

Magn. Reson. Discuss., referee comment RC2
<https://doi.org/10.5194/mr-2022-23-RC2>, 2022
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Comment on mr-2022-23

Alexej Jerschow (Referee)

Referee comment on "Paramagnetic relaxivity of delocalized long-lived states of protons in chains of CH₂ groups" by Aiky Razanahoera et al., Magn. Reson. Discuss., <https://doi.org/10.5194/mr-2022-23-RC2>, 2022

This is very interesting work, presenting the surprising results that delocalized long lived states can be longer lived than T1 by factors of 3-5 in systems with paramagnetic interactions. The context is DNP, where radicals would typically be present, and hence these findings can be of practical use as well. The insights gained with respect to the sizes of the paramagnetic agents and the simulations of Fig. 6 are particularly useful.

Here are my minor comments:

(1) The text refers to single, double, and triple SLIC sequences. Perhaps this requires a minor clarification: do you mean single, double, and triple frequency irradiation? One could also read this as several cycles of SLIC pulses.

(2) It would seem suitable to cite our recent work on paramagnetic relaxation (and other mechanisms) of singlet order by experiment and MD simulations: Kharkov et al, Phys. Chem. Chem. Phys., 2022, **24**, 7531-7538, https://pubs.rsc.org/en/content/articlehtml/2022/cp/d1cp05537b?casa_token=gMiUwO-MKY0AAAAA:N3Uh0TjOIocXkD6BfVIFo1NoabXK CWK6mVqq5XN_G5F_ntohz0qsuLv0LaxW4veoIRTxIBzBN0DLATE