Title[1]

Full Name

Date

Course and Laboratory Section

1. Abstract (5%)

Here students will tell the reader what was done, why it was done, the important results, and what the significance is. This section is an overview of the entire write up and should be concise and to the point. No figures go into this section but final values do (including uncertainty) and conclusions drawn from these results. This section should be only 250-500 words.

2. Introduction (10%)

This section should cover the basic concepts of what the purpose of the laboratory is. This, in most cases, will require research on the part of the student to figure out what underlying concepts are associated with the assignment. This section is also the theory section. Any references used must be cited and plagiarism will result in automatic F for the assignment. Safe Assign will check all sources, within UTK and online, for text matching any source. The purpose of this section is to allow students to demonstrate an understanding of the basic concepts of the course and the topics covered within the laboratory assignment. This section should be between 3-7 pages.

3. Experimental (10%)

This section needs to give an adequately detailed description of each experiment, including equipment used and short description of method. A bullet point list copied from the laboratory assignment is not acceptable. A general discussion of experimental technique should be included, not a point-by-point discussion of each step in an experiment. Plagiarizing my work will not be tolerated.

[1] Students are advised to consult the following webpage: https://www.publishingcampus.elsevier.com/pages/154/Colleges/College-of-Skills-Training/Resources-for-Skills-Training/Quick-Guides-and-Downloads.html

As an example, from Laboratory Assignment 8, experiment *setup and Background*, we would not list the ~15 steps in sequential order. Indeed, the reader does not need to know that you "Return(ed) the Cs-137 to the GTA." The appropriate way to report this experiment would be the following (or equivalent): *The HPGe detector output was connected to the ORTEC 572A amplifier and its unipolar output was connected to the ORTEC 927 ASPEC MCA. The gain on the amplifier was set to 10, the shaping time to 10 μs, the conversion gain to 14-bits, and a XXXX V bias to the detector. From here, a Cs-137 button source was used to properly set the amplifier gain so that the 662 keV photopeak resided near channel 6,500. Once the settings for the pulse processing chain were properly set, the background radiation environment was measured for ten minutes.* One could mention that we ensured that all sources were removed from near-proximity with the HPGe detector, but this is implied from the "background radiation environment." The goal is to be clear and concise, not verbose.

This section should be between 1-3 pages.

4. Results (20%)

4.1. Subsection

This section should provide all results from the experiment. This includes graphical representations, when appropriate. This section is where students will draw conclusions from the data and discuss discrepancies and the significance of the results with comparison to accepted values/concepts. Error analysis is important, so make sure all numbers and figures are appropriately represented with uncertainty. When appropriate, compare results with accepted value(s), indicate the discrepancy, and whether the discrepancy is significant or not. Students should identify all sources of error, both systematic and statistical in the experimental technique and methods for improvement. This latter point could also find itself within the conclusion. This section should be as long as needed to present collected/analyzed data and an appropriate level of discussion of results/conclusions through demonstrative arguments.

5. Conclusion (10%)

This section is a final overview of the results and their significance. This should be a summary of section 4, the results section, with an overarching view of the results. This section should be no more than one page.

6. References (12.5%)

References need to be cited in order of appearance in the report. This is NOT a bibliography. I do not want to know what students have read in the past that contributed, but what was specifically used in generation of the report. I would like to see Endnote used with the "numbered" style formatting. EndNote is available for free at https://webapps.utk.edu/oit/softwaredistribution/. At the end of this document, the Endnote output style is provided for reference.

