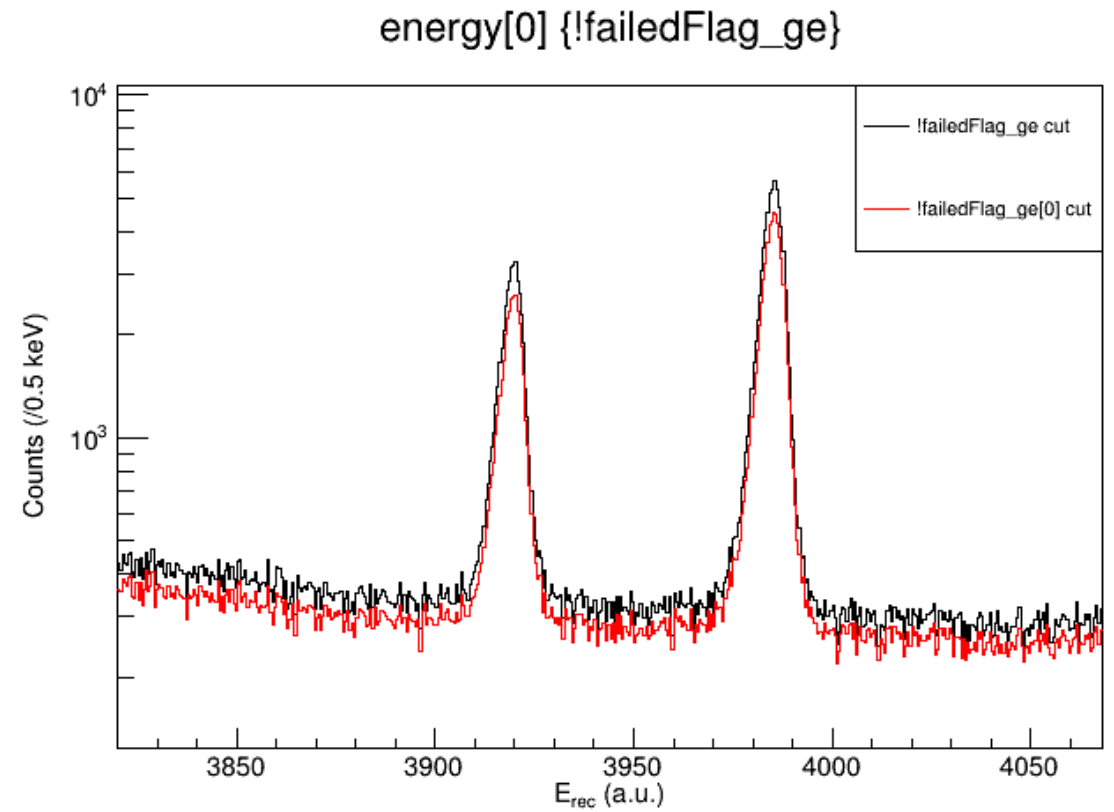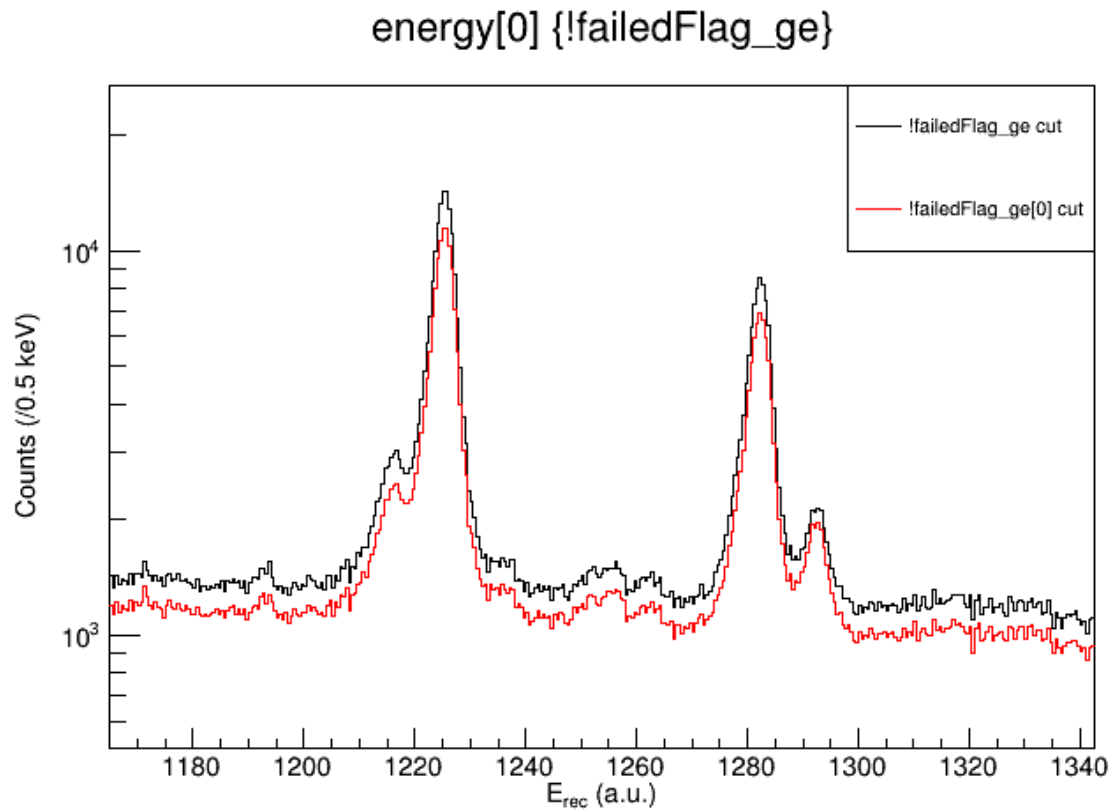# Preliminary