Magn. Reson. Discuss.,
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Interactive comment on "Optimising broadband pulses for DEER depends on concentration and distance range of interest" *by* Andreas Scherer et al.

Anonymous Referee #2

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This work investigates in detail the dependence of DEER signal-to-noise ratio on many experimental parameters (pulse shapes, pulse lengths, pump-observer separation, concentration, truncation).

This work does not introduce any new method. Hyperbolic-secant pump pulses and Gaussian observer pulses are already commonly used in 4-pulse DEER, and many of the optimizations and explorations presented are routinely done by spectroscopists.

Although not innovative for this reason, this manuscript demonstrates explicitly that it can be beneficial to spend time to optimize experimental parameters carefully. Novices to the field will find this manuscript particularly instructing as a tutorial.

I recommend publication in Magnetic Resonance, after the comments below are addressed.

[1] In section 3.3 (background decay), examine in detail how the type of shaped pulse affects the MNR if the recently published superior background correction method (kernel inclusion) is used. It is crucial to include this in this work.

[2] Discuss in more detail whether and how the findings in this work are applicable to other samples (different distance distributions, different concentrations) and spectrometers (different resonator profiles, different Tx fidelity). From the current manuscript, it is unclear whether the findings are generalizable. This is important, since it appears to be the purpose of the manuscript to make some general statements about experimental settings in DEER.

[3] - Eq.(3): Specify that the time axis is defined such that t=0 at the center of the pulse. - Eq.(11): (k*|t|)ˆ(d/3) instead of k*tˆ(d/3) - Eq.(12): A factor of 2 might be missing. - 8.13: "i.e. a chirp pulse" - 12.18: Here, it is not clear how the numbers for the minimum detectable distance limit are obtained. - Kupce needs a grave accent on the c. Bohlen needs an umlaut on the o. - SI Eq.(2): t_truncation instead of tau_2

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