Reviews for submissions to the USD Journal of Undergraduate Physics Research

May 4, 2013

Abstract

Please proofread the enclosed manuscript. The author will be helped by your comments; please write with this in mind. Return the marked up copy and send a .tex, .dvi, or .pdf copy of the answers to the questions below in an email to Dr. Severn.

1 General Questions

1. Did you find any physics errors or mathematical errors? Was the logical underpinning of the arguments and explanation strong or weak? This is really of first importance.

- eq.5 (needs only final result) is off by factor of 2. You’ve got HWHM.
- eq.5 is calculated incorrectly. The Doppler broadening is bigger by an order of magnitude.
- The width of the hyperfine lines gotten from sat. abs. spectroscopy eliminates Doppler Broadening, and so cannot be used as measures of the same. No, those are closer to (but probably broader than) the natural linewidth. Why no spectrum of the groundstate splittings?
- Fig.2 is labeled inaccurately. Preston makes the same error, but that is no excuse. What we are looking at are the Doppler broadened absorptions from both isotopes there! We are looking at just two lines, not the complete spectrum by any means. Do indicate which transitions are shown, using the correct spectroscopic terms and correct F numbers for the ground states.

2. Did the writer adequately explain how the experiment works, both at the advanced, modern physics level, and at the more basic and practical classical physics level?

Most of the pieces are right, but it is not yet understood by the author yet, in total. The author is mixing some things up (see above).

3. Is the manuscript complete? That is, does it describe all of the prescribed experiments and results? It is missing initial results for absorption spectrum without sat. abs. spectroscopy. Something important is there. One can get $g_I$ and measure the
strength of the hyperfine splitting of the ground state, which is known. Also missing are a delineation of the absorption and cross-over resonance lines for both isotopes and the frequency gaps (which gives the hfs splittings for the excited state.

4. Did the abstract tell directly and concisely about what done and what were the results? **No, it’s missing the results part and the uncertainty part.**

5. Did the author help provide a sense of background interest in the experiments? Was it clear why the experiments provide useful scientific knowledge? Did the author explicitly describe the organization of the paper, and did the author stick with it? **Yes**

6. Were the attempted experiments clearly described? **Yes, but it could be sharpened and corrected and completed as described.**

7. Were their results adequately explained? **No, this part is largely missing**

8. Is it clear that author has revised the submitted draft and has proofread it for errors? **There are many vague sentences**

9. Were the 3 rules for formatting mathematical prose scrupulously followed? **Looks pretty good**

10. Does the format of the submission (section numbering, format of references, etc.) conform to AIP standards? (By the way, if the manuscript isn’t suitably ‘L\(\text{a}\)T\(\text{e}\)X’d’, then there is an issue to note here). **Looks pretty good**

**2 Short responses to be made at the discretion of the reviewer**

- Was there anything you wished to know more about which if added could improve the paper (or anything which should be left out)? **I would like to see the title and the first sentence of section II suitably restricted the transitions studied. Further, it seems as if part of section III A needs to go into section B and that whole section needs to be shortened.**

- Any general comments about the paper?