

Thank you reviewer 2. Below we provide a response to your comments. Our response is in red and the uploaded revised manuscript highlights the changes made.

Anonymous Referee #2

Received and published: 11 March 2020

This paper discusses experimentally and theoretically the ELDOR spectrum of TEMPOL solutions in presence of protons and ^{14}N nuclei. Three different TEMPOL concentrations are considered : ??? At very low concentrations the electron spin of TEMPOL are weakly interacting and the ELDOR spectrum can be computed considering a collection of randomly oriented 3 spin systems (one electron and two nuclei) ??? At very high concentration the ELDOR spectrum is dominated by the electron-electron interaction. A phenomenological model that mimics the spectral diffusion between different electrons reproduce well the experimental data ??? At intermediate concentration the interplay between spectral diffusion and depolarization induced by ^{14}N solid effect is not correctly described by the model. The paper contains a large amount of work,

is well written and should be published. I have few comments :

- 1) I was not able to clearly find the temperature at which the experiments are performed (20 Kelvin ?).

Yes, this is mentioned at the experimental section under Spectroscopic measurements. We added in each Fig. caption the temperature to avoid confusion.

- 2) In the introduction the papers Kundu 2018a and Kundu 2018b are cited because they performed quantum mechanical based calculations of the EPR spectra. They found a connection between eSD models and thermal mixing regime. The paper Caracciolo et al (PCCP , 2016, vol. 18, no 36, p. 25655-25662.) should also be cited in this context.

This was added in p. 2.

- 3) Before equation 7c the thermal equilibrium populations should be specified (they are not in the rotating frame)

The sentence was modified in p. 11 to:

“ ...being the ratio between thermal equilibrium populations defined in the laboratory frame, and “