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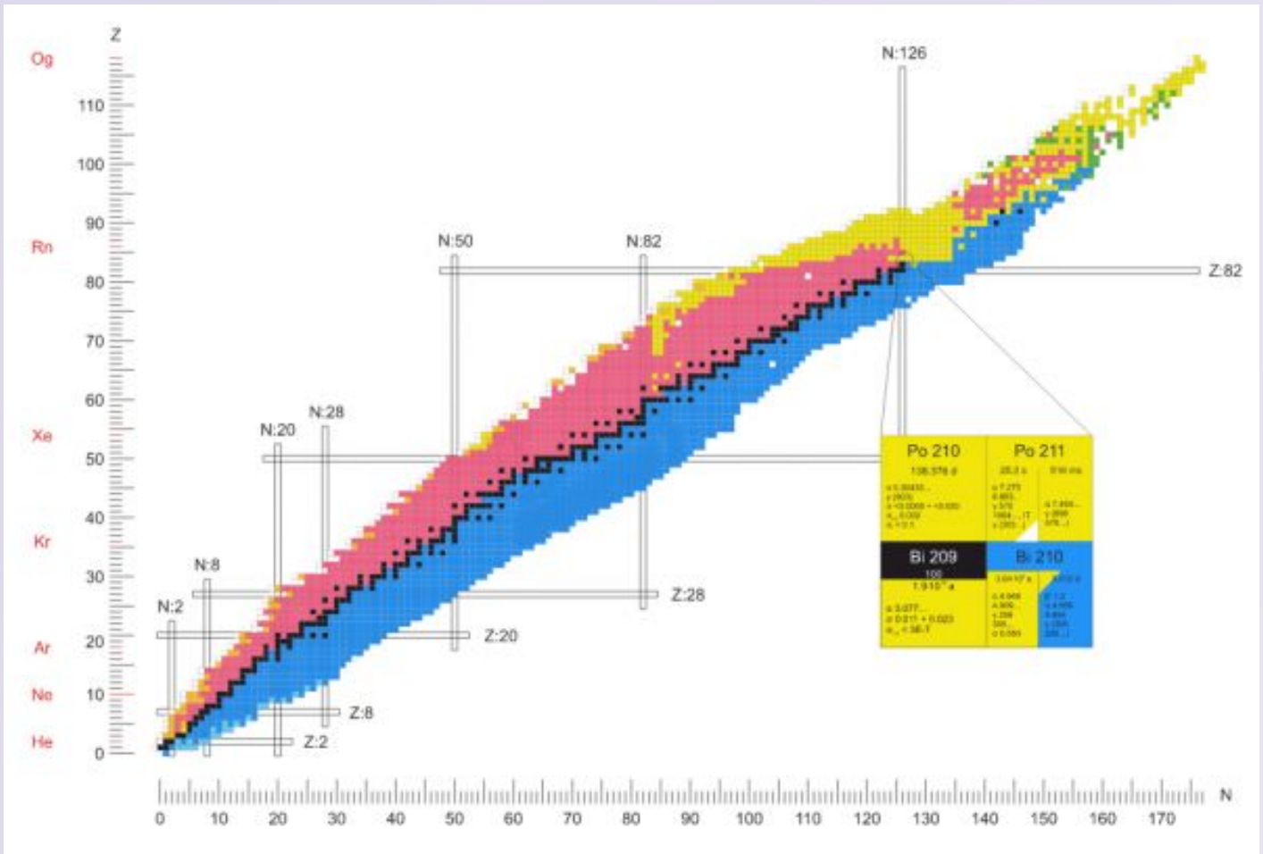
JINA-CEE

