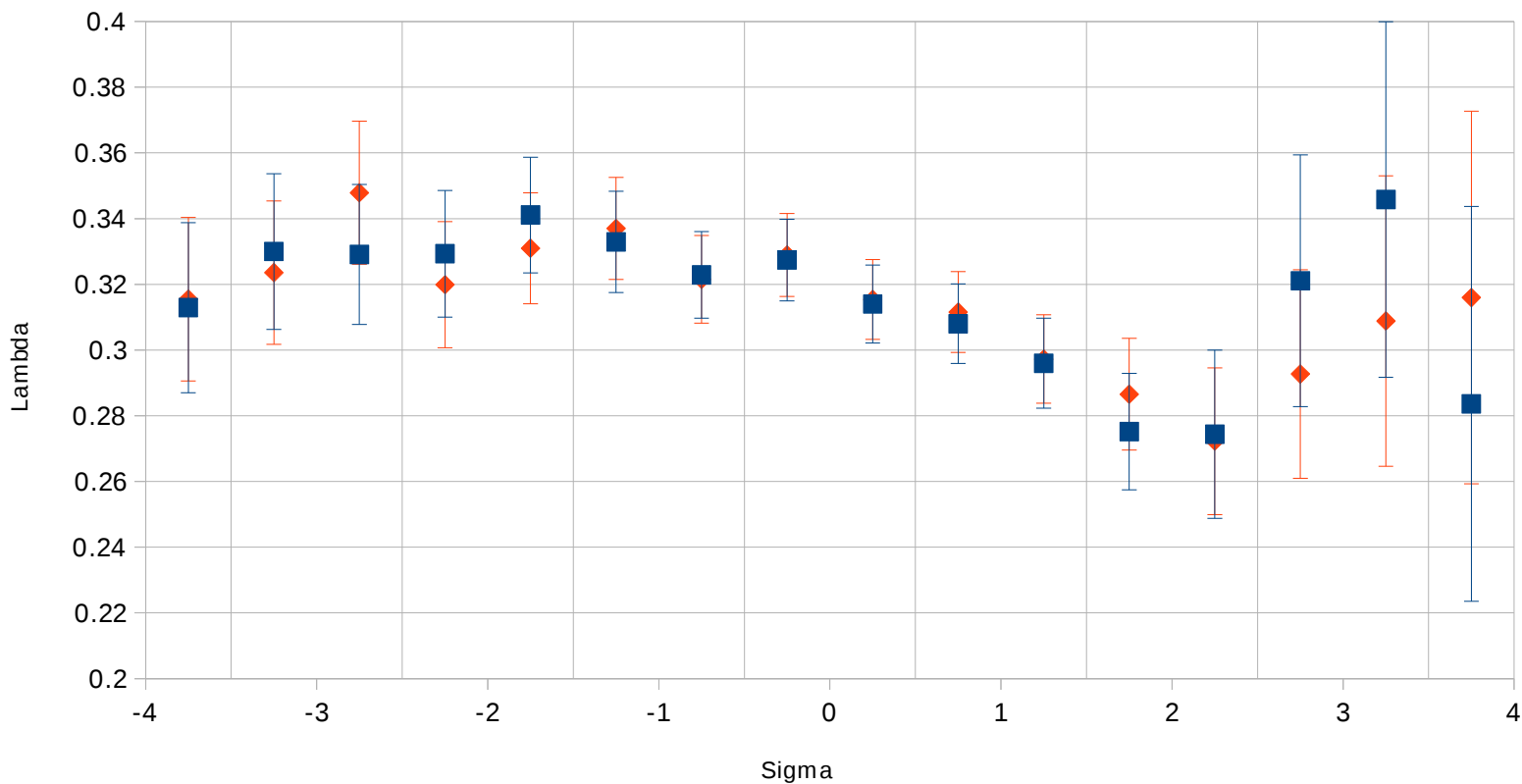
Background Subtraction vs Not



# Lambda versus