time stability of peaks
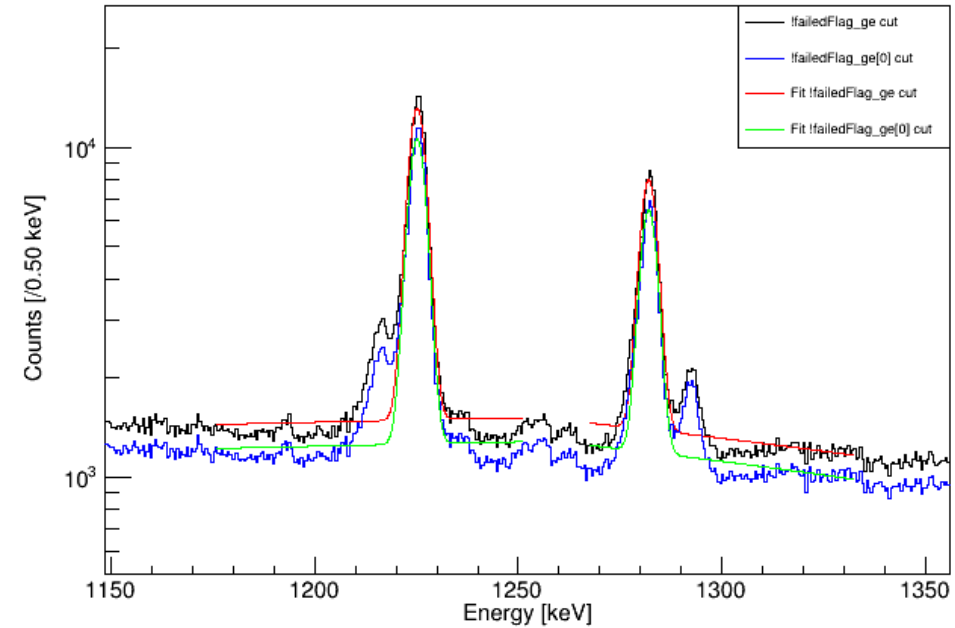
- Dhanurdhar Bajpai (U.A.)

