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Coherent and Incoherent Scattering of Tetrahydrofuran from Meso- to Inter-molecular Scales by Neutron Spectroscopy with Polarization Analysis and Spin Echo

Tuesday 21 March 2023 16:00 (2 hours)

We have extended our previous investigations on self- and collective dynamics of liquid water [1,2] to the case of tetrahydrofuran (THF). Neutron polarization analysis on a wide-angle time-of-flight spectrometer (PLET @ ISIS) has allowed measuring separately coherent and incoherent dynamic structure factor of deuterated THF with sub-meV resolution in a wide scattering vector (Q) range. The combination with Neutron Spin Echo (WASP @ ILL) experiments on deuterated and protonated THF with higher resolution has allowed to fully characterize the contributions to self- and collective dynamic structure factors also at low temperature. Interestingly, a low- Q mode (independent of Q), as that discerned in the collective dynamics of water and attributed to the reorganization of the HB-network, is also found in THF. The activation energy is however much lower, suggesting van der Waals interactions at the nature of the underlying process in this low- Q mode for the case of THF.

References

- [1] A. Arbe, P. Malo de Molina, F. Alvarez, B. Frick, and J. Colmenero, Physical Review Letters **117**, 185501 (2016).
- [2] A. Arbe, G. Nilsen, J. R. Stewart, F. Alvarez, V. García-Sakai and J. Colmenero, Physical Review Research **2**, 022015 (2020).

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