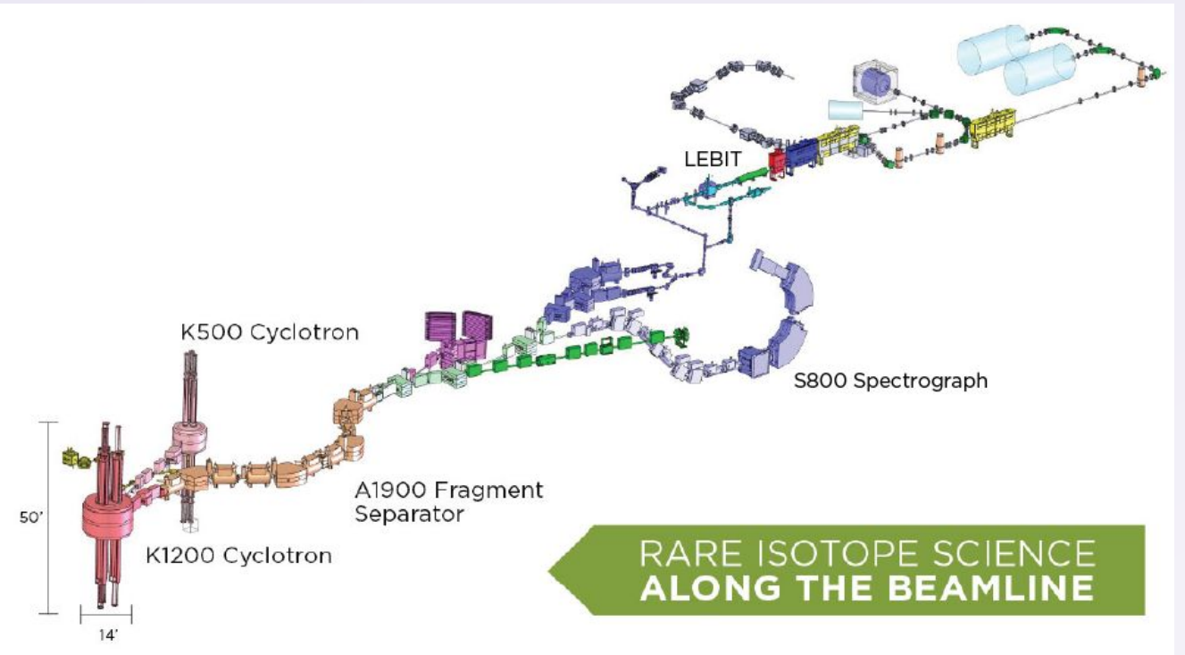
Peter PANicky PANdora's PANoster

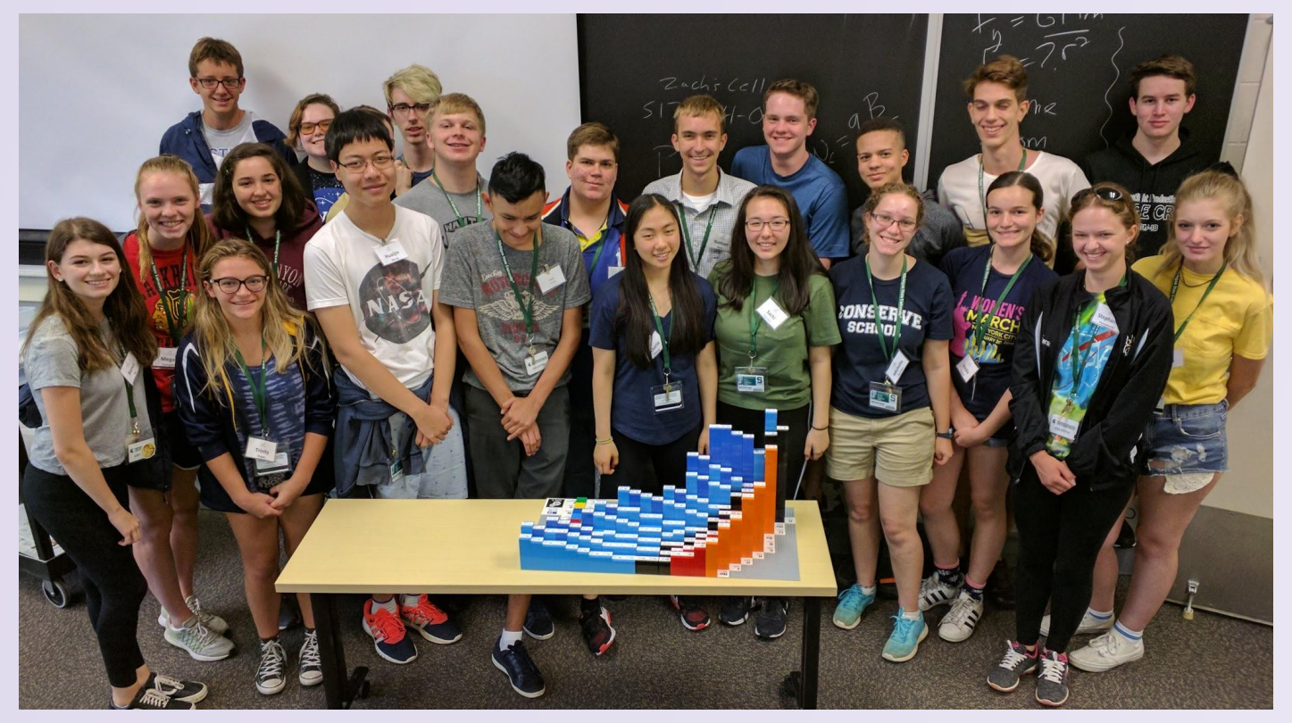
Alexa Bukowski[1], Aaron Chizhik[2], Alder Fulton[3]
1 JINA-CEE, Naperville Central High School, Naperville, IL, 60540, USA.
2 Garden of Eden, San Diego, CA, USA.
3 JINA-CEE, Lorena High School, Lorena, TX, 76655, USA.