# Time stability of peaks

- Analyze the position of peaks with respect to time of data collection
- Tier3 root trees for every 6 hours interval was taken between Oct 22-28
- 4 peaks, 1227, 1283, 3922 and 3983 keV were fitted with a gaus+lin fit function and the peak positions were obtained
- This work discusses only about Channel-0 time stability
- 135 hours of tier3 data was utilized starting from midnight Oct 22
- !failedFlag_ge flag to be used such that events that pass all the quality cuts will survive
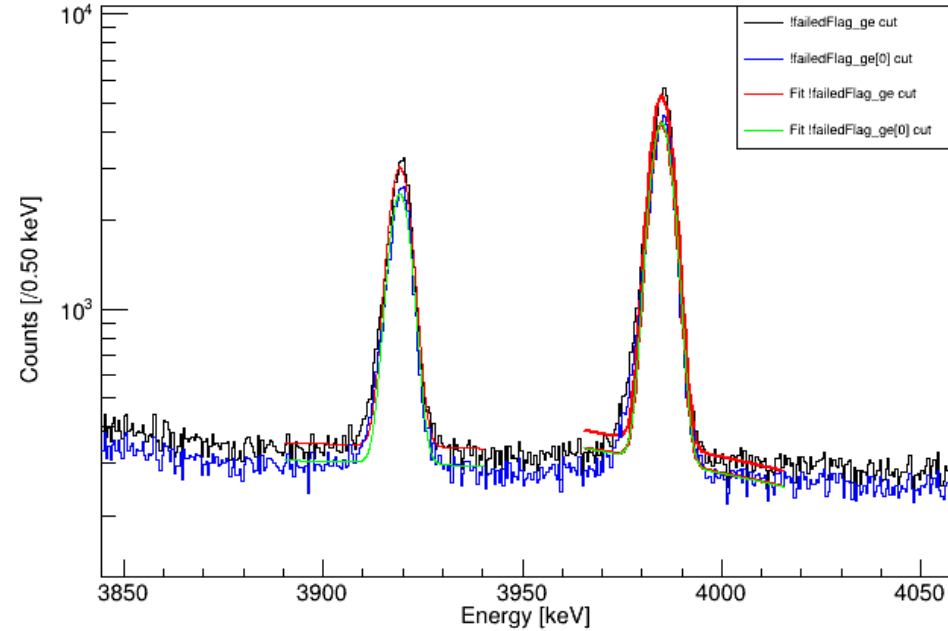- But !failedFlag_ge cut used accidently instead of using it channel-wise, i.e. !failedFlag_ge[0]

- ❑ Histogram with !failedFlag_ge and !failedFlag_ge[0] cut
- ❑ ~51% events survive after the second cut
- ❑ Black histogram: tier3->Draw("energy[0]>>h(11000,0,5500)","!failedFlag_ge")
- ❑ Red histogram: tier3->Draw("energy[0]>>h(11000,0,5500)","!failedFlag_ge[0]")

| | !failedFlag_ge | !failedFlag_ge[0] |
|---|---|---|
| Peak (keV) | Fit (keV) | Fit (keV) |
| ~1227 | 1225.138±0.008 | 1225.135±0.009 |
| ~1283 | 1282.06±0.01 | 1282.07±0.01 |
| ~3922 | 3919.28±0.02 | 3919.28±0.02 |
| ~3983 | 3984.92±0.01 | 3984.92±0.01 |

❑ Ba136-01 data used to compare means of the histogram obtained from the two cuts
❑ Black histogram: tier3-> Draw("energy[0]>>h(11000,0,5500)","!failedFlag_ge")
❑ Red curve: Fit of peaks from black histogram
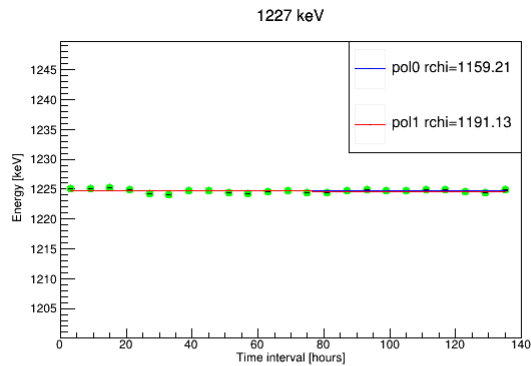❑ Blue histogram: tier3-> Draw("energy[0]>>h(11000,0,5500)","!failedFlag_ge[0]")
❑ Green curve: Fit of peaks from blue histogram
❑ Mean of peaks are consistent within 1σ error

# Individual fit of mean peaks with only statistical errors
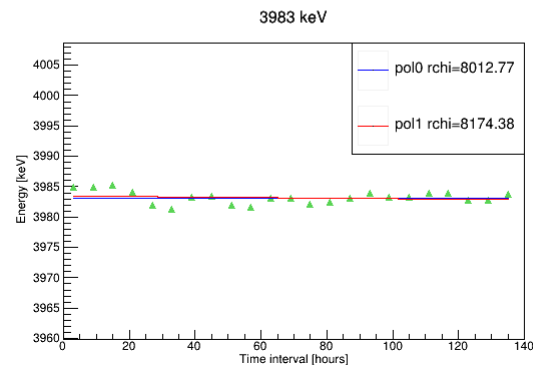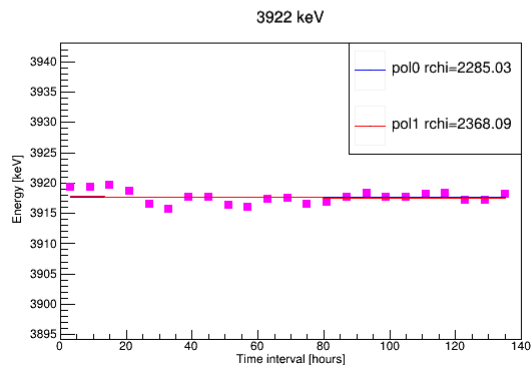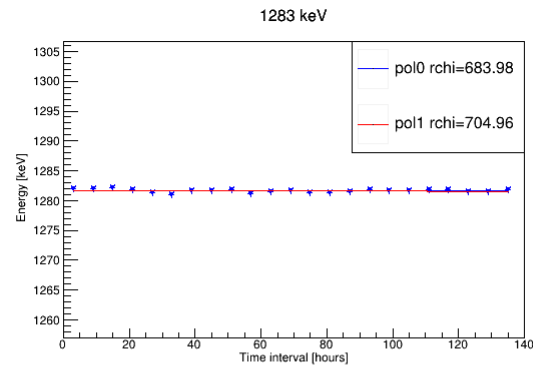