Energy Slice

Background Subtracted vs Not

■ No Background Subtraction    ◆ Background Subtracted

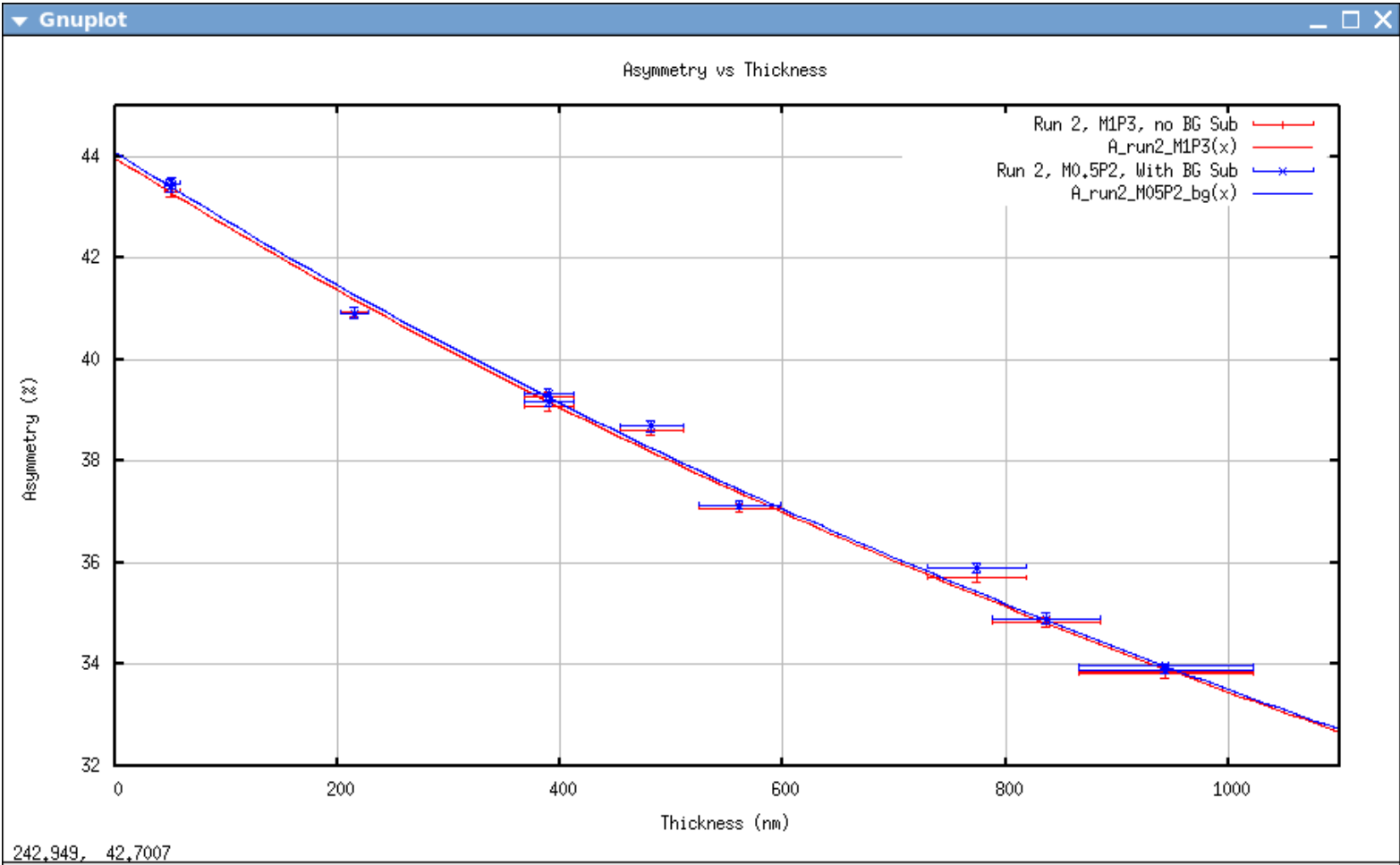
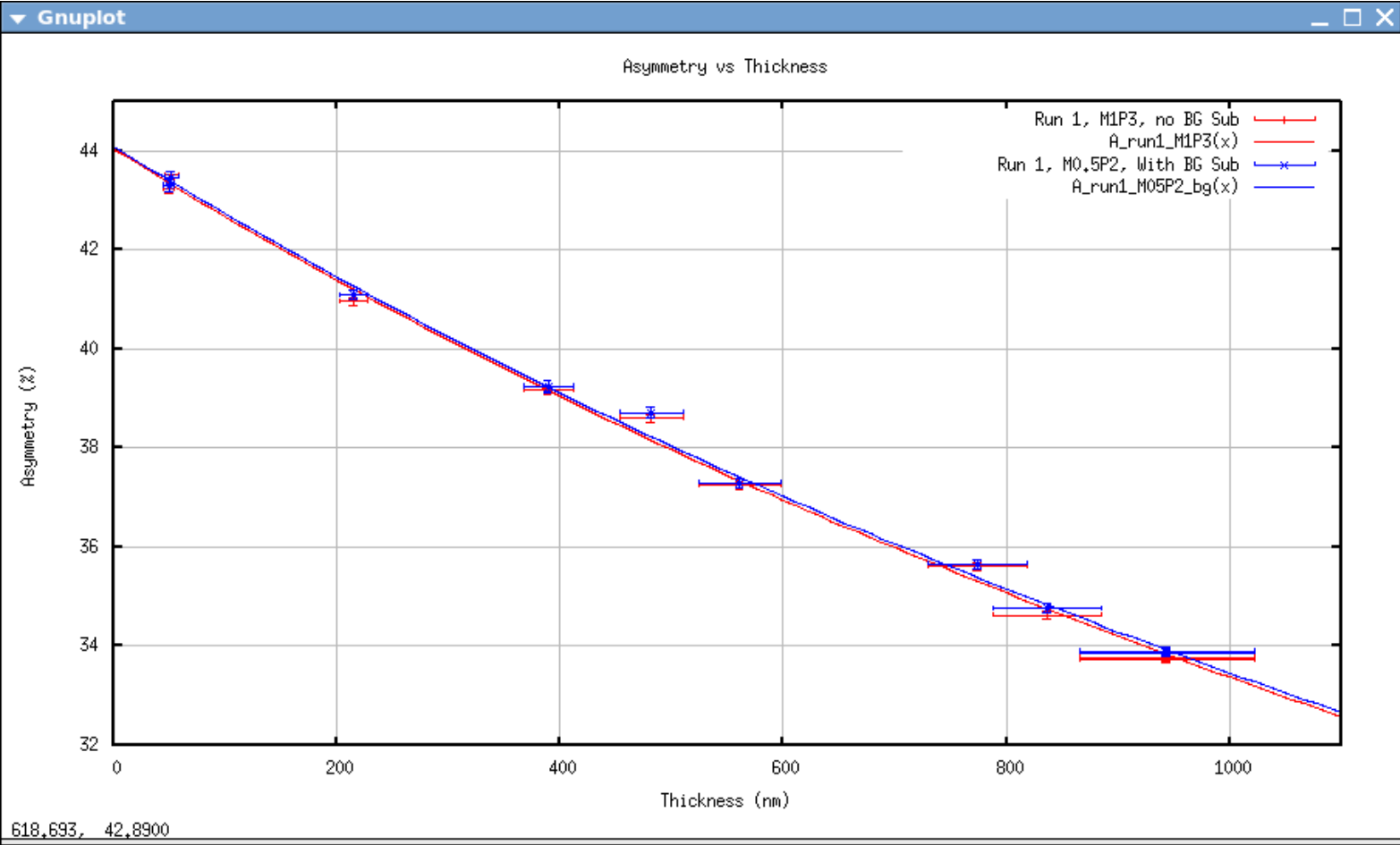


