

# **Hydrogen bonds as a possible explanation of the unusual behaviour of water and aqueous solutions**

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Since more than 30 years the puzzle of the anomalous properties of liquid water remains object of debate. The more recent developments have been achieved almost exclusively by computer simulations of the molecular dynamics using different "effective" potentials. Some of them demonstrate the existence of liquid-liquid phase transitions and of a critical point under temperature-pressure conditions not accessible to real experiments. It is not obvious that such results apply to liquid water. We focus our attention on the role of hydrogen bonds formed between neighbouring molecules. Their fast dynamics and ability to create short lived networks with structures similar to ices must be taken into account in theories to be developed at the molecular level. We will present recent experimental results that use coherent quasi-elastic neutron scattering in an original way that partly discriminates the dynamics of different partial components of the scattering law. The results confirm that the dynamics of hydrogen bonds follows an Arrhenius behaviour. We argue that the dynamics of supercooled water between the homogeneous nucleation temperature (not accessible to simulations) and the glass transition is determined by the dynamics of the bonds similarly to beta relaxation in polymer melts.