Re: LN15708

   Topological magnons in a one-dimensional itinerant flat-band ferromagnet

   by Xiao-Fei Su, Zhao-Long Gu, Zhao-Yang Dong, et al.

Dear Dr. Su,

The above manuscript has been reviewed by our referees.  A critique drawn from the reports appears below.  On this basis, we judge that while the work probably warrants publication in some form, it does not meet the Physical Review Letters criteria of impact, innovation, and interest.

The paper, with revision as appropriate, might be suitable for publication in Physical Review.  If you submit the paper to Physical Review, the editors of that journal will make the decision on publication of the paper, and may seek further review; however, our complete file will be available.

If you submit this manuscript or a revision of it to Physical Review, be sure to respond to all referee comments and cite the code number assigned to the paper to facilitate transfer of the records.

Yours sincerely,

Donavan Hall

Associate Editor

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Report of Referee A -- LN15708/Su

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In this manuscript, the authors studied the acoustic magnon behavior in one dimensional Tasaki model, where Hubbard interaction are present. By performing numerical calculations on this strongly correlated system, the authors discover that possibly nontrivial Berry phase arises at certain parameter range of the Tasaki model, and confirm the nontrivial topological phase by further investigating the edge state behavior with open boundary conditions at the ends of the one-dimensional chain.

However, I think this paper is not suitable to be published in PRL for following reasons:

1. The studies in this manuscript heavily rely on the numerical calculations, but the complete and definite understandings of the underlying physical mechanism are lacking.

2. In addition, the Tasaki model used in this work is a kind of artificial model therefore may be a little far away from realistic magnetic system.

3. Even the nontrivial topological phase arises as demonstrated in this paper, what could be its significance and advantage in comparison with the previous reported local spin models? Previous local spin models have already provided us straightforward and robust ways to construct topological magnon insulators. In comparison, the emergent of topological magnon phase seems to be heavily relying on specific parameter range.

Besides, I have also following questions/comments on this paper:

1. The authors states that “the Berry phase of the acoustic magnon band changes from 0 to π, while that of the optical band changes from π to 0”, why the total Berry phase in not an integer of 2π? And what is implication when Berry phase of the optical band is π (instead of acoustic band)?

2. The configuration of magnetic system in Fig. 1(a) is similar to a system where Dzyaloshinskii-Moriya interaction is likely to arise, if we consider the A site as normal magnetic atom, and B site as the heavy atom with strong spin-orbital interaction. What is difference between the chain considered in this work and the magnetic chain with Dzyaloshinskii-Moriya interaction?

3. It seems that that the lower flat band (and thus the ordered ferromagnetic ground state) relies on that “the on-site energy of impurities is properly tuned”, does this mean that the phenomenon discussed in this paper only occurs at strictly selected parameter range?

4. In this work, only one-dimensional system is considered, what would happen if the system is extended to two or three dimensions?

5. The concept of magnon here seems to be different from the concept of magnon as normally used in topological magnon insulators, which refers to the precession of ordered magnetization. Some discussions on this aspect should be made.

As a summary, I do not recommend this paper to be published in PRL. Instead, I would recommend to publish this paper in PRB after proper revisions.

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Report of Referee B -- LN15708/Su

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Present paper "Topological magnons in a one-dimensional itinerant flat-band ferromagnet" discusses a topological phase transition in a one-dimensional interacting system of fermions. In particular, the transition occurs in their magnetic structure and is revealed by an appearance of magnonic localized end-states in the topologically non-trivial phase. This prediction is in accord with general established topological arguments based on topological invariant. The paper is computational and technical. In my opinion, the paper is not suited for the Physical Review Letters. In short, I do not get an impression that the paper conveys a material that meets the PRL criteria of novelty.

1. The paper is devoted to a specialized theoretical model, namely the one-dimensional Tasaki model. The model is very specific and is not aimed to a broad audience. The proposed topological phase transition is based on tuning the Hubbard on-site interaction. This is barely possible experimentally, especially in one-dimensional setup. The Hubbard on-site interaction is an interaction devised for analytic considerations. On the other hand, the paper is computational. One may ask what will happen with the calculations if the range of the interactions is increased to next neighbors?

2. From the paper It is impossible to understand what mechanisms are driving the topological phase transition. The authors mention exactly that in the passage before the summary and send this concern to future works. In my opinion this future work, which should elaborate the physics, is required from the authors for the effect to be appreciated by general audience. The reader, in my opinion, would like to understand better how one can obtain the spectrum of magnons. Can this be done via Bethe ansatz?

3. It does not look like the proposed effect can explain an ongoing experiment. Neither the paper discusses where the proposed effect can be observed. There are no suggestions on possible materials where the proposed effect can be measured.

4. The text is too technical. A lot of technical details meant for specialized readers.

5. At what temperature the calculations are done? For example, will the obtained topological phase be stable against the temperature increase?

In my opinion, the paper is suited for consideration to the Physical Review B journal as a regular paper.