

# PANdemonium

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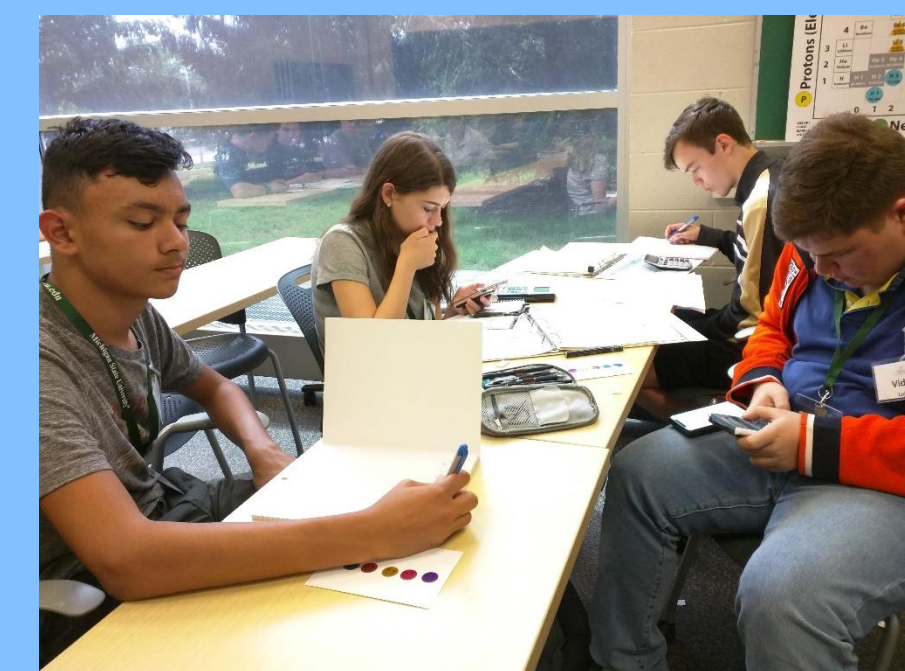
## Day 1

