Future fyCiSiZts of America (a.k.a FFA)

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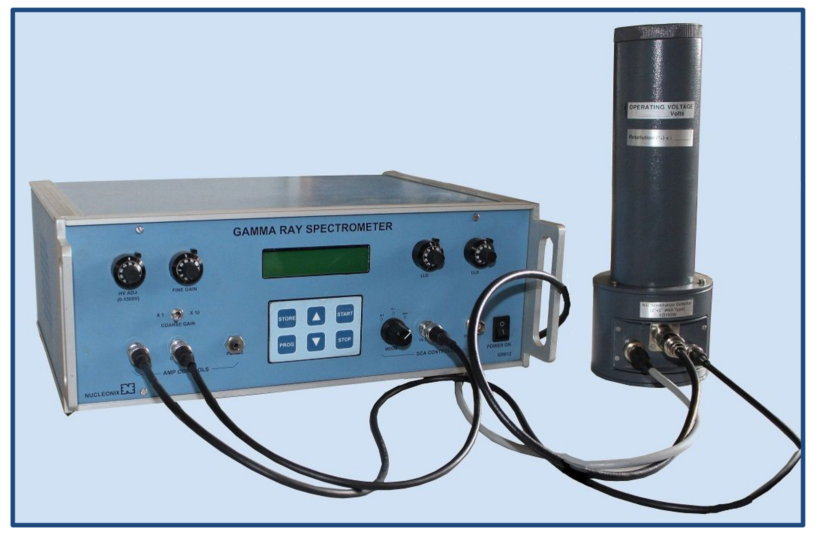
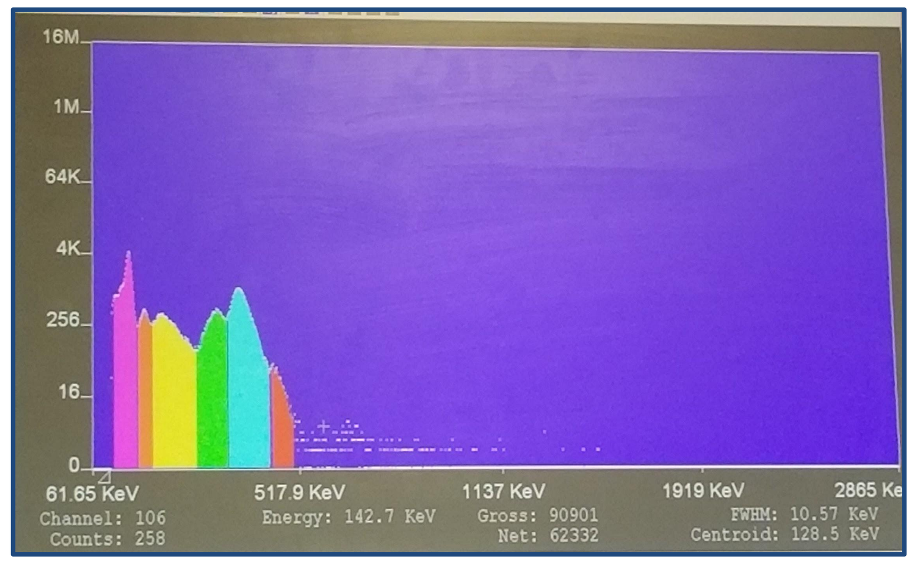
Gamma Spectroscopy Experiment

<u>The purpose</u>: To identify an unknown isotope through the gamma-ray spectroscope (as pictured). This gave us the gamma-ray energies, which was used to solve the isotope mystery.
We understood the procedure by calibration with Cs-137 and Co-60.

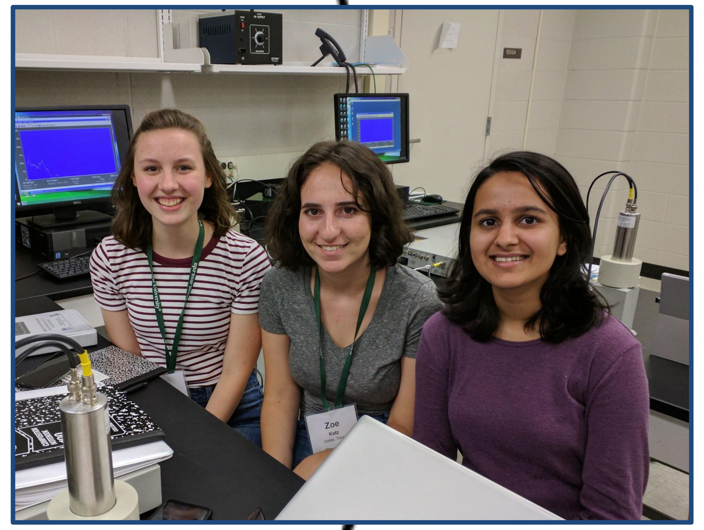


A gamma-ray spectrometer.