Monday



We also toured the NSCL and the campus! Unfortunately we could not see the cyclotrons, however we still saw much of the lab and got to see many professionals!



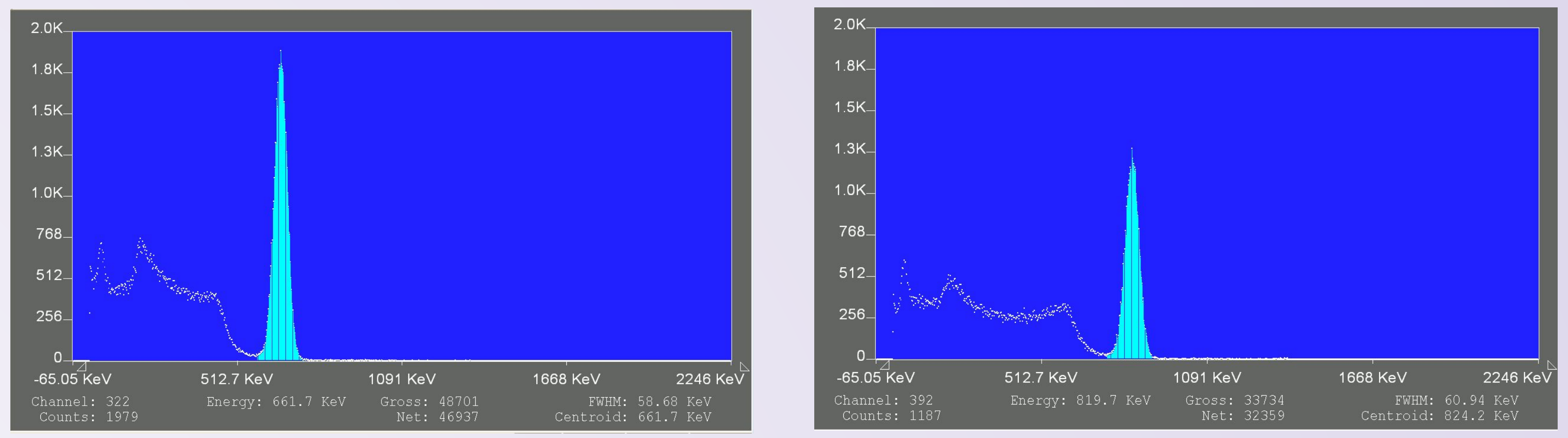


- Energy is lazy, so it wants nuclei in the lowest possible energy state.
- They do this by making their way towards the valley of stability (The black line).
- They get there through decay (Losing and converting neutrons and protons).
- They also tend to prefer the magic numbers (The thin straight lines on the graph).
- We made a lego representation of the energy levels (and types of decay)

We also smashed magnetic marbles, representing nuclei, together. We were recreating nuclear fusion. We learned that faster collisions cause more powerful collisions, resulting in more broken nuclei. However, with slower collisions you have a better chance of fusion!

