

Comment on mr-2022-9

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Community comment on "Visualization of dynamics in coupled multi-spin systems" by
Jingyan Xu et al., Magn. Reson. Discuss., <https://doi.org/10.5194/mr-2022-9-CC6>, 2022

Thank you for the interesting paper! I completely agree with two prior comments. First, I also think the surface obtained in Eq (1) as the representation in the maximal F block spanned by $|F_k, F_k\rangle$ should be the standard Q function and the connection to literature on phase-spaces should certainly be discussed. Second, I think the paper has presentational as well as more technical issues: The main selling point of the paper is that the representation is based on eigenblocks of the total angular momentum operator as illustrated in Fig1, but the following central quantities are nowhere mathematically defined

- $|F, m\rangle$ are never defined. They're presumably eigenvectors of a certain total angular momentum operator. A comment in parentheses above Eq (C4) attempts to define these as 'defined with the projection mF along the z-direction)' which still gives no detail as to what these are
- The total angular momentum operator is nowhere defined and, moreover, not even a symbol is introduced for it!

Furthermore, the authors present some derivations in appendix A. These again give no detail where the involved mathematical objects come from. Most of these proofs are actually quite standard and can be found in the literature, yet the authors present these without citing any literature at all. At least some information should be given how these derivations connect to existing literature and the involved objects, e.g., spherical tensor operators, Clebsch-Gordan coefficients etc. should be defined or references should be cited.

If these comments are properly addressed I think the paper could be an interesting addition to literature.