## Comparison Of Energy Cut, Background Subtraction, Runs I and II, For Nominal Fit

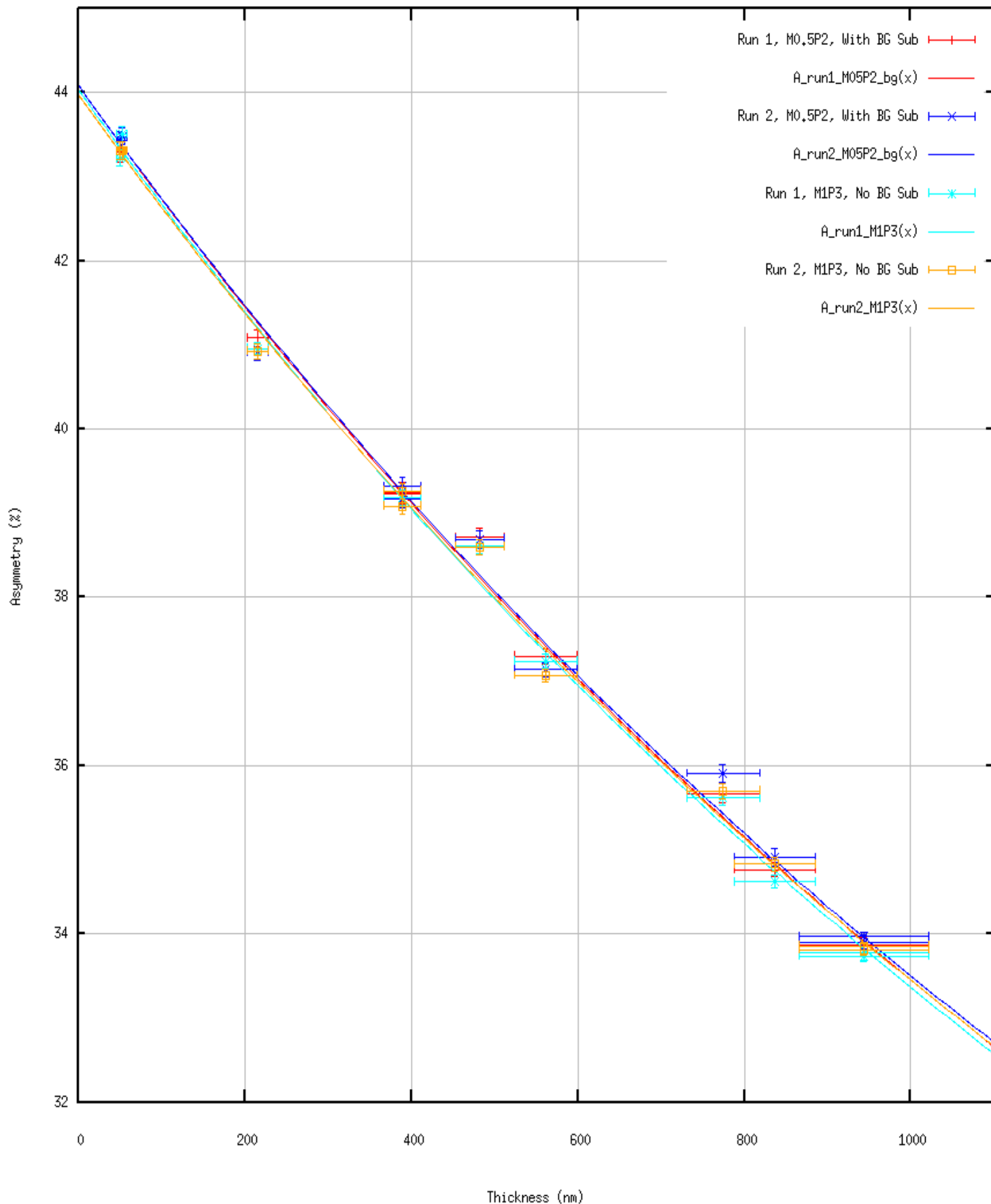
| <b><math>A(t) = A_0 / (1 + \lambda * t)</math> Fit Parameters; Run 1 vs Run 2</b> |                    |                   |   |                  |
|---|--------------------|-------------------|---|------------------|
| Energy Cut/Background Subtraction/Run   | $A_0$ (%)          | Lambda            | NDF<br>Chi <sup>2</sup> / NDF<br>P(Chi <sup>2</sup> ,NDF) * | P <sub>0</sub>   |
| -1 to +3 Sigma, No Background Subtraction, <b>Run 1</b>                           | 44.0372 +/- 0.0905 | 0.3196 +/- 0.0089 | 10<br>0.8689<br>[0.5, 0.6]                                  | 86.347 +/- 0.538 |
| -1 to +3 Sigma, Background Subtracted, <b>Run 1</b>                               | 44.0143 +/- 0.0904 | 0.3187 +/- 0.0089 | 10<br>0.8817<br>[0.5, 0.6]                                  | 86.303 +/- 0.538 |
| -1 to +3 Sigma, No Background Subtraction, <b>Run 2</b>                           | 43.9704 +/- 0.0995 | 0.3143 +/- 0.0094 | 9<br>0.6233<br>[0.7, 0.8]                                   | 86.216 +/- 0.543 |
| -1 to +3 Sigma, Background Subtracted, <b>Run 2</b>                               | 43.9844 +/- 0.1001 | 0.3142 +/- 0.0094 | 9<br>0.6246<br>[0.7, 0.8]                                   | 86.244 +/- 0.544 |
|   |                    |                   |   |                  |
| -0.5 to +2 Sigma, No Background Subtraction, <b>Run 1</b>                         | 44.0809 +/- 0.0956 | 0.3167 +/- 0.0093 | 10<br>0.9043<br>[0.5, 0.6]                                  | 86.433 +/- 0.542 |
| -0.5 to +2 Sigma, Background Subtracted, <b>Run 1</b>                             | 44.0896 +/- 0.0951 | 0.3178 +/- 0.0090 | 10<br>0.8469<br>[0.5, 0.6]                                  | 86.450 +/- 0.542 |
| -0.5 to +2 Sigma, No Background Subtraction, <b>Run 2</b>                         | 44.0721 +/- 0.1056 | 0.3142 +/- 0.0096 | 9<br>0.8719<br>[0.5, 0.6]                                   | 86.416 +/- 0.543 |
| -0.5 to +2 Sigma, Background Subtracted, <b>Run 2</b>                             | 44.0889 +/- 0.1070 | 0.3158 +/- 0.0097 | 9<br>0.9253<br>P ≈ 0.5                                      | 86.449 +/- 0.550 |