94 Hours Remaining



**Modeling Nuclear Accelerators with Marbles**

**Building a Lego Chart of the Nuclide**



**Questions**

**Nuclear Experimentation Q & A**



**Answers**



**Students on the Campus Tour in Front of the FRIB Facility**



## Day 2

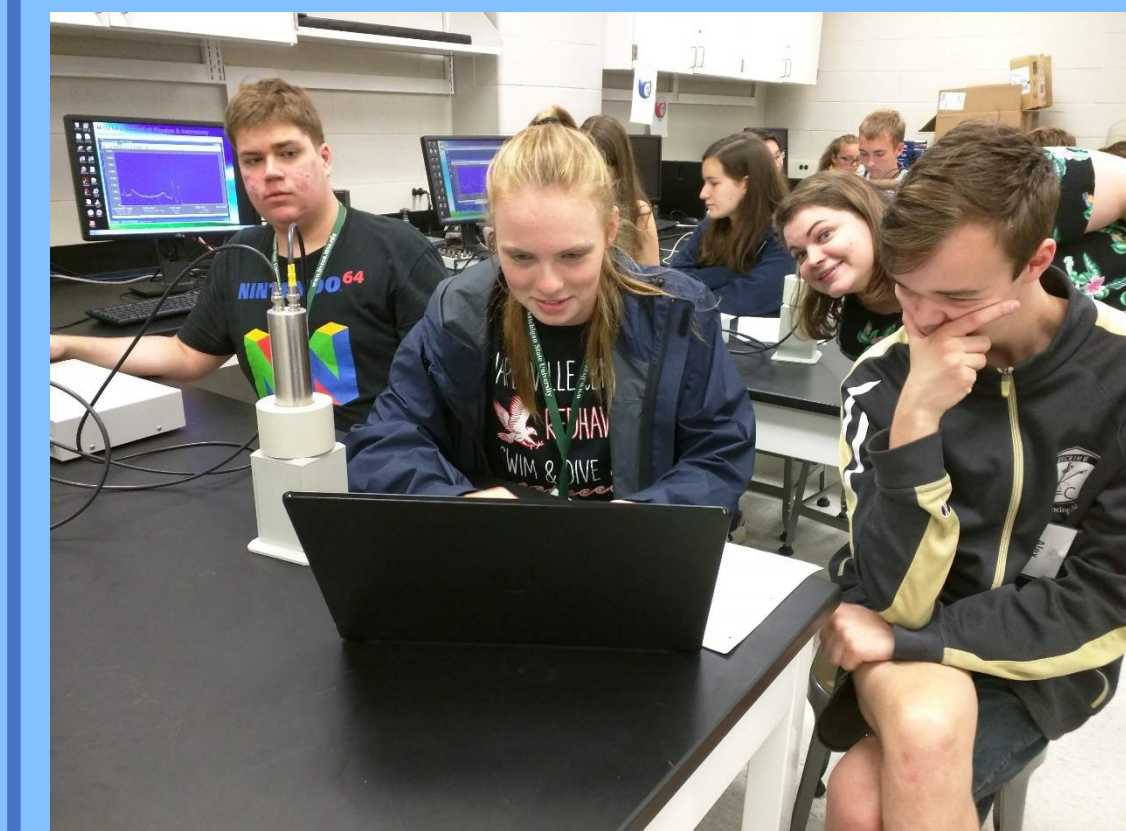
70 Hours Remaining



**Radiation Detectors Presentation and Q & A**

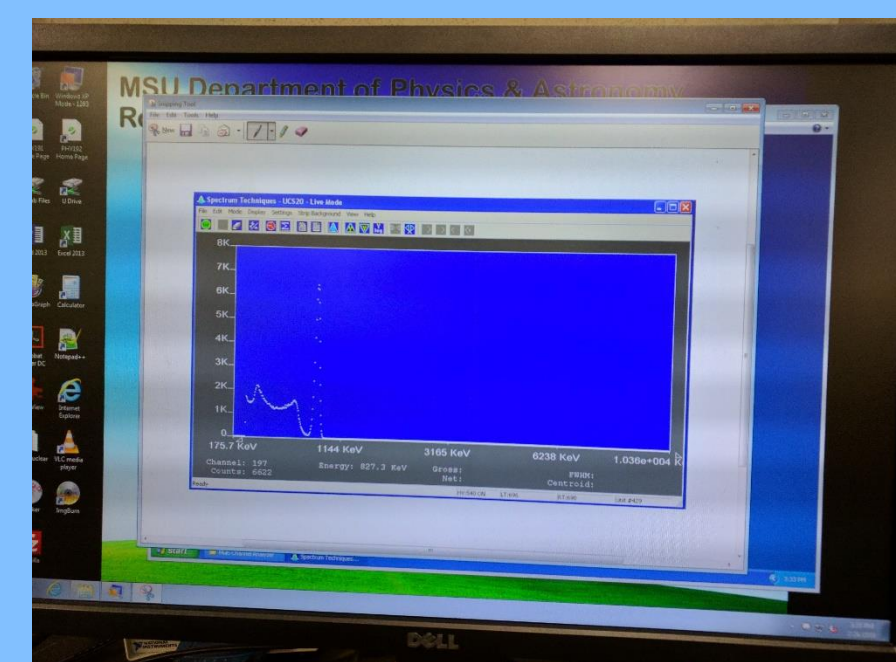


**Gamma Spectroscopy Experiment**



The purpose of the lab is to discover the identity of an unknown isotope. We used a gamma ray energy detector and a multichannel analyzer and a computer program. Using commonly used gamma spectrum energy values for  $^{137}\text{Cs}$  and  $^{137}\text{Co}$ , we calibrated the program.

Then measured the energy the gamma rays of an unknown radioactive element. Using an online table and our peak energy value while taking into account the half life and the intensity/number of major peaks we determined our unknown was Mn-54