Tuesday

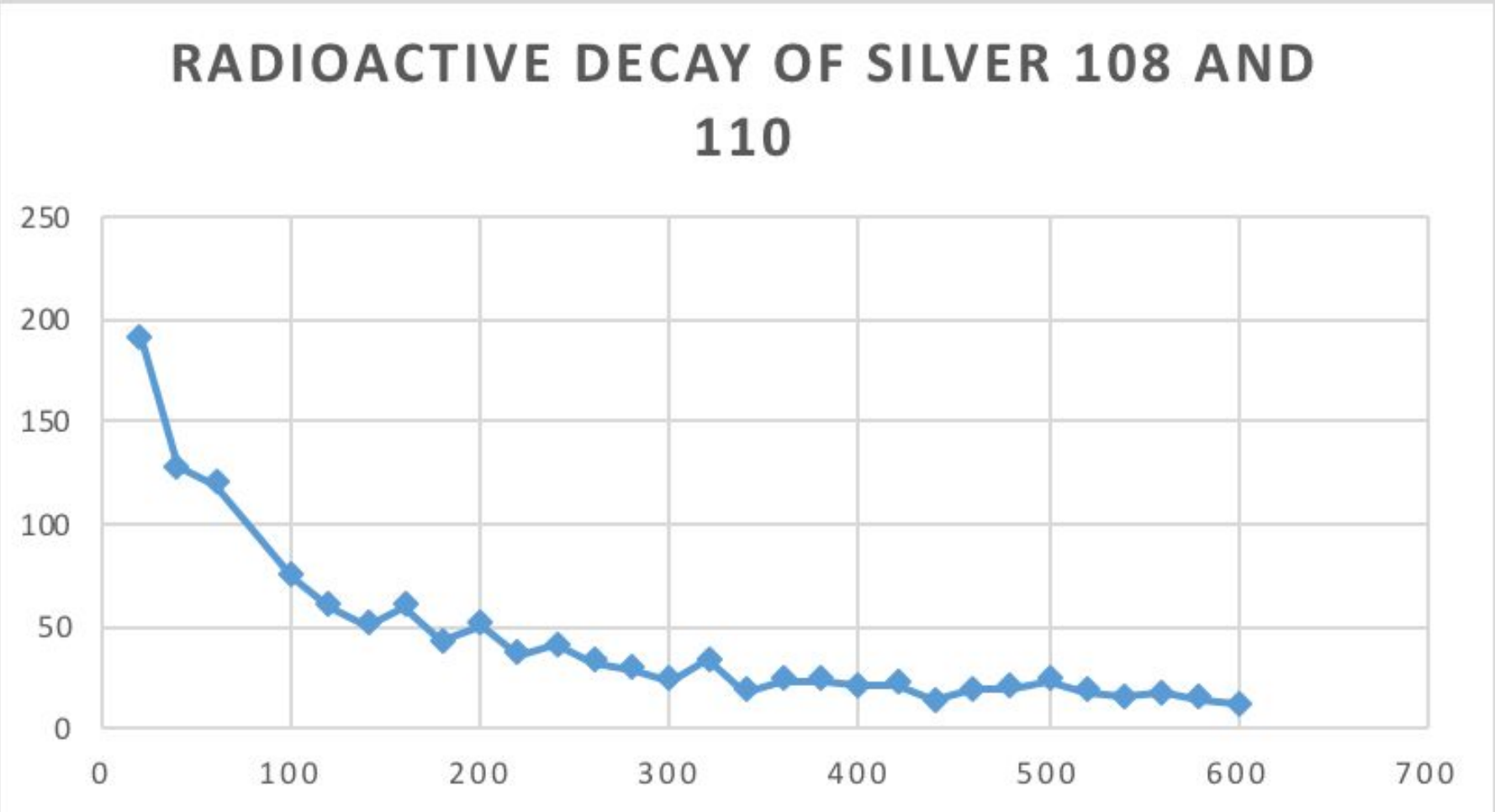
We also walked around campus and visited MSU museum!