\* Probability of exceeding Chi<sup>2</sup> versus the number of degrees of freedom





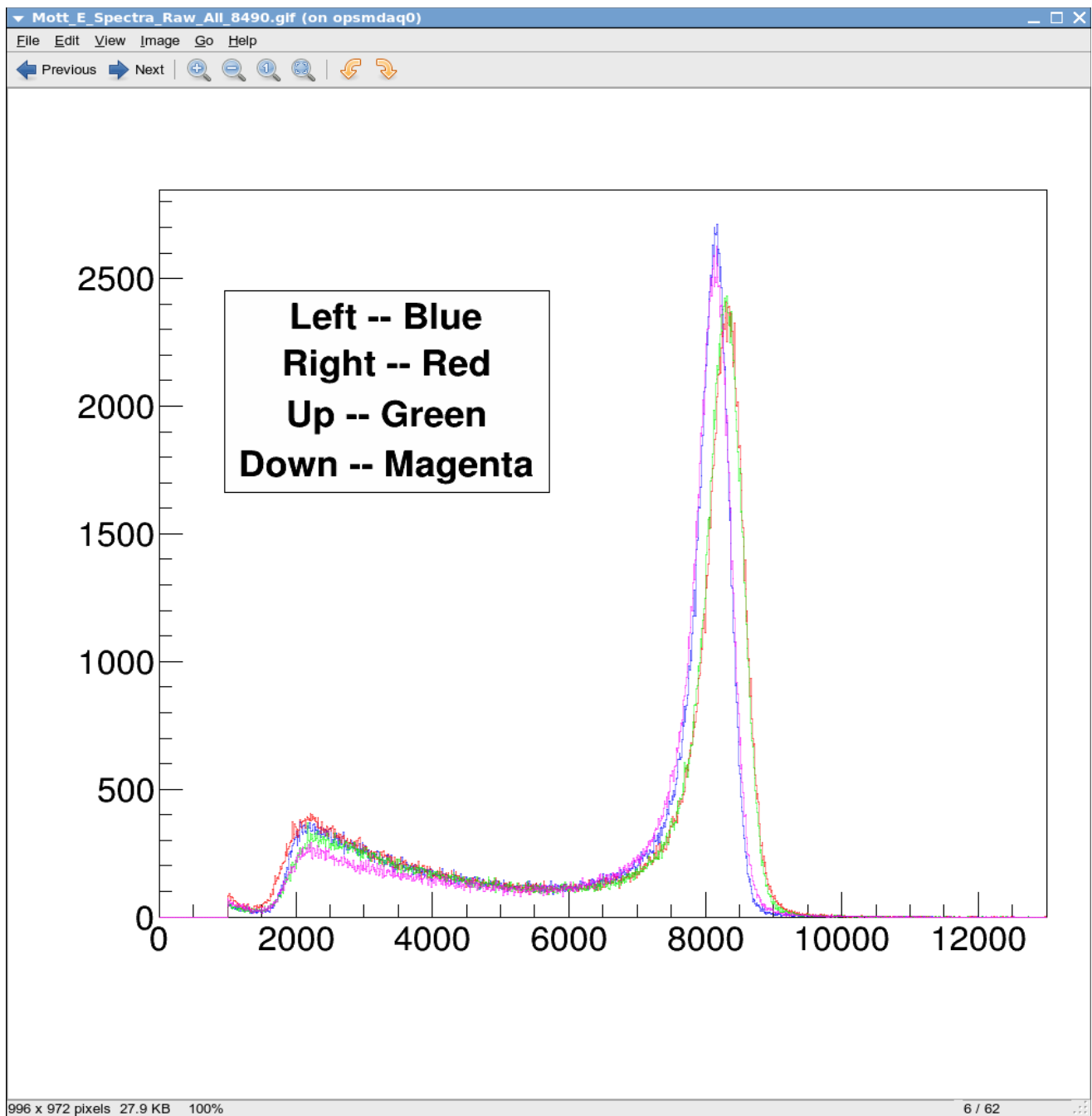
Asymmetry vs Thickness



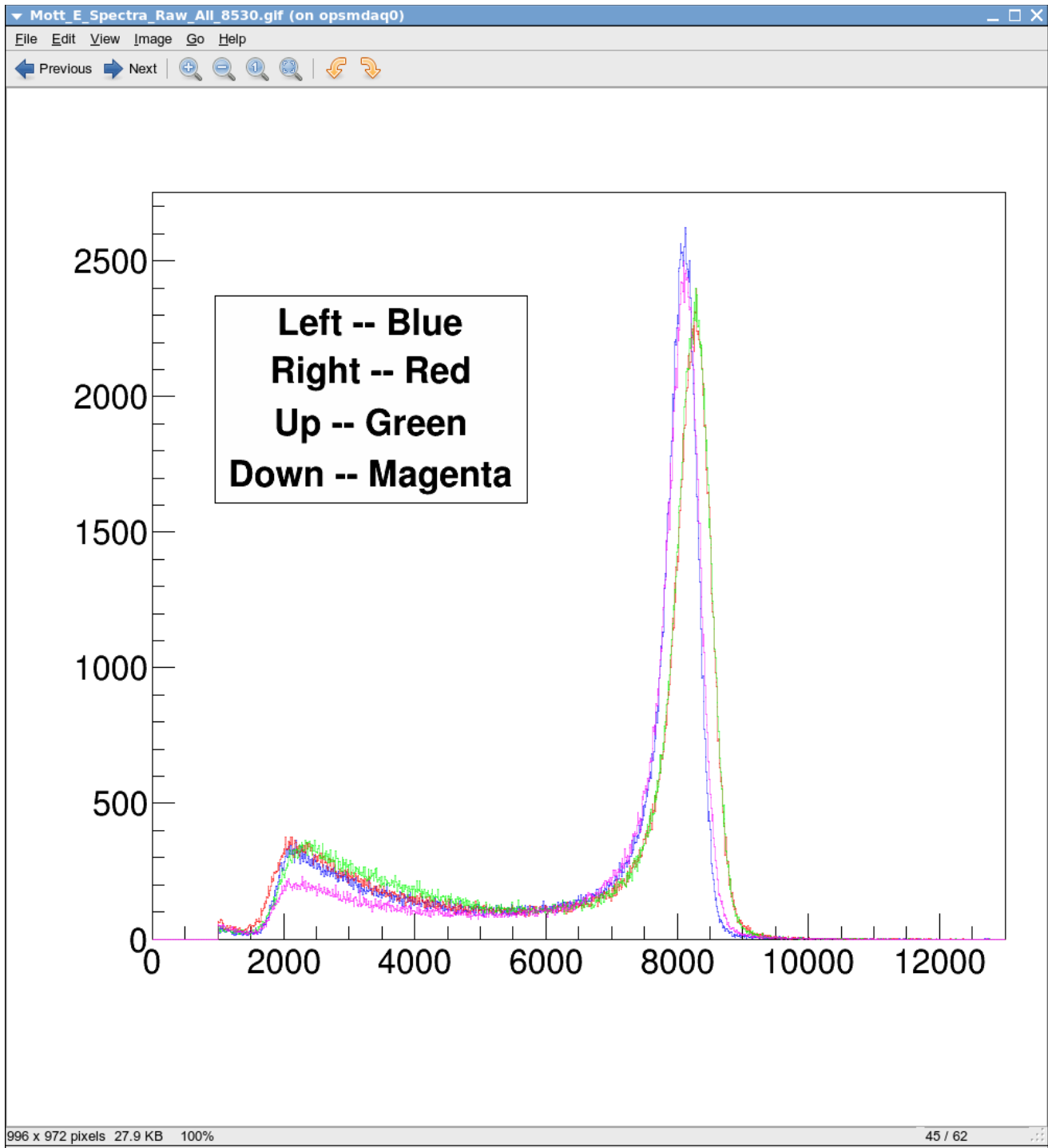
## Sample From Run II, All Four Energy Detector's Raw Spectra Overlaid

- Run II was done with dump dipole de-gaussed
- Raw => no Time of Flight Cut applied, no Background Subtraction performed, simply the signal from the DAQ
- Getting ROOT to display statistics for four different histograms is hard

### Run 8490 – TL 15 – 1000 nm Foil



# Run 8530 – TL 5 – 500 nm Foil



# Run 8497 – TL 13 – 50 nm Foil