**The Rock**



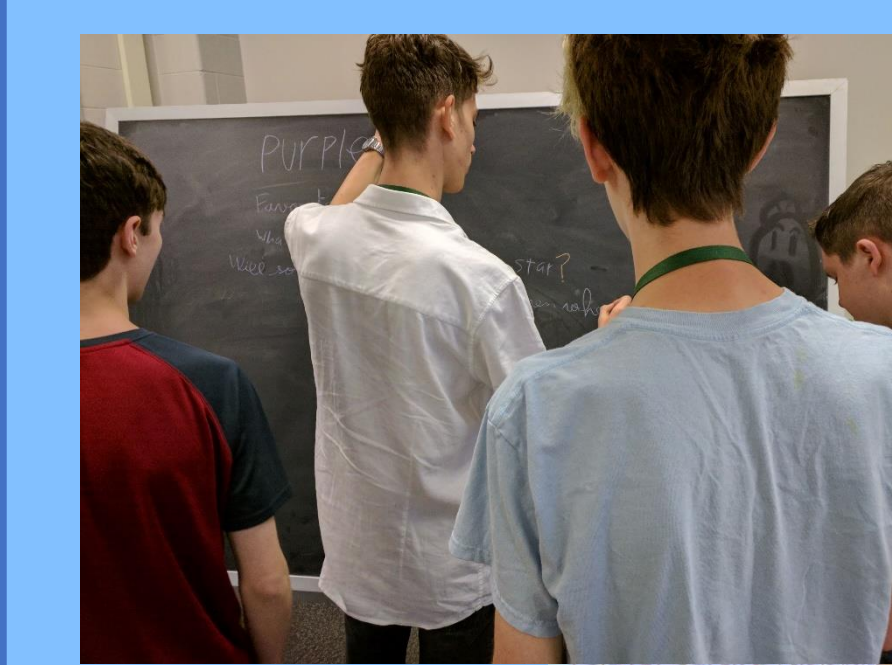
**World War 1 Exhibit**

## Day 3

46 Hours Remaining

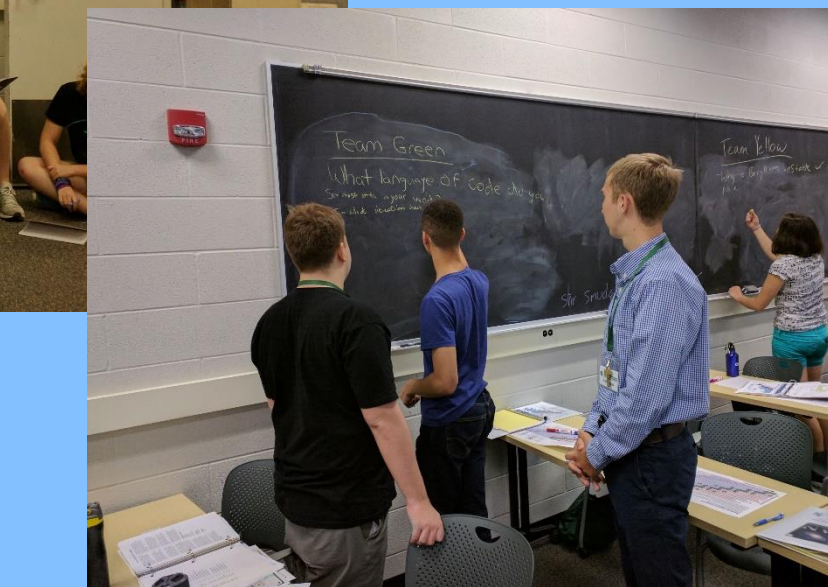
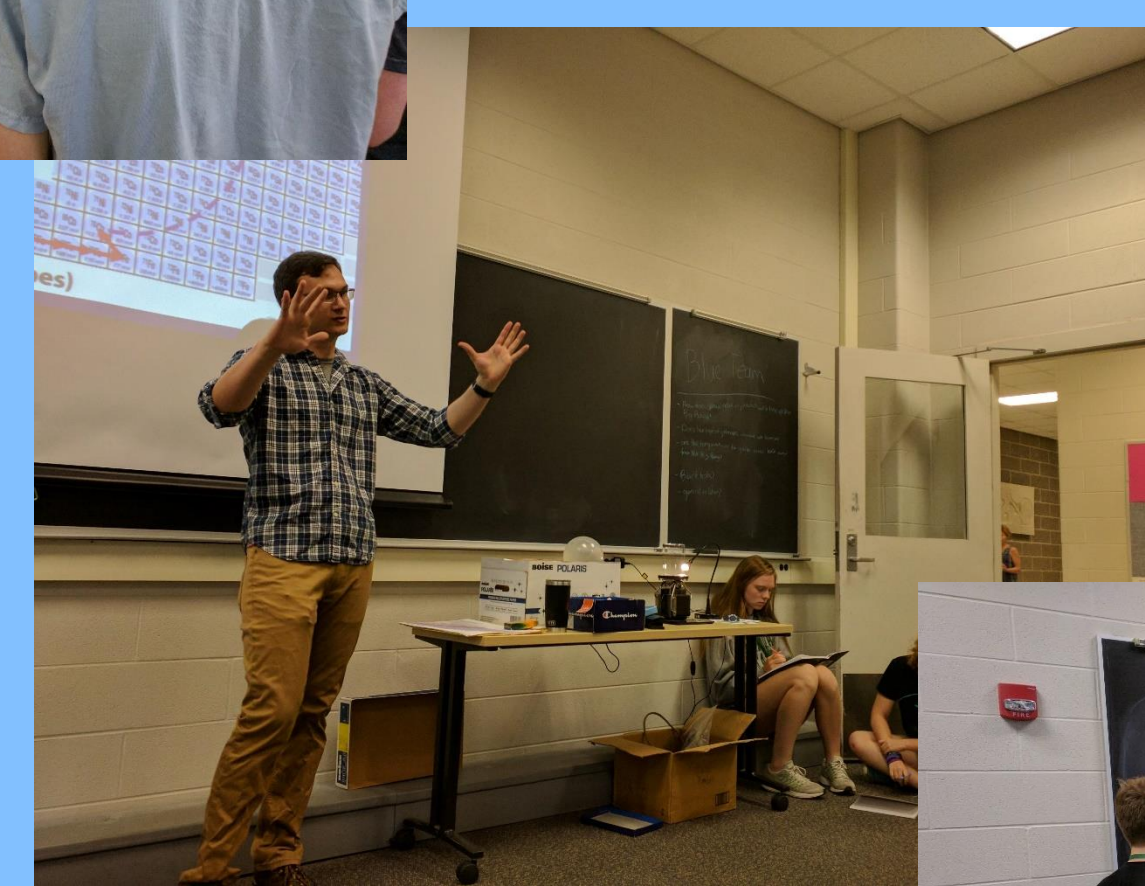


