Nuclear Experimentation

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Monday afternoon

Please put your questions under your group identification below

Lawrence Group (Krysta, Laura, Mike)

We understood…

- the band of stability includes the most stable isotopes http://www.pbs.org/wgbh/nova/physics/stability-elements.html
- the idea of separating out fragments that we are not interested in studying
- labeling of diagrams was extremely helpful, when referenced during the presentation
- all the visuals were extremely helpful (in place of text)
- the difficulty of the task at hand ("observed 140 successful events over the course of 2 weeks")

We didn't understand…

- Why does the band of stability digress from the Z/N = 1 line?
- How do you predict if a process will be r or s?
- How far are the halos of the neutrons from the nucleus (on the order of the electron orbitals)?
- Is it possible that multiple pathways for nucleus decay could occur (2-neutron AND one at a time)?

Questions for the future:

- Why/how is the island of stability expected?
- How is the "shell" of the nucleus detected and what shapes can it take?

Feeback:

- A brief background on strong/weak/nuclear forces would be helpful, as however it relates to the topics at hand

Einstein Group (Carolyn, Jim, Tiska)

Understood:
What magic numbers are

Limits for proton halos & neutron halos (Large Z/N or N/Z ratio)
Where electron shell magic numbers come from

Not Understood:
What force holds proton or neutron in halo formation?
Where do nuclear magic numbers come from?
How are results of sequential, 3-body, and dineutron predicted so you know it was dineutron decay?

Questions for the Future:
What is the Pandemonium Effect?

Fermi Group (Pat M, Matt P)

Understood:
Experiment on sequential or dineutron decay
Drip lines
Basic understanding of how accelerator facility works

Not understood:
Borrowmean nuclei- know more about it?
Halo formation
What triggers difference between r and s process?

Question for future?
What role do electrons play?
Particle theory?

Feynman Group: Sarah and Kim

We understood: We understood the “point” of research conducted at the laboratory.
We understand how the accelerator works.

Didn’t Understand: How researchers work backwards to reconstruct which radioactive isotopes formed during an experiment.

Questions for the Future:
How can we determine where heavier elements come from?
What should we tell students about heavier element formation (in terms of where it happens) considering we are not quite sure if it happens during supernova or neutron star mergers?

Feedback: They are “probably” ** formed in supernova :)

Bohr Group (Tom & Ellen)

Understood:

*Dineutron decay and how it was verified
*What the drip lines mean on the chart
*Borromean nuclei
*Procedure for experimentation (from question to publishing)

Didn't completely understand:

*Why are the magic numbers magic numbers?
*Drip lines: is it the same neutron that isn't absorbed, or could it be simultaneous absorption/emission?
*How does the range of the strong force compare to the radius of the halo nuclei?
*weak force??

Curie Group (Cari & Jessica)

Understand:
band of stability, exploring the p and n extreme possibilities, shell model and preconceived magic numbers.

Didn't understand:
abundance distribution-specifically not validating magic numbers and r-process, what's the difference between the two data analysis graphs (dineutron experiment), on the question slide about the dineutron decay experiment - why is it theoretically possible to bypass Be15 (why is the Be15 energy higher vs the sequential model).

Further questions:
What are the smaller peaks on the astrophysical r-process magic number graph?
Could there be a band of triple neutron ejections on the drip line?