Water - the Home of Quantum Processes

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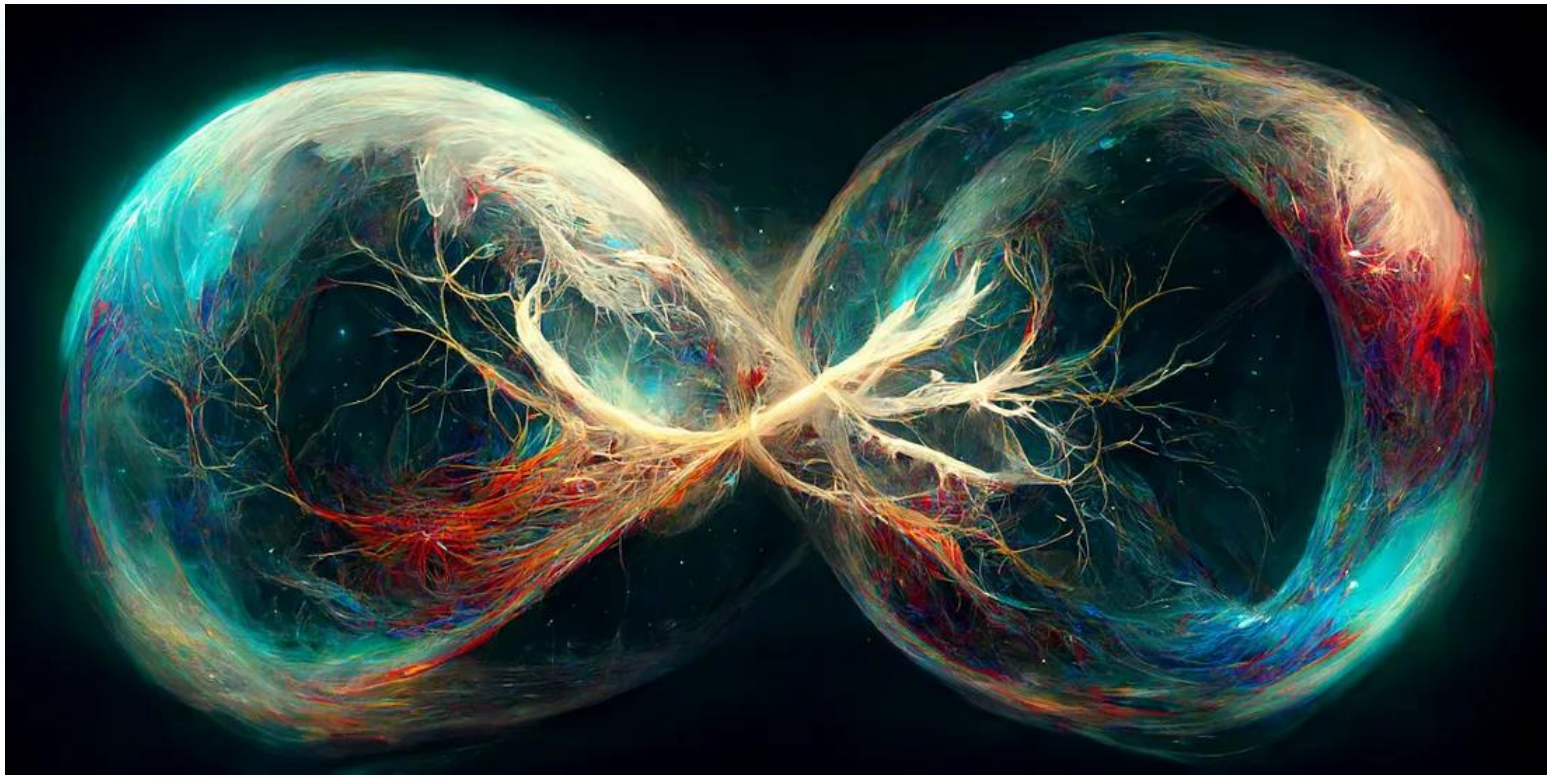