**Neutron Capture Activity**

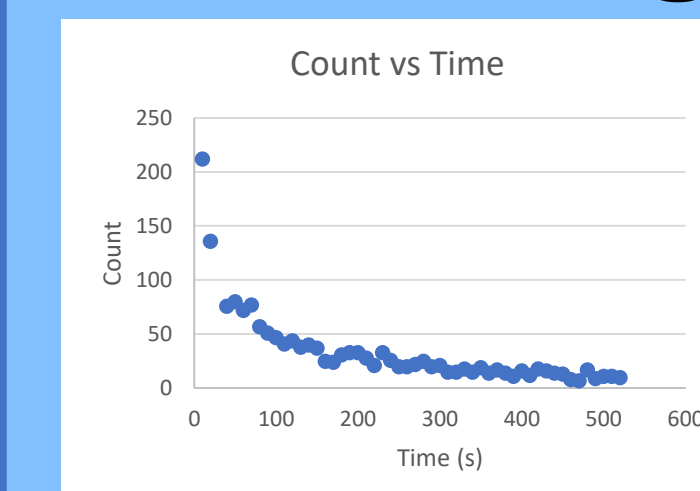


**Nuclear Astrophysics**

**Q & A**



**Measuring Nuclear Half-Life Labs**



The purpose of this lab was to find the half-life of a silver disk after it was put in proximity to a neutron source. We setup a Geiger-Muller counter and measured the  $\beta^-$  decay of the Ag disk.