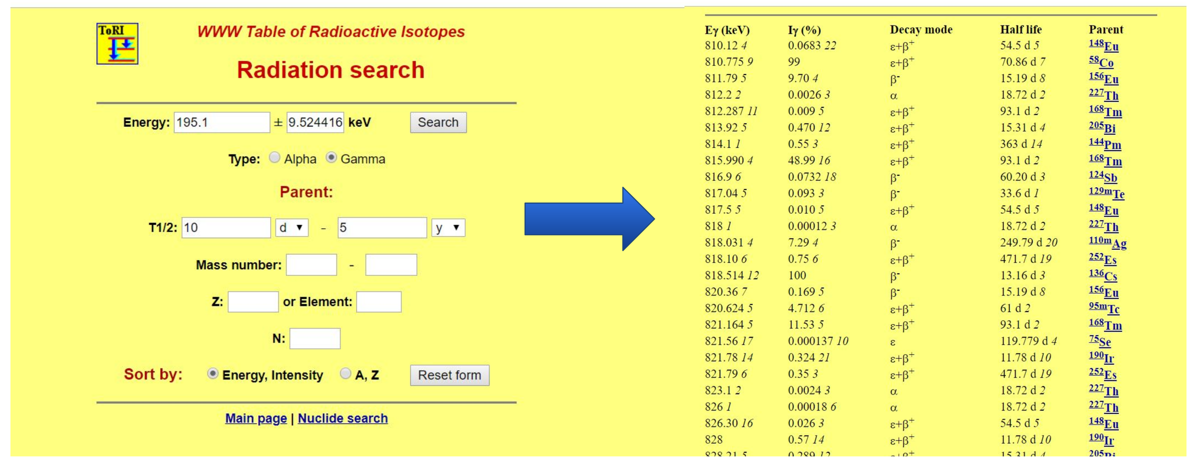
Our data for Mn-54 with colored centroids.

Once we measured the radiation through the spectroscope, we then used the **centroid** of each peak to find the gamma-ray energies. We also divided the **FWHM** by 2.355 to find the error percentage. This helped narrow down the search results, making it easier for us to find the correct isotope.

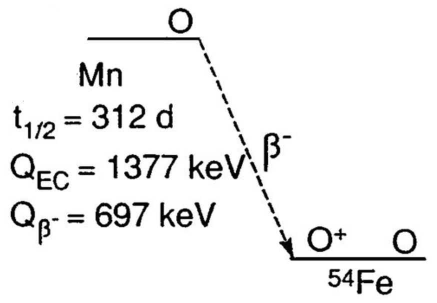

The future fycisizts at work in their lab.

Using the gamma-ray energies and our own estimated half-lives & gamma-ray intensities, we identified the right isotope (Mn-54)*.

*Take a peek at the top left-hand corner :0

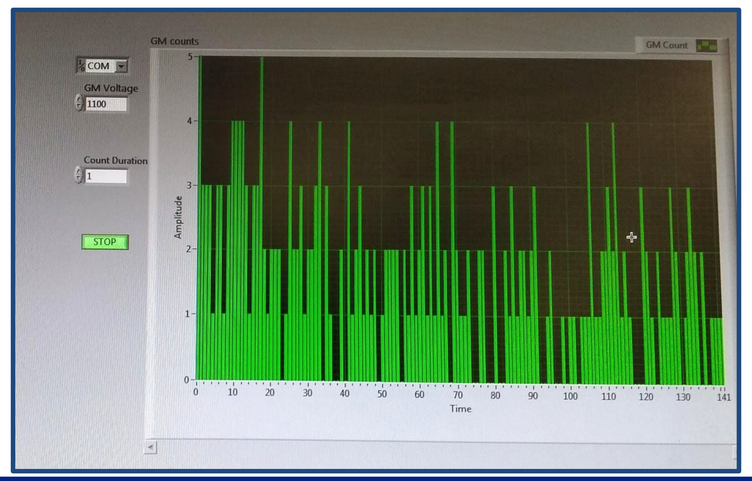


Radiation Search



The right depicts the decay scheme of Mn-54. It follows β^- decay, meaning a proton is changed to a neutron.

