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Magn. Reson. Discuss., referee comment RC1
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Comment on mr-2021-29

Anonymous Referee #1

Referee comment on "Improved NMR transfer of magnetization from protons to half-integer spin quadrupolar nuclei at moderate and high magic-angle spinning frequencies" by Jennifer S. Gómez et al., Magn. Reson. Discuss., https://doi.org/10.5194/mr-2021-29-RC1, 2021

I found this to be a very nice paper by Gomez et al comparing the efficiency of SQ and ZQ symmetry-based polarization transfer sequences at moderate and high MAS rates. The search for optimal sequences was thorough which adds confidence in the results. I have a few minor corrections and comments that I will outline below.

Line 99 – Although the sentence is correct is sounds as though the author is trying to say that the rf power increasing with homonuclear dipolar interactions makes it unsuitable for high MAS rates. I think it should be split into two sentences.

Line 112 – Why define R'? The phase phi is defined and R with a phase of –phi is sufficient.

Line 137 – Please include a reference for dipolar truncation

The reason given for screening the phase of the sequence to those near 90° is that that is what is used but the authors could be more specific that these sequences are better compensated for rf inhomogeneity due to the 180° phase difference between the two pulses.

Line 264 – This statement may be misleading. $R12^5_9$ has a non-zero scaling factor when the rf field is greater than 2nu_R

Figure 2 e and f are distorted.

My last comment has to do with the generality of the results being presented and perhaps the authors might want to look into this point more deeply. As the authors have demonstrated in an earlier JACS paper, the INEPT sequences can outclass PRESTO when the dipolar couplings are weaker, for instance with low-gamma nuclei, since the zero-quantum sequences can sustain longer recoupling times. We have also noticed that PRESTO-II far surpasses INEPT when the dipolar couplings are very strong (since it enabled for very short non-synchronized recoupling periods, presumably) so there might be some cross-over point in dipolar coupling strength when INEPT surpasses PRESTO. 27Al is likely near this cross-over point. So likely the best RINEPT sequences will remain the best, and the same for the PRESTO sequences, but the comparison of the two types of sequences may be very dependant on the dipolar coupling strength and the time required to recouple the interaction.