- Every mean peak vs time plot fitted with pol0 and pol1 functions

- Includes only statistical errors from gaus+lin peak fit function

- Reduced-$\chi^2$ large because of very small error bars

- The slope of pol1 fits are consistent with zero

# Individual fit of mean peaks including systematic errors
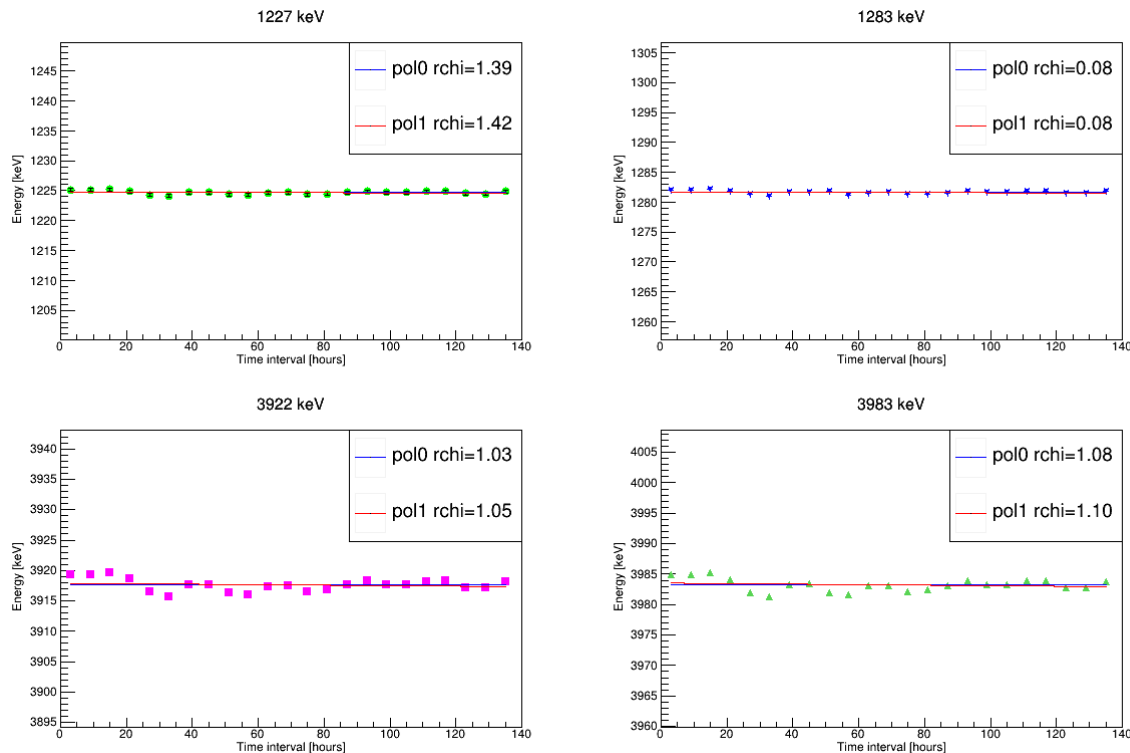


- The systematic errors from fitting the peaks during energy calibration were between ~0.2-0.3 keV
- Naively assumed a systematic error of 0.25 keV and added it in quadrature to the statistical error
- Reduced-$\chi^2$ value gets closer to 1
- The slope of pol1 fits are consistent with zero within 1σ
- Preferred fit function: constant
- So, with the given information, we can conclude that channel 0 has no measurable drift over a period of 135 hours

# Next Steps

- Use the correct channel-wise flag and generate the peak positions again

- Extrapolate the method to all other channels

- Include data from later time also, i.e., after Oct 28