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Introduction: Quantum Water

In 2016, scientists at the US Department of Energy's Oak Ridge National Laboratory created a new quantum state of water. They made their discovery by forcing water molecules between hexagonal beryl crystals[1]. The massive compression increased the pressure so much that the atoms of the water molecules became uneven, and from that moment on, water no longer obeys a number of physical laws. . (Fig.1). Molecules were able to pass through barriers at the atomic level, and their behavior is now explained by quantum mechanics and is called "tunneling". (Fig.2). This behavior occurs only when matter is in a quantum stateScientists believe that water often goes into quantum mode, passing through very narrow cavities in rocks, soil, or even through the cell walls of living beings

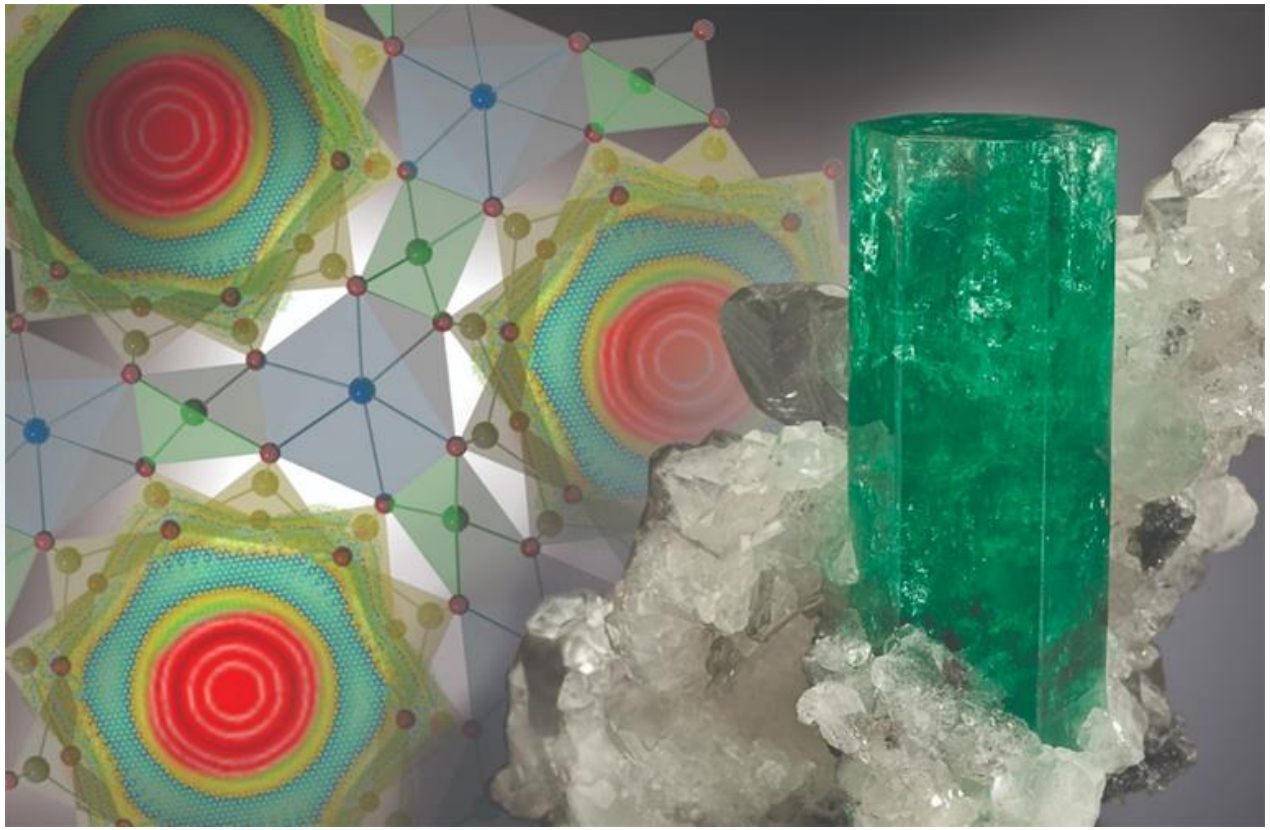


Fig.1. In a paper published in Physical Review Letters, researchers at the Department of Energy’s Oak Ridge National Laboratory describe a new tunneling state of water molecules confined in hexagonal ultra-small channels – 5 Angstrom across – of the mineral beryl. An Angstrom is 1/10-billionth of a meter, and individual atoms are typically about 1 Angstrom in diameter [2].