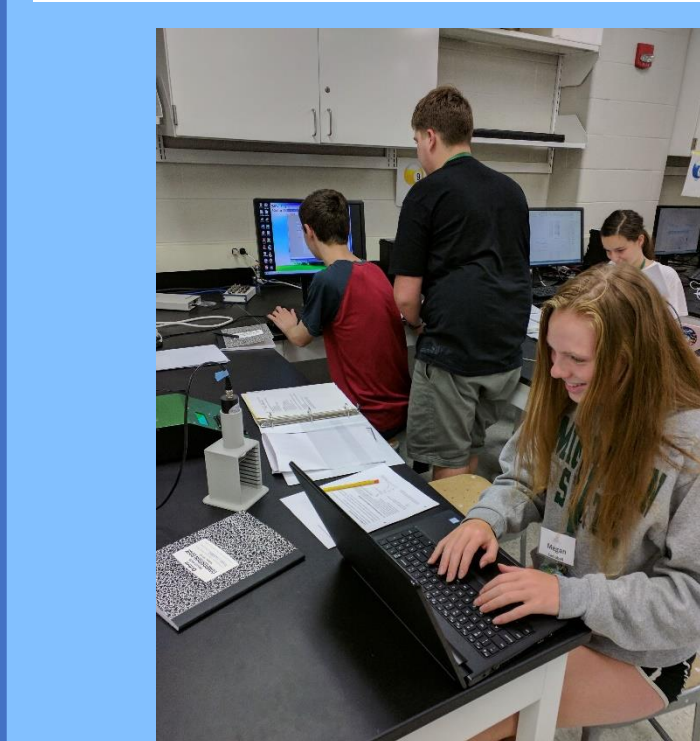
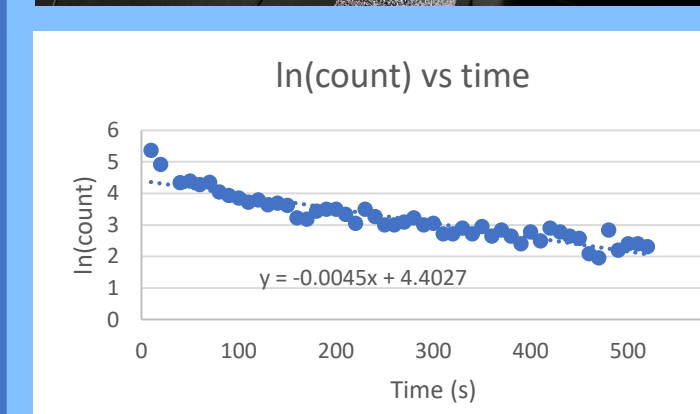
We created our count vs. time graph and because silver has a short half life, it was exponential. We linearized the graph to create our  $\ln(\text{count vs. time})$  graph.

$$\ln(\text{count}) = -\ln(2)/t_{1/2}(\text{time}) + \text{initial count}$$

$$\text{slope} = -\ln(2)/t_{1/2}$$

$$-0.0045 = -\ln(2)/t_{1/2}, \text{ so } t_{1/2} = 154 \text{ seconds}$$

The actual half-life is 142 seconds



**Field Trip to the Dairy Store**



## Day 4

22 Hours Remaining



**Astronomy Presentation and Q & A**

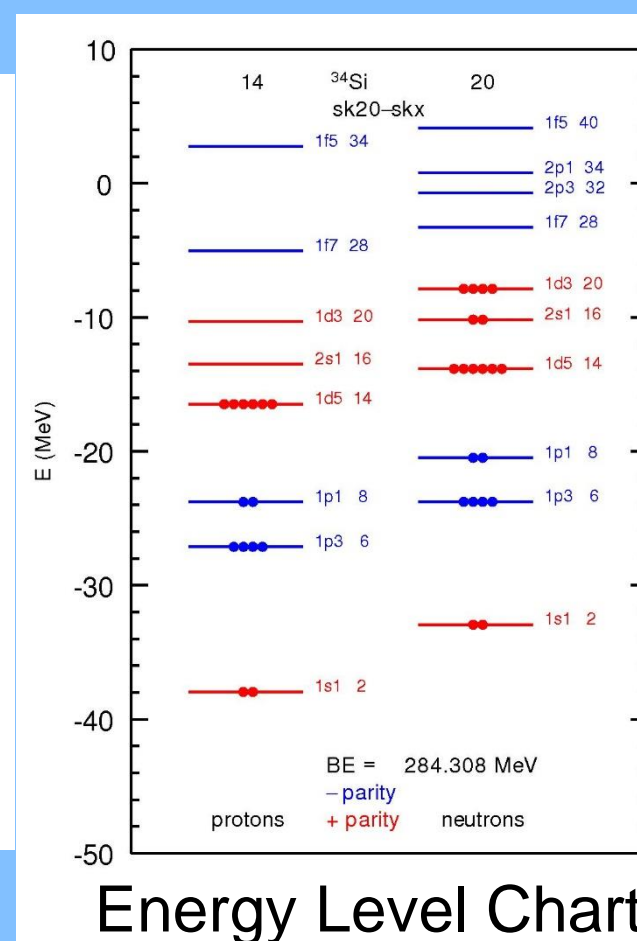
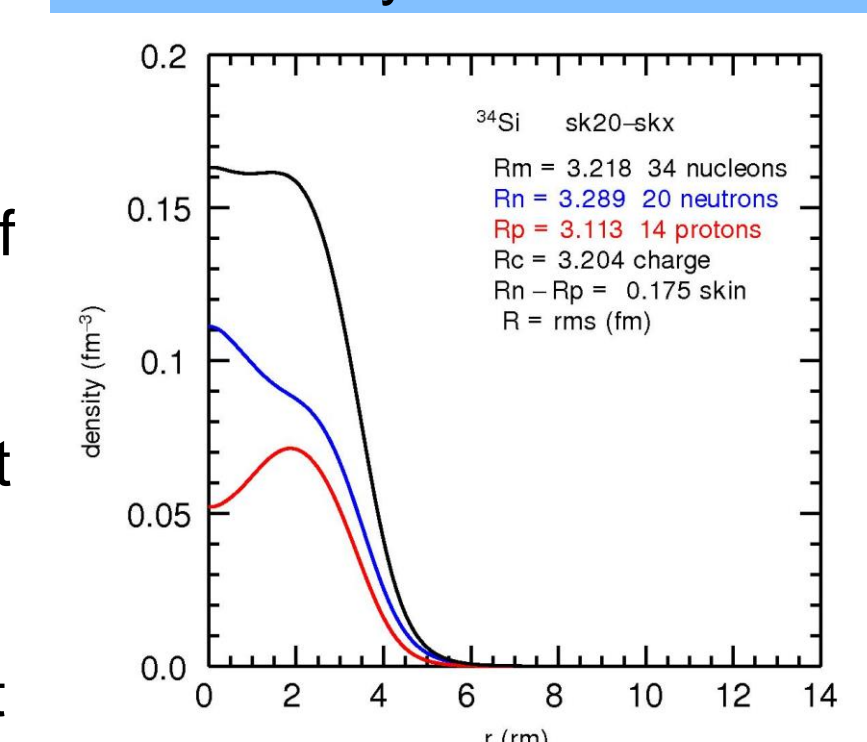