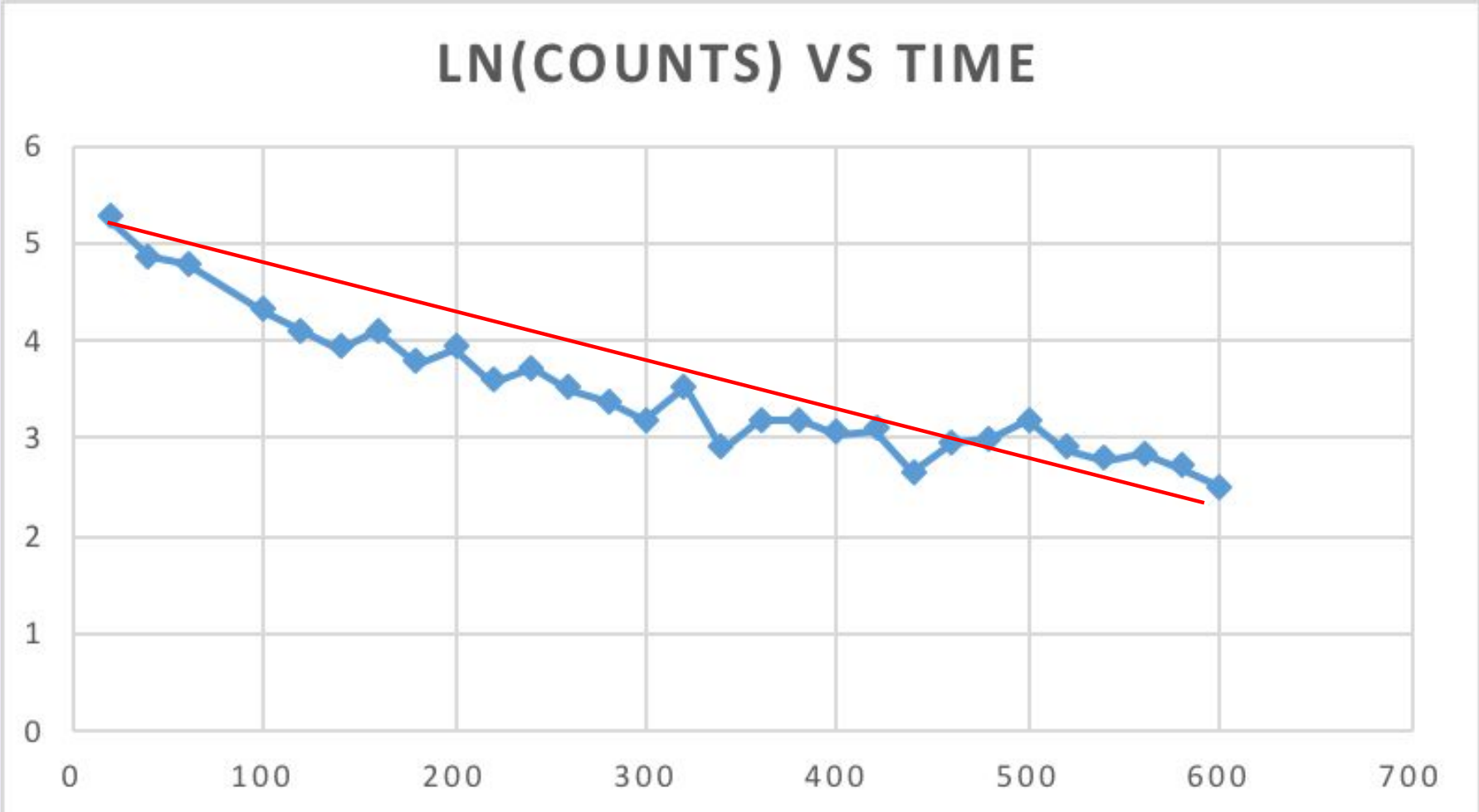


A reading of Cs-137 (left) and Mn-54 (right) gamma radiation after the spectroscopy experiment, where we determined the element and isotope of a "mystery element" by detecting peaks in reading counts at specific energies. Gamma radiation energy is the energy detected from the high energy photons released.

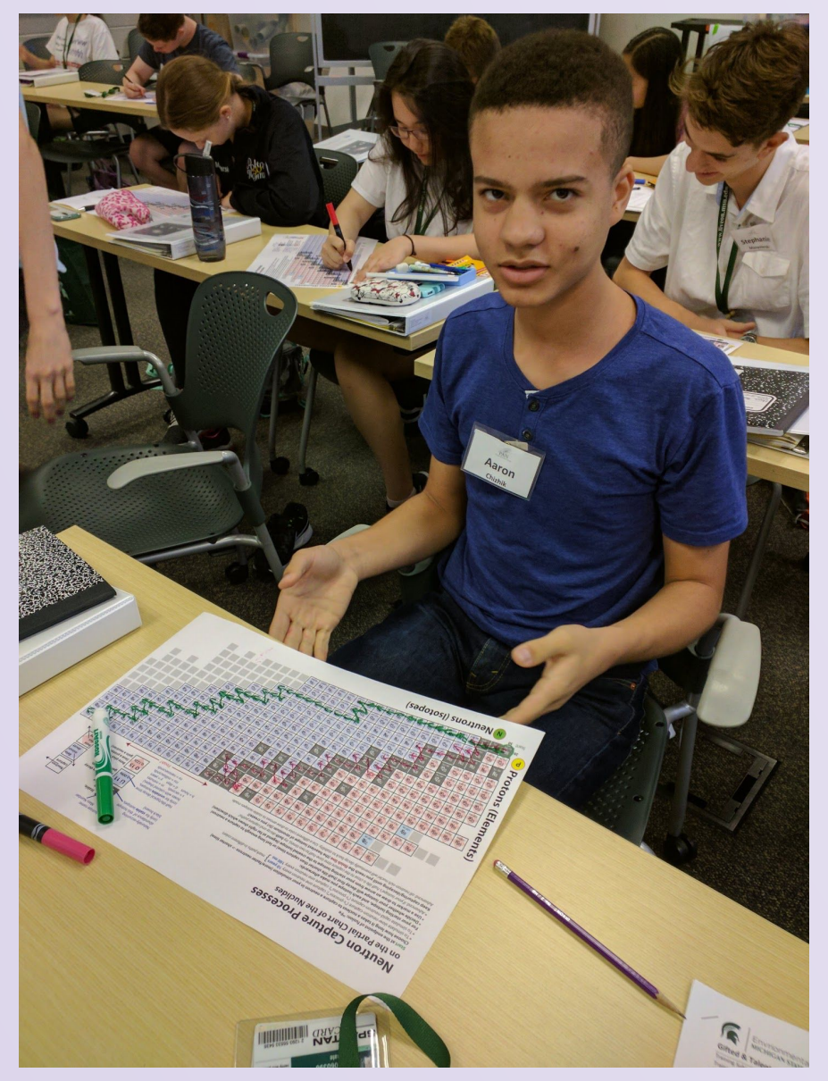
- We first wrote up a mock grant proposal. We learned the perils of having to edit and re-edit before it was finally approved.
- You can't view radiation directly, so you need to use specific equipment to view it indirectly.
- We first calibrated the signals the computer was receiving to specific gamma readings through already known elements. We knew the energies of the readings Cs-137 gave off, so we set the channels to those energies.
- We then got the energy of the unknown element.
- We had to sift through many different elements to find the one that matched our reading the most. We filtered the search by setting a reasonable half-life for the substance, and then looked closely at the few elements that examined for the unknown element, Mn-54!