Vibrating currents in a Water

Ordinary water has many unusual properties that scientists have yet to explain. Although most liquids harden when cooled, water does not do so. Further cooling, it re-expands, illuminates and rises to the surface – thus freezing the surface of the pools first [3]. Because of it water has an unusually high surface tension, which allows some insects to walk on its surface. Water molecule contains two hydrogen atoms and one oxygen atom – HOH. (Fig.3).

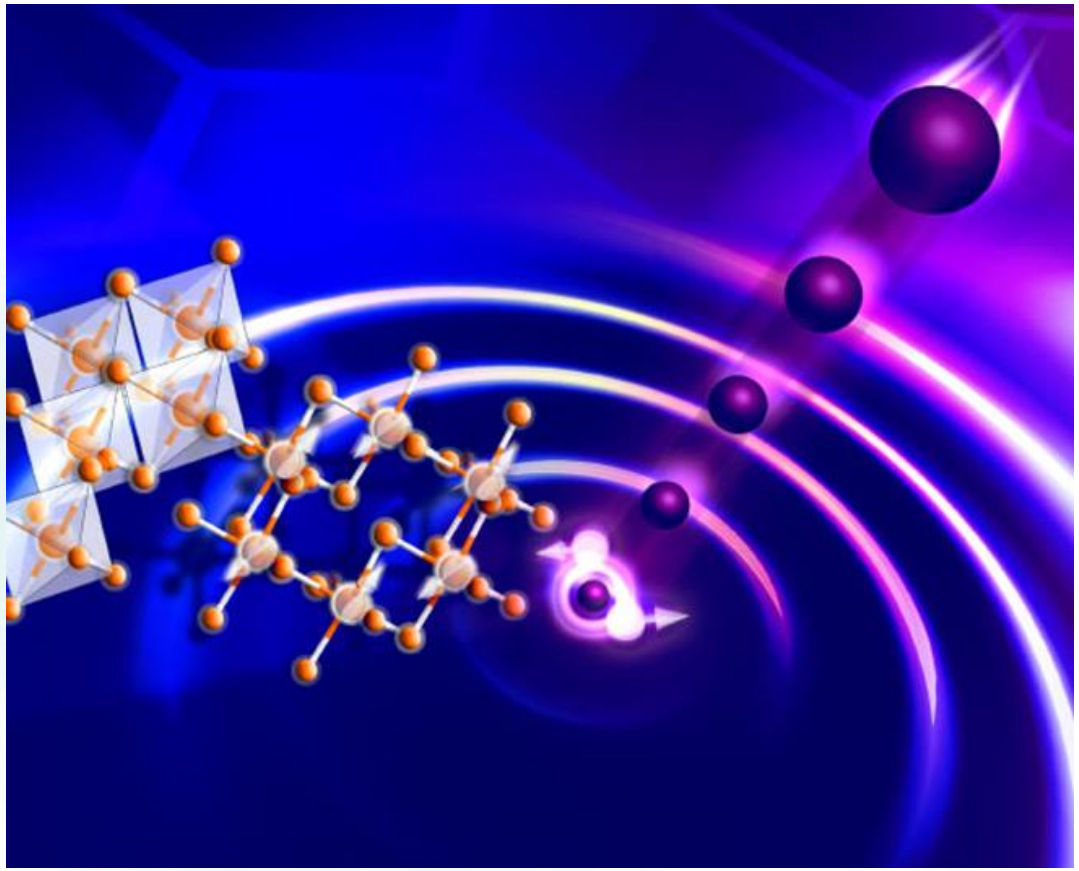


Fig.2. The excitation of a spin liquid on a honeycomb lattice with neutrons. Image credit: Genevieve Martin, Oak Ridge National Laboratory

