Plastic Scintillator Response to Light Ions

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Nuclear Compressibility and Giant Resonance
- The compressibility of nuclear matter (N=Z and no Coulomb interaction) is important because we can use it to better understand properties of the nucleus (nucleus, meson, giant resonance, etc) superheated neutron stars, and heavy ion collisions...
- The study of the energy range of favorable Giant Monopole Resonance (ISGMR) is an important source of information for the study of the nucleon 3-He configuration.
- Giant Resonance is the collective excitation of all the nucleons in the nucleus resulting in their collective motion.

Different Types of Giant Resonance
1. Description of integral of scattering with Radial wave function
   - The specific form of giant resonance my group is interested in is Isoscalar Monopole Resonance.
   - This type of monopole is found when protons and neutrons move in phase such that the nucleus will remain in the shape of a sphere and the density and volume changes.

Calculations (continued)
- Having found a suitable function of U(t), we needed to determine the light output we would have in order to determine the light output we would have in order to determine the light output we used the equation.$$ E = \frac{1}{2} m c^2 \left( 1 - \frac{v^2}{c^2} \right) $$ where $m$ is the mass of the particle and $v$ is its velocity.

Results
- Having obtained the light output for the theoretical calculations as well as from the test run, we normalized them by the light output of the alpha particle for E and dE. In order to compare the two data sets, we will plot a graph of E versus dE.

Conclusions
- In order to use the MDM spectrometer detector, we have to repair it. But first we had to rebuild the clean room in which we wanted to repair the detectors in the high bay because it was getting in the way of another group's work. This is actually what I spent most of the project working on as it was quite an undertaking.

Experimental Objectives
- We spent a lot of effort building the clean room, but we can't run a nuclear physics experiment in the clean room. We needed to develop a target and what we are studying will change. The target must remain in the shape of a sphere and the density and volume changes.
- Also we did not use helium as a target because it would be difficult to use laser to track.

Scintillation Material
- Scintillation detectors are used to detect light that is produced when a high energy particle interacts with a scintillation material. After photoelectrons are created, the light detector collects and amplifies the light output from the detector.

Calculations
- We can use a program called Mentor: Dr. Youngblood for detecting decay of protons and neutrons interested in is 28Mg reacting to produce 28Si reacting to produce 116Sn.

Experimental data
- Data taken from test run of scintillation detectors be used for analyzing the accuracy of the scintillation detector by using a Photomultiplier Tube.

Clean Room
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MDM Spectrometer Detector
- We are using a multifunctional detector for detecting the horizontal angle and position as well as the vertical angle of high energy particles such as "Alpha" and "Hg" which make up the spectrometer. These are fine used for detecting horizontal angle and vertical angle to determine the vertical angle of high energy particles such as "Alpha" and "Hg" which make up the spectrometer.

GR Study by Inelastic Scattering
- We used inelastic scattering of 40Ar on Mg + Alpha.

Stopping Range of Ions in Matter
- To do this we used a program called Mentor: Dr. Youngblood to determine the light output we need to identify them.

Voltage Divider Network
- The voltage divider take readings to divide the high voltage across the photocathodes. We applied, and the photocathode in such a way as to guide the photodetectors on a path to each dynode and to the anode in order to make use of as many photodetectors as possible.

Testing Decay Detector
- The experimental decay detector is to verify our experimental data. We are using a program called Mentor: Dr. Youngblood to determine the light output we need to identify them.

Identification of Giant Resonance
- The identification of Giant Resonance is possible when the light is produced from the detector that is acceptable for the light output from the test run we obtained.

Isho-Scalar Resonance
- The isoscalar resonance occurs when protons and neutrons move in phase such that the nucleus will remain in the shape of a sphere and the density and volume changes.