Peer Review

(Dated: 19 March 2025)

OVERVIEW

Overall the author has provided a solid submisison with the experiment being well conducted and the results being well presented. Additionally, they have coverd the key aspects of the experiment and have demonstrated a good understanding. However, there are a few key areas that need to be improved. The author should consider adding additional theoretical background and some key components would not be immediately obvious to a reader unfamiliar with the area. Lastly, some sections would benifit from some rephrasing and restructuring to improve the flow of the paper.

MAJOR COMMENTS

Strengths

- Background has good points about fundemental theory of superconductivity
- Overall, the conslusion is quite good as a summary of the experiment.
- Experiment overall extremely well conducted. The data is quite clear and the results are generally well presented.
- Report is well stuctured and is easy to follow. It is overall very well written bar some specific issues elaborated on later.

Weaknesses

- Additional theoretical background would be extremely benificial. Specificically about what *Cooper pairs* and *Grain Boundaries* are (and related relavent theory for both).
- Full sentances should be used and bullet points should be avoided whenever possible. Consider rephrasing the bullet points in §II.C
- The sentance *"The critical current can change slightly depending on the magnetic flux of the SQUID"* should be elaborated on as this is a key result. Additionally, this should in generally be emphasized more and explained in greater detail.
- Fig 2 has an overloaded textbox (within the diagram) which is nigh impossible to read. While this might normally be a minor comment, the text in this figure is crucial to understanding the experiment. Consider moving this text to the caption or to the main body of the text.

MINOR COMMENTS

Strengths

- Uncertainties and units present and well presented.
- Citations generally well formated
- Figures are generally quite well presented.

Weaknesses

- General capitalization, punctuation, and typsetting needs to be improved in certain areas.
  - Unit formatting could be slightly improved. Units are typically not italicized. Addiiontally, using , in LaTeXimproves visual formmatting Spacing and ($10\,\mu$V in comparision to $10\mu V$) to correctly space.
  - Capitilization of *"Knee"* in Table 1 may not be correct.
  - There are a few LaTeXtypesetting errors where *VPhi* is written instead of $V\Phi$ in a few paragrams.
  - Citation [6] (Feynman Lecturs) formatting seems incorrect.
- A few sentances don't flow very well. Consider rephrasing or removing the following
  - Remove the sentance *developed by Bardeen Cooper, etc.* as it is not exactly relevant to the experiment. Consider moving it to a footnote at most or, better yet, citing the original paper.
  - *"They do not agree with each other"* is §could be rephrased.
  - Some extra details can be omitted to footnotes for better clarity and flow. For example the sentance *"in this experiment coil 2 is not used"* can be moved to a footnote.
- Potentially include a footnote the definition of *Ohmic*. Though it is quite a common term in this field, it may not immediately be obvious to the target audience (undergraduate PHY424 students).
- Move equations 2 and 3 to the introduction as numbered equations should typically be introduced in the theoretical background.
- Try to incoperate a 'story' into your conclusion. The abstract is your summary, the conclusion is the cummulation of all the hours of hard work that you've done all condensed down into one final thing that the reader will see, make it count.
- Add private communications as a ciration in the bibliography as you must've discussed with your Professor and their Teaching Assistant. You may also consider adding a small paragraph in the acknowledgements.
- Beyond the text box problem in Figure 2, improving captions overall to guide readers would help. For instance, briefly explaining each figure's setup and relevance (e.g., "Figure 1: The DC SQUID setup used, with key components for measuring VI and VΦ responses") would make the images more accessible.