General Notes:

1. Use the formatting shown in this document, including line spacing, font, font size, margins, etc.
2. Equations should be centered on the page, one equation per line, with an equation number justified on the right margin.

$$x = y \qquad 1$$

3. Do not use first person tense in any part of the document. The use of "we" is acceptable when the discussion within the paper is such that the reader and author can now draw a conclusion. For instance, one could say *from the result in figure 5, we can see that the linearity of the SCA is not within the quoted specifications from the manufacturer."* As can be seen, this is not a "we" the experimenters, but a "we" the reader and author in a demonstrative argument.
4. Students are expected to cite at least seven documents in the full report. At least one must be a text book, and at least two from a source other than a webpage. These citations will generally be within sections 2 through 4, providing reference to background information or comparing experimental setups and results. Students may use more than seven references, as needed/desired.
5. Although lists are generally okay, they must be in direct reference to written explanation and not just a list of equipment and procedures. This report style requires full paragraphs with proper grammar and syntax, which is included in the grading rubric.
6. Figures must have a caption "at the bottom of the figure" and must be referenced in the text and numbered in the order in which they appear in the text. No figure or table should

have a title. The figures can be out of line or in-line with text, as long as it looks presentable and fits within the margins. Making a table (possibly with hidden outlines) is a great way to get figures to sit side by side. An example is given below. Students can identify specific figures via a), b), c), etc. or as I have below.