Half-lives Experiment

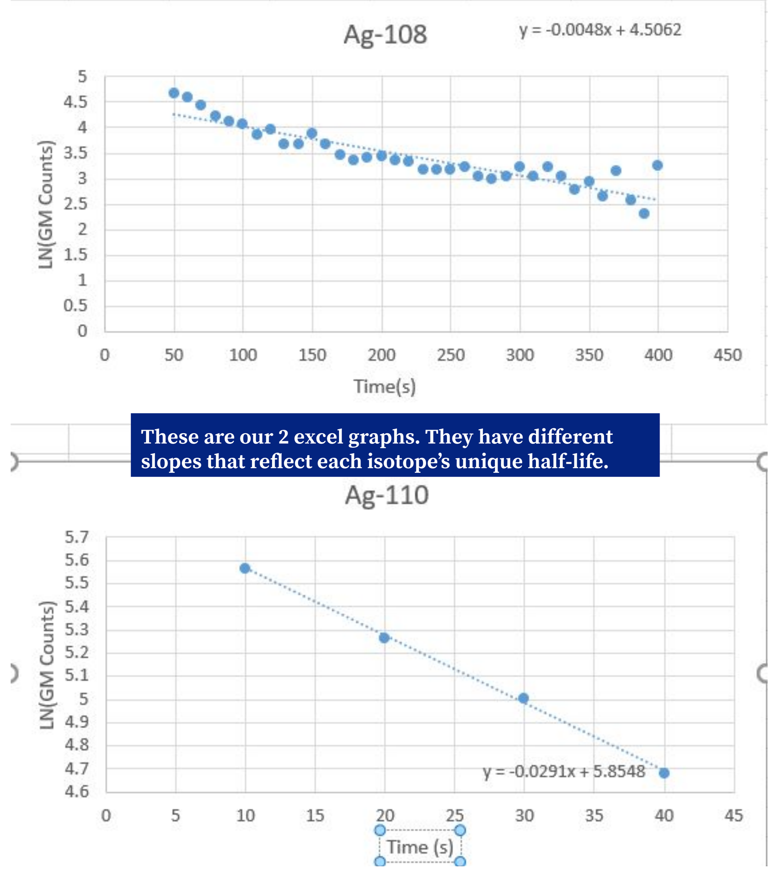

This is our first graph. There is a lot of discrepancy in the measurements.

<u>The purpose</u>: To calculate the half lives of Silver isotopes Ag-108 and Ag-110.

FAILURE

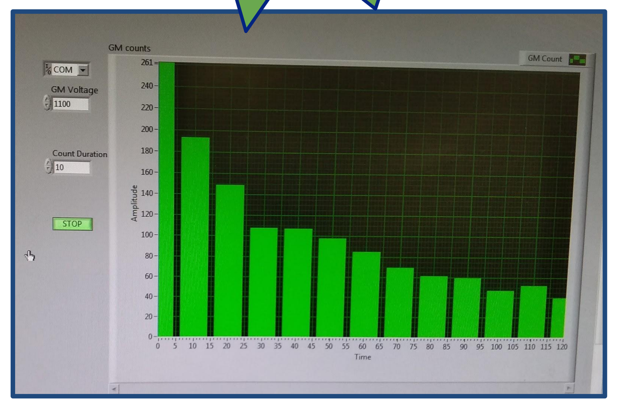
After bombarding neutrons at a silver coin to produce the required isotopes, we plotted a **GM counts vs time graph**.
Unfortunately, the first time we collected our data, we forgot to change the count from 1 sec to 10 sec. Due to user error, our data fluctuated a lot due to background disturbances. This data was hard to interpret.

Then, we transferred the data collected onto excel spreadsheet. We calculated the natural log of the GM count and plotted linear graphs of data collected from both Ag-108 and Ag-110. To find the half lives of each isotope, we divided ln(2) by the slope of the linear equations.



These are our 2 excel graphs. They have different slopes that reflect each isotope's unique half-life.

SUCCESS


Successful graph!

Despite a few initial setbacks, eventually we were able to get to the heart of the problem. By optimizing our data collection, our experiment ended up being a great success: the half-lives we calculated were 23.98 sec for Ag 110 and 2.40 min for Ag 108, which are close to the actual half-lives of 24.6 sec and 2.37 min.

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