Wednesday



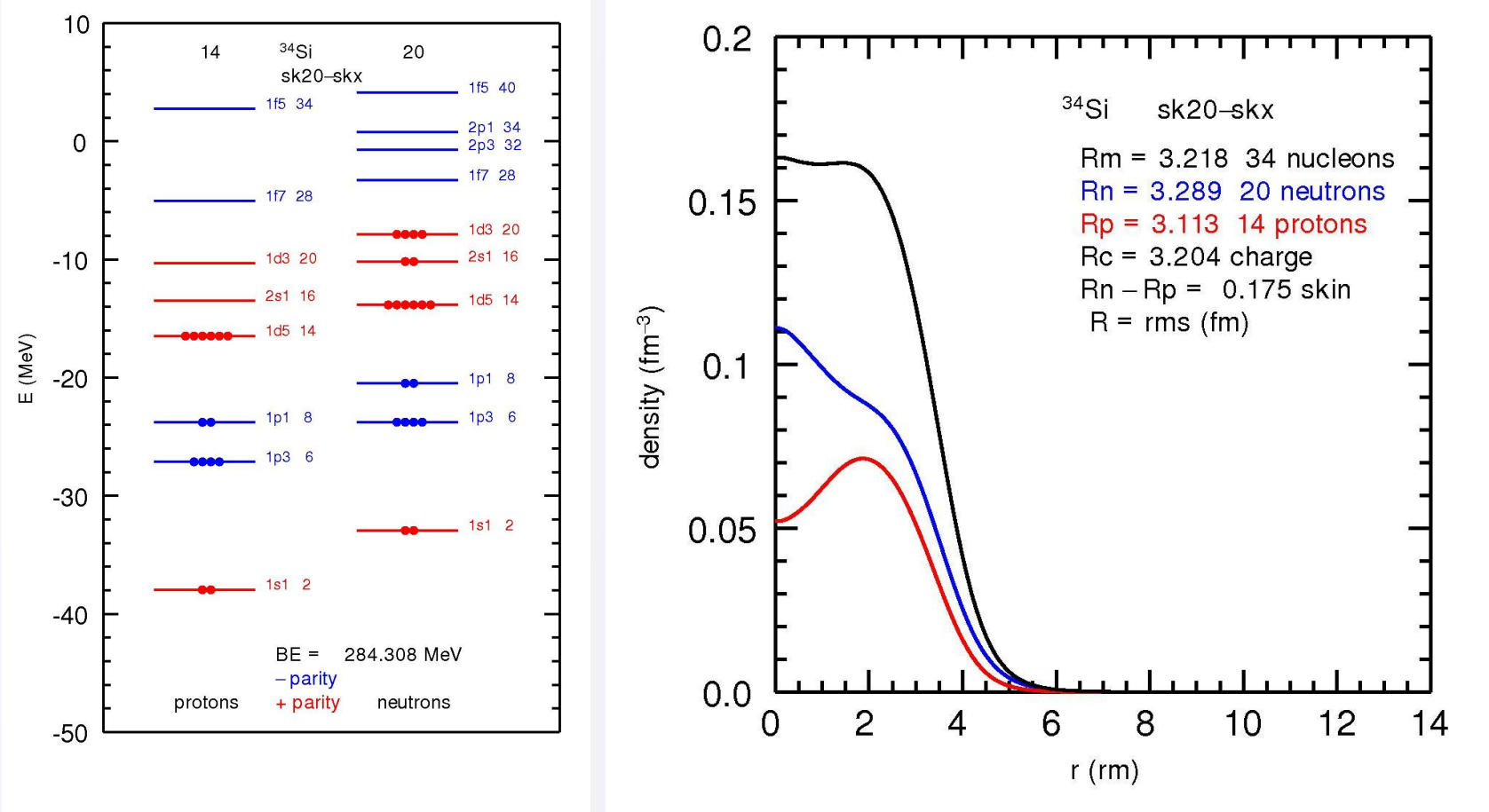


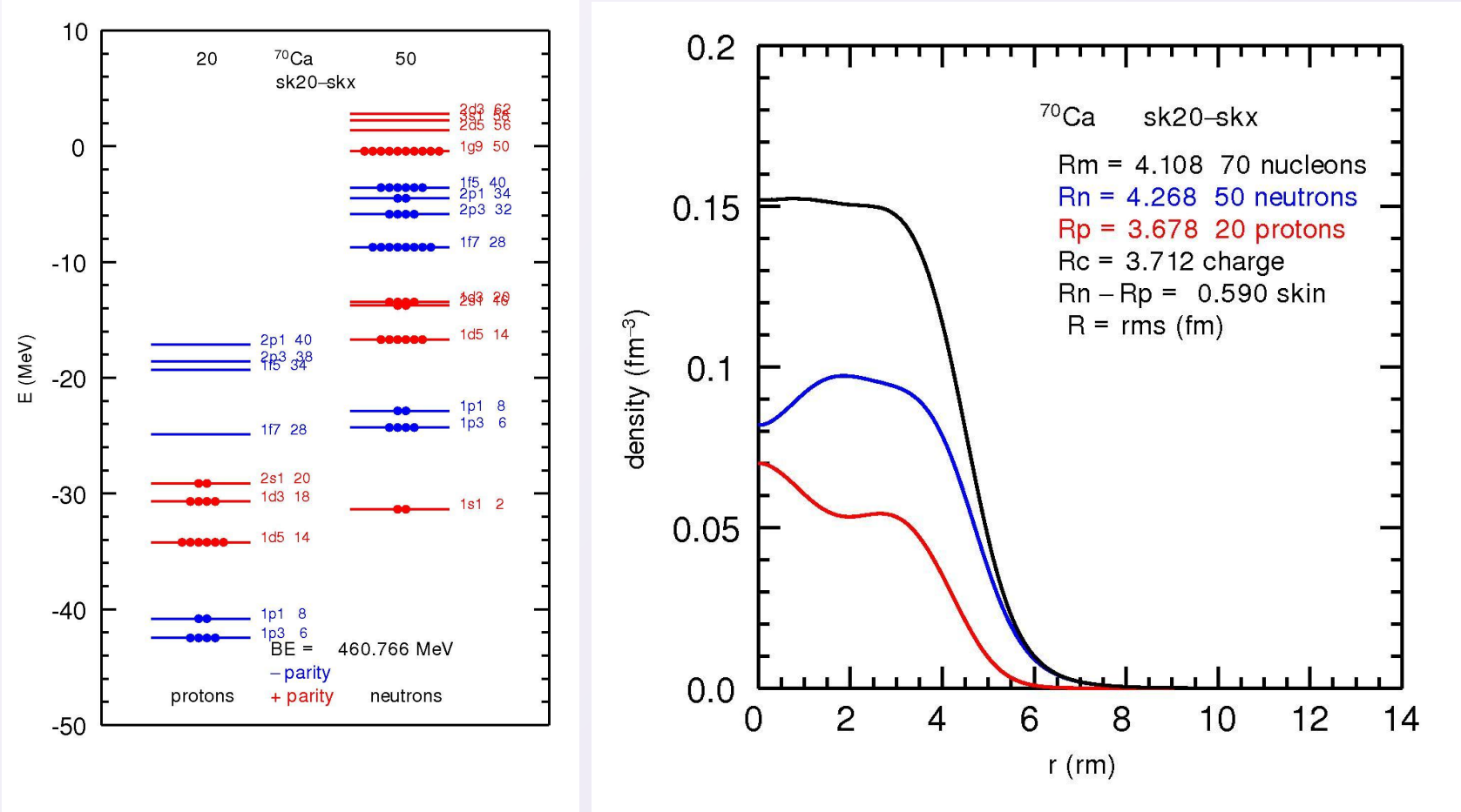
For our afternoon experiment we graphed the radiation coming from a coin made from silver 108 and 110 in order to determine its half-life. We measured the radiation indirectly through the use of a Geiger-Mueller counter which detects electrons that are stripped from the gas inside of it. We detected beta minus radiation from the silver decaying into cobalt 108 and 110. The calculated half life was 164 seconds.



We put r and s decay in stars into practice by charting out the decay process on our favorite Chart of the Nuclides.

