

Subject: AJP: decision on your manuscript #25512
From: AJP Editorial Office <ajp@dickinson.edu>
Date: 2013/01/28 20:57
To: "Daijiro Yoshioka" <daijiro@toki.c.u-tokyo.ac.jp>

Dear Professor Yoshioka,

First, allow me to apologize for the lengthy delay in getting reviews for your manuscript. Attached you will find copies of the reviewers' reports on your manuscript "Meissner effect cannot be explained classically," MS 25512. As you can see, the reviews are mixed and there are many important points for you to consider and address. In addition to the reviewer comments, I think there are two "big picture" items that you should keep in mind.

First, you need to really clarify the focus of the manuscript. I believe there are a lot of people who disagree with the the conclusions of Essen and Fiolhais, but they make this point loud and clear in their original paper. I also believe that many readers who disagree with this paper do not read it carefully. For example, in the conclusion of this paper Essen and Fiolhais state, "The reader may get the impression from our investigations above that we consider superconductivity to be a classical phenomenon. Nothing could be further from the truth." And yet, many readers seem to get the impression that Essen and Fiolhais do not think superconductivity is a quantum phenomenon. Thus, it is very important to clearly specify your disagreements with this paper.

Second, the paper needs to be written more clearly. There are a lot of poorly worded sentences that make it difficult to understand exactly what you are trying to say. In this regard, it would be very helpful if you could find a native English speaker to help you with the writing.

Lastly, I should mention that because that your manuscript is essentially a Comment on a previously published paper, we will be giving the original authors an opportunity to respond to your manuscript.

If you wish to revise your manuscript along the lines indicated, we would continue its editorial consideration once it has been resubmitted using the procedure indicated on the AJP website <ajp.dickinson.edu>. Any revised manuscript should NOT just make the specific changes suggested by the reviewers. Instead carefully consider the recommendations in context, and revise the manuscript to make sure that there exists a coherent and logical story line for the manuscript. If you do resubmit, please indicate in a single cover letter how you have responded to the various comments of the reviewers. DO NOT send separate replies for each reviewer.

Thank you for your interest in the American Journal of Physics.

Sincerely,

David Jackson

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Attachments:

R1's report
R2's report
R3's report
R4's report

—AJP MS25512-1 R4's report.txt—

Dear AJP editors,

I am sending the report of the paper "Meissner effect cannot be explained classically" (which I will refer to, from now on, as "paper 1"). This manuscript was written in response to a previously published AJP article: "Meissner effect, diamagnetism, and classical physics-a review" (which I will refer to, from now on, as "paper 2"). I have read both papers, and I agree with the first one, "Meissner effect cannot be explained classically", although this paper should be improved. I think it is very important to correct the mistake of the already published paper (paper-2), as AJP is a journal where many of its readers are students or physicist that read about different topics in physics, and so they could get erroneous ideas about superconductivity and Meissner effect. I think a manuscript to understand and clarify the relation between Meissner effect and quantum mechanics is important. In summary, authors in paper 2 show from "classical Physics" that a perfect conductor always expels the magnetic field. And therefore the superconductors are just perfect conductors, where the Meissner effect is a consequence of zero resistance. I think this is a dangerous argument, without going to debate whether the results of classical physics in paper 2 are correct or not (in classical physics), this cannot be extrapolated to the explanation of the Meissner effect in a superconductor. Superconductivity (zero resistance and Meissner effect) can only be explained from a quantum theory and classical conclusions may be erroneous. Paper 1 shows some arguments, but I believe that the author can improve the manuscript. First, I will explain some of the mistakes on paper 2, which could be used by the author (of the paper 1). Afterwards, I will give the report on paper 1.

1. About paper 2 ("Meissner effect, diamagnetism, and classical physics-a review")

1.1 The authors make a review of the different points of view about Meissner effect and London equations, and the behavior of a perfect conductor. The problem here is that they believe the classical conclusions about a perfect conductor can be extrapolated to a superconductor.

1.2 There is not evidence of a classical perfect conductor, the systems with zero resistance only exist by quantum mechanics and the interaction among particles, in this case electrons. For this, in the superconductor state there is condensation energy and the system has a phase transition, from a normal state to superconductor state. This is a very important point, which is highlighted by the author of the paper-1.

1.3 The assumption of a perfect conductor without condensation energy leads to a perfect conductor expelling any magnetic field. As there is no condensation energy, the system could never be a normal conductor. So, there will never be a phase transition and the perfect conductor will exist forever.

1.4 This logic leads, by Lenz law, to the expelling of any magnetic field applied, and so there will never be a magnetic field inside of perfect conductor, what is obvious, and the conclusion of the paper-2 is trivial, always into of a perfect conductor $B=0$.

1.5 When the penetration length is found, it depends on n , the authors of paper 2 mention that there are no quantum effects because it does not contains Planck's constant. This conclusion is incorrect and superficial as quantum effects are in the density of the super particles n and the condensation energy, that depend of n .

With respect to paper 1, the author does a correct discussion and the emphasis about the condensation energy which is not considered by authors on the paper 2. However, I have various changes and suggestions for the author, in order to improve the paper and make it more understanding to a general audience.

1. In the introduction it is very important to do a more detailed description of the Meissner effect and, maybe, explain a phase diagram of H vs T . The general reader does not know the Meissner effect.

2. I think the author is too much focused on paper 2 and should try to convince the reader that the effect can only be explained from quantum mechanics. Some references about it are needed. The author can explain some elements of the BCS theory that are essential to explain Meissner effect.

3. In the paper, the author can say as the magnetic field inside the superconductor must be zero, the microscopic answer is that B breaks the time reversal symmetry,

and Cooper Pairs are time reversal symmetric.

4. In page 2, the author says "wave function of the Bose-Einstein condensed pair", what is a mistake, Cooper Pairs are not a Bose-Einstein condensate, this should be corrected.
5. The author may consider arguments in items 1.1 to 1.5 regarding on paper 2.
6. Some figures are necessary to explain Meissner effect, in particular section III, item (4).

In summary, the manuscript cannot be published in its current form, I think the manuscript is not very accessible to readers with different areas of specialization and further review is necessary.

—添付ファイル:—

AJP MS25512-1 R1's report.pdf	34.5 KB
AJP MS25512-1 R2's report.pdf	20.5 KB
AJP MS25512-1 R3's report.pdf	2.9 KB
AJP MS25512-1 R4's report.txt	5.0 KB