**Nuclear Properties with EDF Theory...**

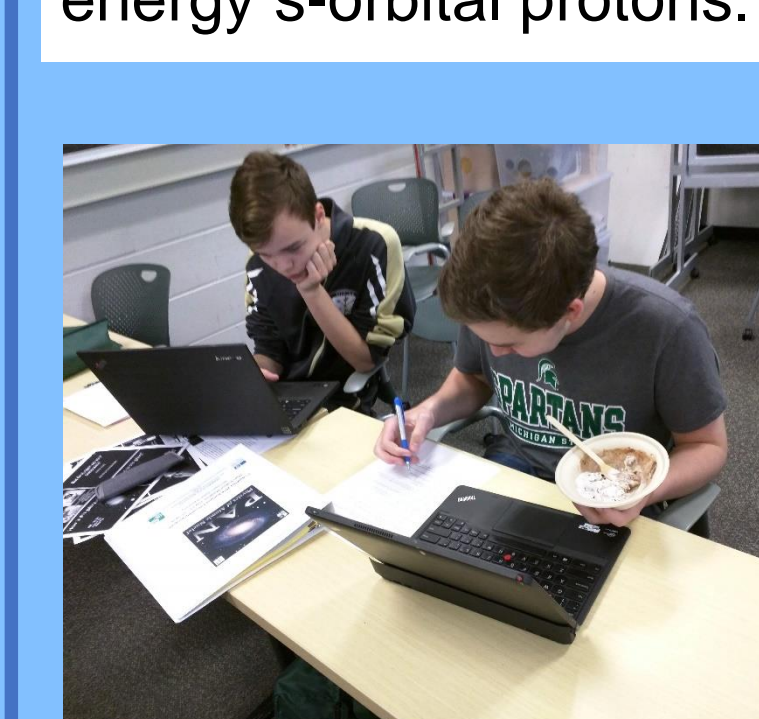


The propose of this lab was to better understand the shape, angular momentum, and polarity of the nuclei using quantum theory. We used Dr. Alex Brown's program to collect data on energy shells and density distribution. Using the data we explained that  $^{34}_{14}\text{Si}$  has a bubble nuclei due to a lack of high energy s-orbital protons.

**Density vs. Radius**



**...With the Weekly 2:30 Ice Cream Break**



**Day 5**  
0 Hours Remaining