Thursday



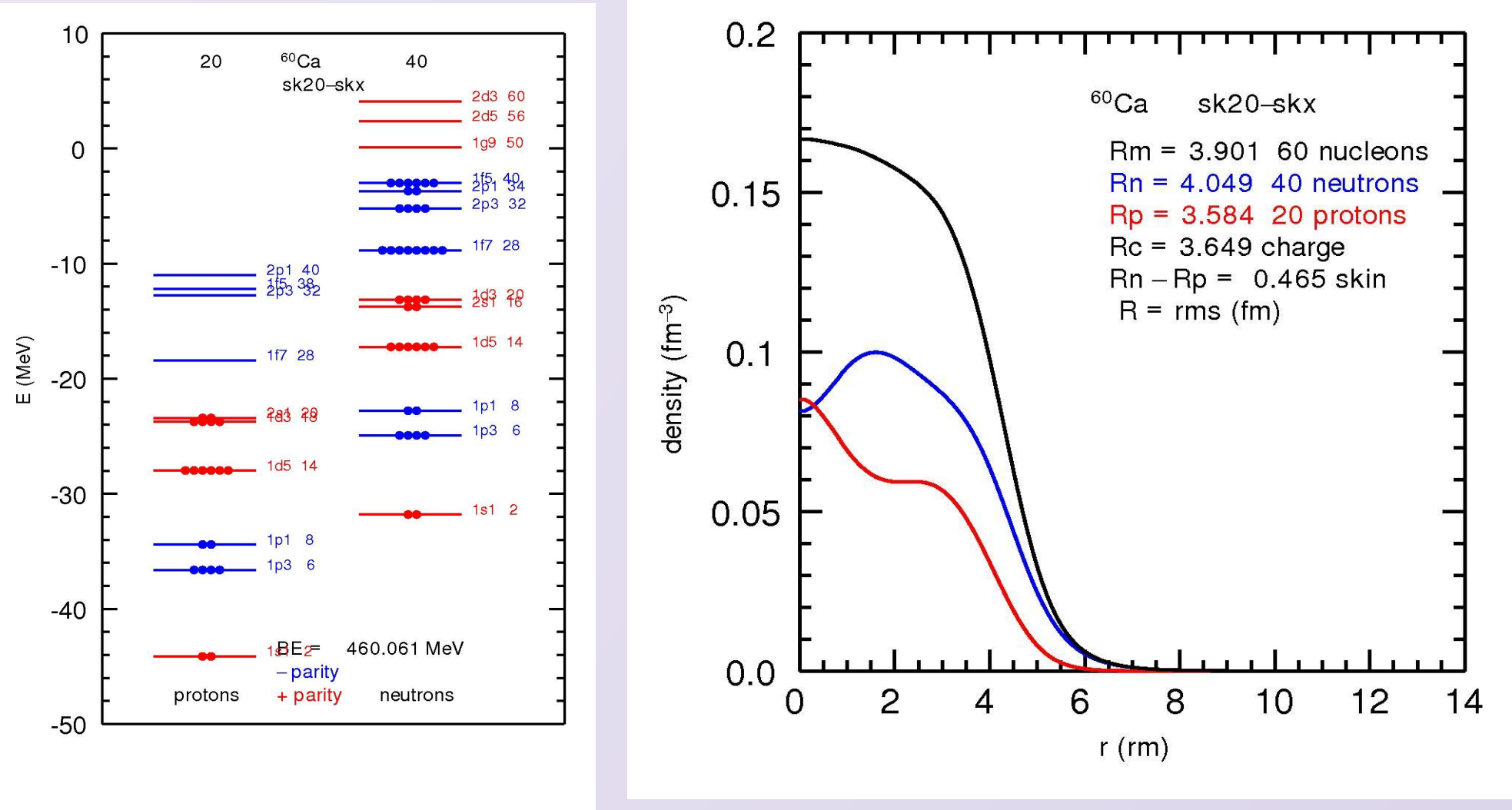


We discussed the graphs of energy and the density graphs of different isotopes. A density graph has Y axis be the density, while the X axis is the radius (how far from the center it is). A ping pong ball has the density graph of a vertical line at its radius because it is hollow at every other radius before that. A baseball, however, will have a more even distribution of a horizontal line ending at its radius.

For ^{34}Si, the density of protons is less in the center of the atoms than at other radii. This makes a kind of "bubble" that is very important to our understanding of nuclear science. This bubble can be explained in part by the coulomb repulsion between the protons.

^{70}Ca and ^{60}Ca are both theorized isotopes that are currently unobserved, but very important. ^{70}Ca would be important to physics because we are able to study the properties of neutron stars. The reason for this is that the entire surface of the element is dominated by neutrons, like it is in a neutron star. On the density chart, there are almost no protons after 5 fm, leaving about 2.5 Fm of only neutrons. ^{60}Ca would be important for this same reason, although to a lesser extent. There is only about 2 fm of mostly neutrons, and ^{60}Ca has a lower number of neutrons per proton.

To the right bottom we have a picture of the PAN group getting icecream from the local Dairy Shop. To the right top we have graphs showing energy and density distribution of ^{60}Ca and ^{70}Ca. To the left our group posing like we are working after finishing Tuesday's lab. Right below is our group on the last day working on our poster.



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