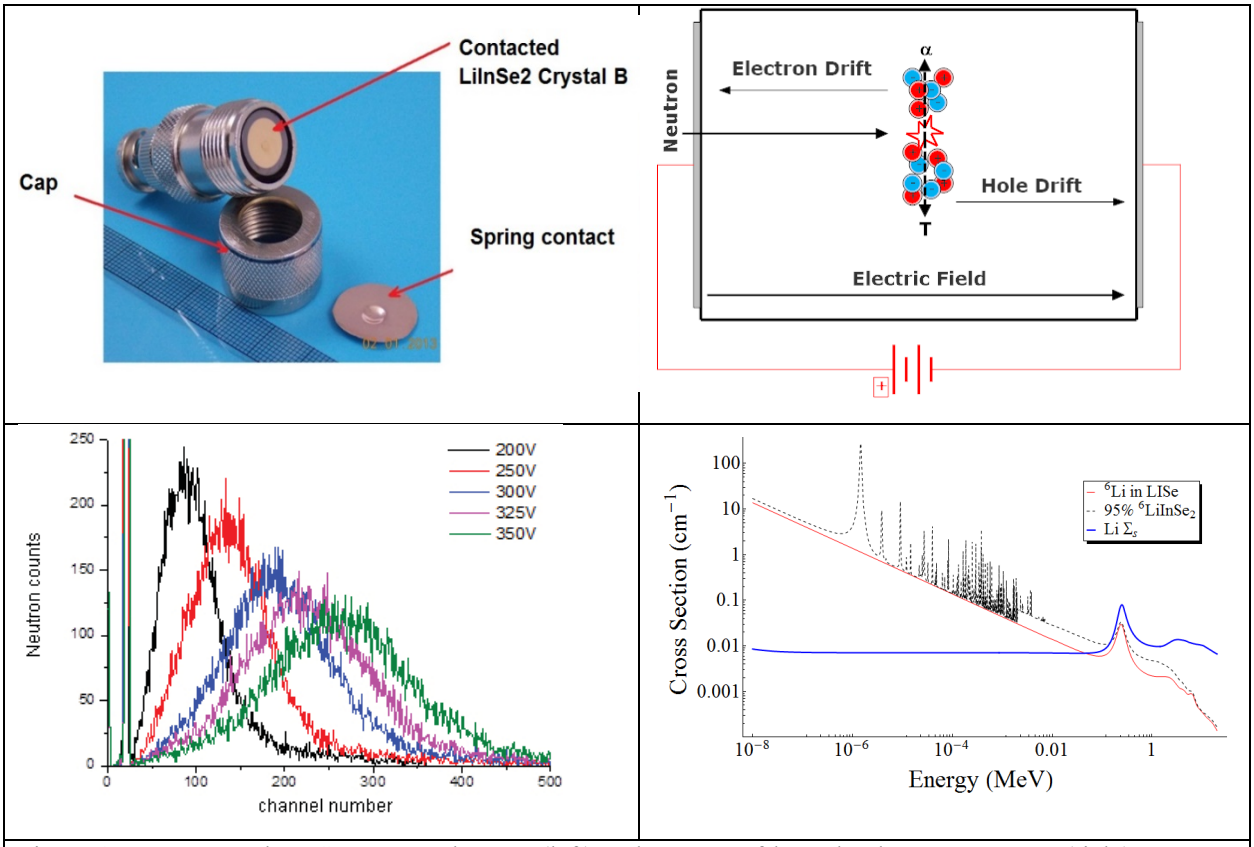

Figure 1: Top: Example LISe neutron detector (left) and cartoon of how the detector operates (right). Bottom: Spectra generated with alpha particles (left) and the total neutron cross section with lithium-6 in LISe compared to the total neutron cross section with LISe and the neutron elastic scattering cross section with lithium-6.

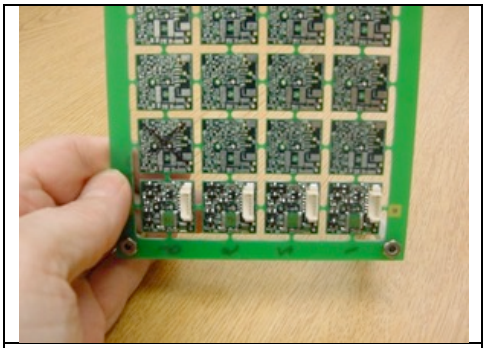

Figure 2: Charge-sensitive preamplifier assembly.

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7. Tables must have a caption "at the top of the table" and must be referenced in the text and numbered in the order in which it they appear in the text. The title should be within the table, not separate. Notice that the table has double bar, single bar, and no bar format. All tables must be in this format. Also note that the table is so long that it could potentially spill into the second page. **Note that a table needs to be on a single page, so properly format the paper to ensure that there are no white spaces.**

Table 1: Neutron interactions with natural carbon

Reaction number	Reaction	Q-Value (MeV)	Threshold Energy (MeV)
1	$^{12}C(n,\gamma)^{13}C$	4.946	0
2	$^{12}C(n,el)^{12}C$	0	0
3	$^{12}C(n,n')^{12}C^{*}$	-	4.450[2]
4	$^{12}C(n,n')^{12}C^{*}(3\alpha)$	-7.275	7.886
5	$^{12}C(n,n')^{12}C^{*}(3\alpha)$	-	9.64[2]
6	$^{12}C(n,n')^{12}C^{*}(3\alpha)$	-	10.8[2]
7	$^{12}C(n,n')^{12}C^{*}(3\alpha)$	-	11.8[2]
8	$^{12}C(n,\alpha_o)^{9}Be$	-5.701	6.181
9	$^{12}C(n,\alpha_1)^{9}Be^{*}$	-7.381	8.800
10	$^{13}C(n,\gamma)^{14}C$	8.176	0
11	$^{13}C(n,el)^{13}C$	0	0
12	$^{13}C(n,\alpha)^{10}Be$	-3.835	4.132
13	$^{13}C(n,n\alpha)^{9}Be$	-10.65	11.47

[1] All data unless otherwise specified was obtained from the National Nuclear Data Center maintained by Brookhaven National Laboratory [1].
[2] Data obtained from Pillon *et al.* reported in 1995 [2].

8. Example of what the references will look like is given below. These references are from the table of data given above. You will need to convert the references to the right font and text-style once you are done writing your paper, as Endnote will format the references otherwise.

1. National Nuclear Data Center: p. www.nndc.bnl.gov.

2. Pillon, M., M. Angelone, and A.V. Krasilnikov, *14 MeV neutron spectra measurements with 4% energy resolution using a type IIa diamond detector.* Nuclear Instruments and Methods B, 1995. **101**: p. 473-483.