

Magn. Reson. Discuss., author comment AC1
<https://doi.org/10.5194/mr-2022-12-AC1>, 2022
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Reply on CC1

Nino Wili et al.

Author comment on "Reverse dynamic nuclear polarisation for indirect detection of nuclear spins close to unpaired electrons" by Nino Wili et al., Magn. Reson. Discuss., <https://doi.org/10.5194/mr-2022-12-AC1>, 2022

Thank you for your comments.

Regarding RA-NOVEL: The same shape was used for both steps. We are not aware why it would make a difference if they have the same or opposite sweep direction.

Regarding electron decoupling: We will mention more clearly in the Fig. caption that decoupling is during time T. The 30us were chosen as a compromise between "as often as possible", and "not risking the TWT amplifier or the protection circuit". It is not the value that leads to "optimal decoupling". The inversion pulses were 200ns linear chirps spanning 300 MHz at full power (not quite 100 MHz nutation frequency). We will mention this more clearly in the revised version.

We agree that the hyperfine coupling is not fully decoupled for these parameters, but even a down-scaling should lead to a facilitated spin diffusion.

We would like to refrain from a detailed analysis in this article, but we would still like to highlight in this answer that the relevant matrix element in the Hamiltonian that "quenches" the n-n polarisation transfer is actually the difference in the hf-couplings, not their absolute values.

We do not see how the periodic electron inversion should lead to electron-electron decoupling (the complete spectrum is inverted, i.e. the electron-electron couplings are unaffected by this). Even if that would be the case, it is unclear how this should lead to increased nuclear spin diffusion (or more precisely, a faster decay of the nuclear polarisation close to the electrons). IF it were the case that e-e-decoupling speeds up nuclear spin-diffusion, then that would mean that electron-electron couplings would actually need to slow down nuclear spin diffusion, but clearly this is not the case when comparing 0.1mM and 5mM.

Minor points: we will consider them for the revised version.

The same RA-NOVEL parameters were used for all samples (within experimental possibility).