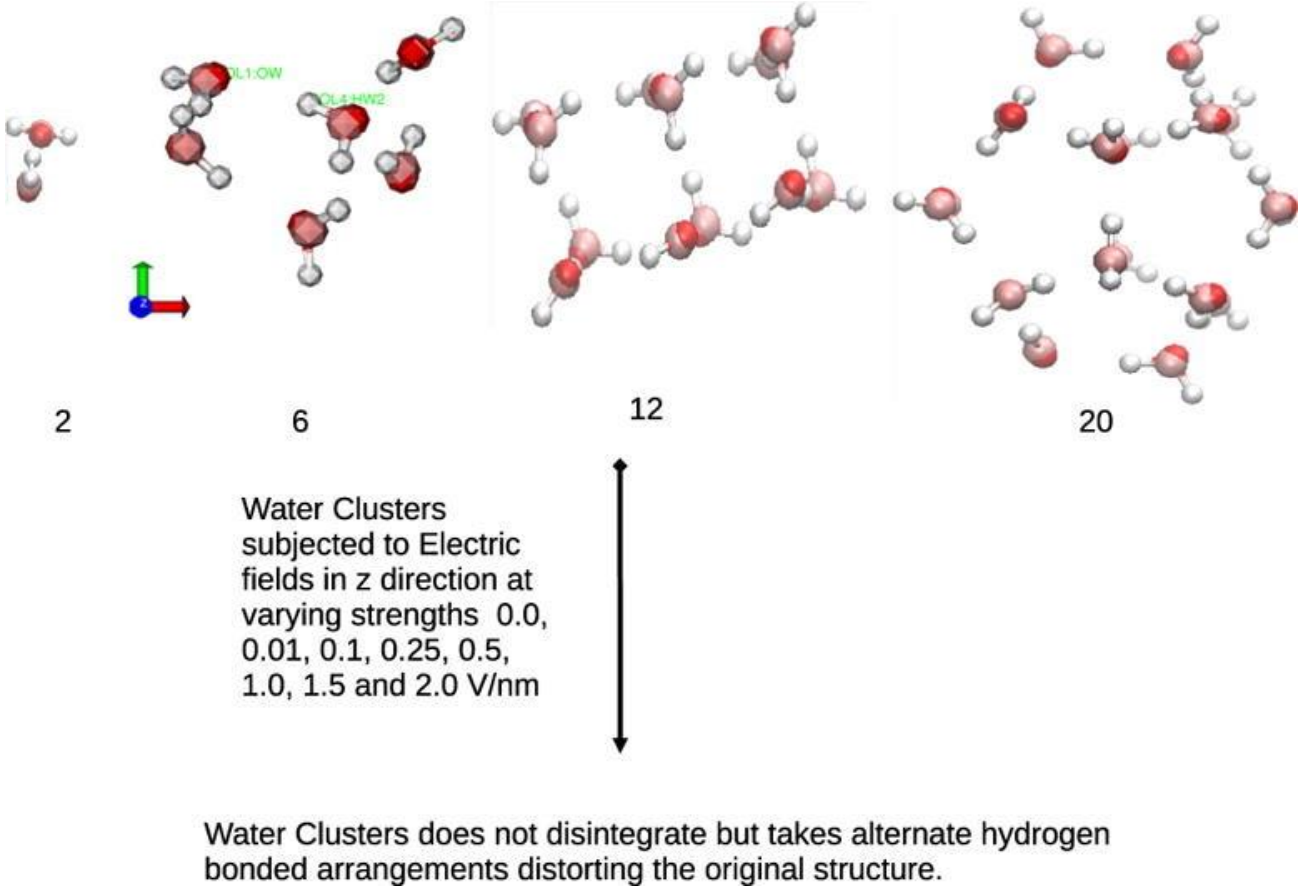


Fig.3: Somendra Nath Chakraborty, Niall J. English. Vibrational, energetic-dynamical and dissociation properties of water clusters in static electric fields: Non-equilibrium molecular-dynamics insights. Chemical Physics Letters, Volume 710, 16 October 2018, Pages 207-214

Vibrating currents in a Water

Water molecules are held together by the hydrogen bonds between the positively charged single molecule hydrogen and the negatively charged oxygen molecules of adjacent molecules. The very small size of the water molecules and the high velocity of hydrogen bond motion prevent such observations. Researchers at the National Accelerator Laboratory SLAC, Stanford University and the University of Stockholm created water jets 100 nm thick and forced them to vibrate with an infrared laser beam (Fig.4). They then proposed short high energy electron pulses to the water molecules in the MEV-UED. They added snapshots of the atomic structure of how water molecules react to light in a video [4]. Observations of the three molecules show that when they begin to vibrate, the hydrogen atoms repel a new force that attracts oxygen atoms from nearby water molecules and then expands the space between the molecules. It is possible to use this method to study the quantum nature of hydrogen species and their significance for the hitherto unexplored properties of water, which are important for many chemical and biological processes.

