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Interactive comment on "Origin of the Residual Linewidth Under FSLG-Based Homonuclear Decoupling in MAS Solid-State NMR" *by* Johannes Hellwagner et al.

Anonymous Referee #2

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This manuscript attempts to understand factors contributing to the residual line width in a certain class of homonuclear dipole-dipole decoupling experiment, namely, FSLG and its closely related variants. The manuscript is theoretically very sound and also is quality of the spectrum shown in Figure 6. I strongly recommend publication of this manuscript. However, the authors may want to look at the following comments:

*It will be interesting to see how compensated cycles perform (even though the contribution the line width is marginal) for super-cycled FSLG/PMLG schemes where the effective axis is more along the z-axis. Does the supercycling minimise the third-order effect in any way or RF inhomogeneity? *The compensated schemes push the spec-

trum to lower ppm values. Is it totally right that transient compensated schemes yield spectra with absolute values of the frequency? For instance, in Figure 6, the shift is uniform, and unless one has the reference, it is impossible to say which gives the absolute values right. And if the reference is fixed, for a given spectrometer, under given conditions, the shift is always the same, unless the higher-order terms come into play for this as well. That is not very clear in the text. *The spectrum obtained with the compensated scheme, Figure 6, has certain artifacts like a shoulder for the NH3+, any comments. *Any comments on the performance of these schemes at higher MAS, higher than 60 kHz. Also in the introduction when slow to medium MAS frequencies are mentioned, perhaps it is good to indicate what the frequencies are. *Certain inconsistencies, I believe, like definition of tau_i (i=1 to 4) on pages 6 and 7, for instance.

As inidcated before, the manuscript is of very high quality and points to interesting terms with the use of multimode Floquet theory limiting the performance of solid-state NMR pulse schemes.

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