**Supplementary information**

**Femtosecond mid-infrared study of the dynamics of water in aqueous sugar solutions**

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This supplement contains several figures that illustrate observations stated in the main article.

**Fig. 1:** *Anisotropic absorption signals* for solutions of glucose, trehalose and sorbitol in isotopically diluted water, at five different picosecond delay times after the excitation. The concentrations are given in molal (mol/kg). The solid lines represent fits using the model described in the main text.

**Fig. 2:** *a:* The isotropic absorption change and *b:* the anisotropic absorption change as a function of frequency for 0.4 molal 10% deuterated sorbitol in DMSO (solid lines are description with model fit). *c:* Spectral components contributing to isotropic signal (relative amplitudes correspond to 1 ps), *d:* Anisotropy of the two spectral components as a function of delay time.
Fig. 3: a: The isotropic absorption change and b: the anisotropic absorption change as a function of frequency for 0.4 molal 10% deuterated glucose in DMSO (solid lines are description with model fit). c: Spectral components contributing to isotropic signal (relative amplitudes correspond to 1 ps), d: Anisotropy of the two spectral components as a function of delay time.

Fig. 4: Anisotropic absorption signal at 2500 cm⁻¹ for solutions of glucose in water of different concentrations (0, 1, 2, 3, 5, 7 and 10 molal). Solid lines are description with our model fit.

Fig. 5: Anisotropic absorption signal at 2550 cm⁻¹ for solutions of sorbitol in water of different concentrations (0, 1, 2, 3, 5, 7 and 10 molal). Solid lines are description with our model fit.