MASA's Radioactive Escapades

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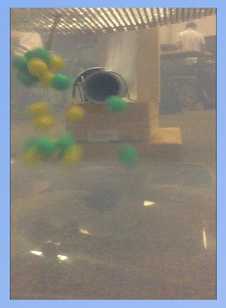
JINA-CEE

Marble Nuclei Collisions



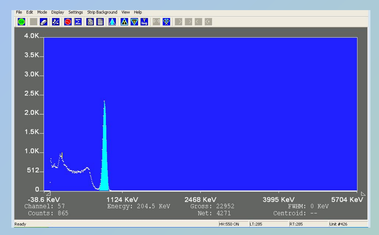
In this activity, magnetic marbles were used to simulate C-12 nuclei, two of which were then collided in a budget accelerator to create different isotopes. The budget accelerator had 3 different energy levels which we experimented with to determine the results of collisions.

Gamma Radiation Spectroscopy

Co-60 Energy Vs Count (Right)

Cs-137 Energy Vs Count (Left)

In this experiment, we had to identify an unidentified source of gamma radiation based on the energy level of its radiation. We figured we could use two known isotopes, Cs-137 and Co-60, to calibrate the computer by measuring the energy peaks. The energy peaks were created by measuring the number of gamma rays that the Geiger counter read. We then took the data and calibrated the computer by aligning the data with the actual energies of the isotopes. Then we ran the unidentified isotope through the counter and cross-referenced the data with known isotopes and determined that the unidentified radioactive isotope was Mn-54. We knew this was a reasonable conclusion to draw based off of the half-life, which is 312.3 days.

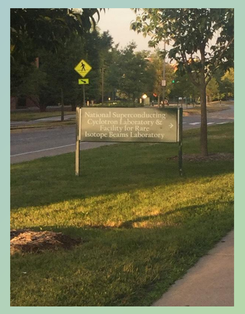


Mn-54 Energy Vs Count

A sample of Mn-54

Geiger Counter

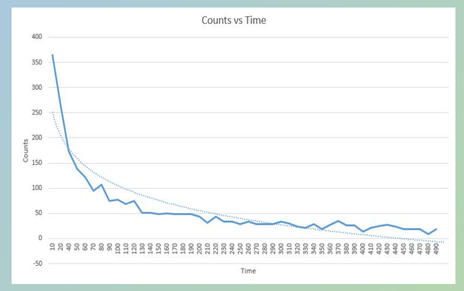
MASA being irradiated (safely)

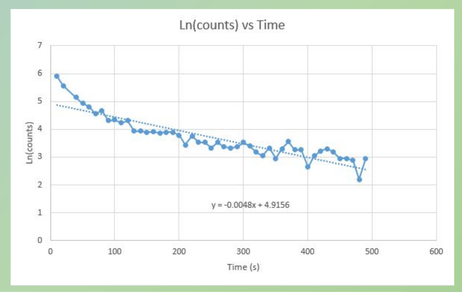


NSCL Laboratory

How to properly teach nuclear physics with Dr. Z

Silver Half Life Experiment

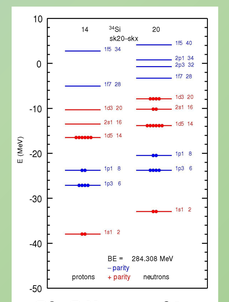


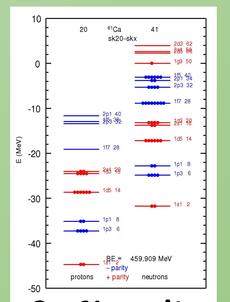


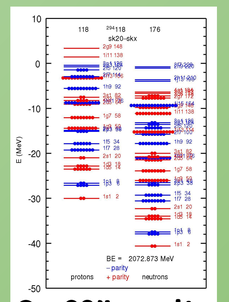
In this experiment, we had to find the half life of Ag-108, an unstable isotope of silver in order to determine why there was a presence of cadmium in a rock.. A Geiger-Müller counter and Co-60 were used to calibrate the computer to operate at an optimal voltage. Then the counter was used to measure the radiation from the decay of the Ag-108. The data (above) was then used to calculate a half life of 144 seconds. We presumed that by irradiating the silver with an AmBe source, we would be able to figure out what the silver decayed into.

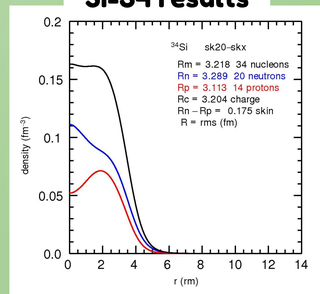
Am-241→ He-4+Be-9→ C-13→ p+Ag-107→ Ag-108→ Cd-108

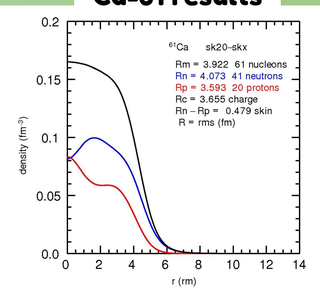
Energy Density Theory

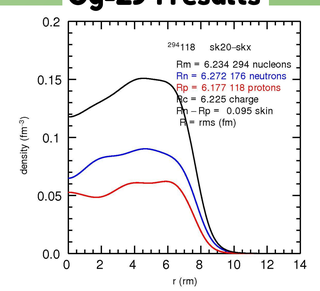












In this activity, we used code that allowed us to calculate the energies and find the probability of the positions of protons and neutrons in the nucleus based on theoretical physics. We were also able to find out what type of decay an isotope has based on these results, as well as the predicted total angular momentum and the predicted nucleon density at given positions in the nucleus.

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