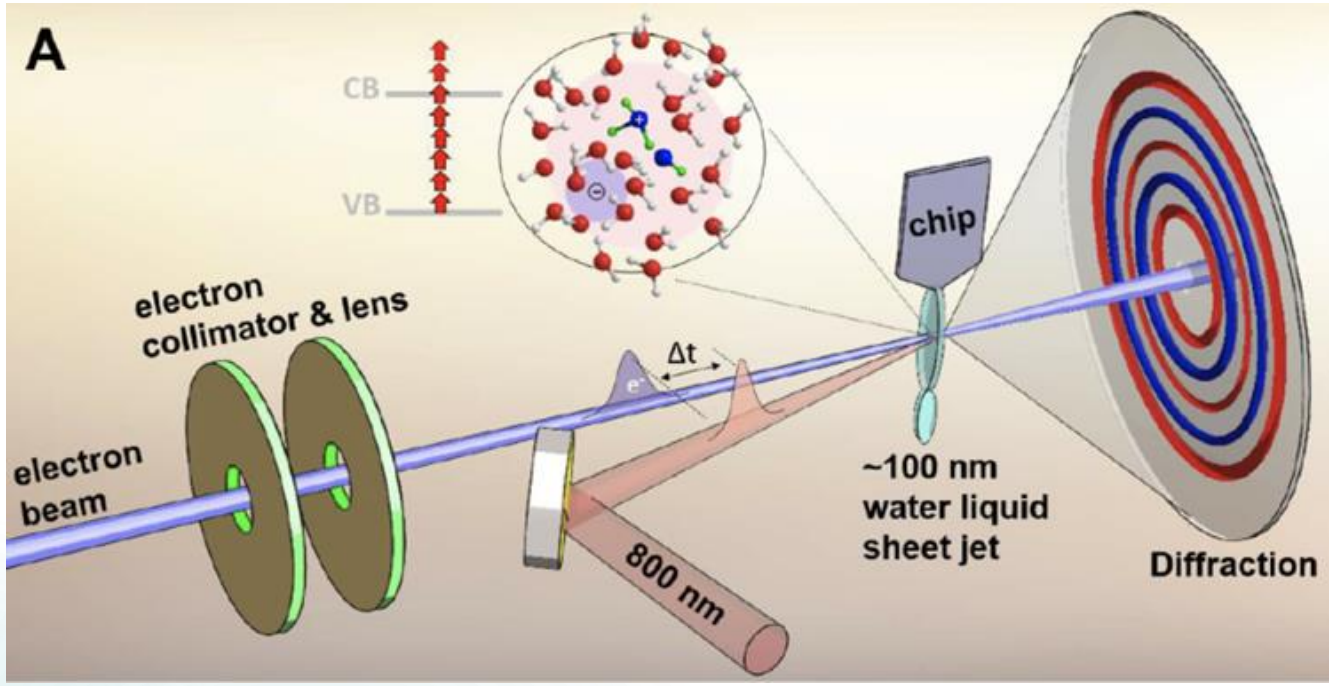


Fig.4. Setap for observation of hydroxyl-hydronium pair. To observe the short-lived hydroxyl-hydronium pair, the researchers created 100-nanometer-thick jets of liquid water and ionized the water molecules with intense laser light (red beam). Then they probed the molecules with short pulses of high-energy electrons (blue beam) from MeV-UED to generate high-resolution snapshots of the ionization process. This allowed them to measure bonds between oxygen atoms as well as bonds between oxygen (red circles) and hydrogen (white circles) atoms at the same time, thus capturing this important but unstable complex (blue and green) [4].

In 2013, for the first time a team of physicists from Austria observed Quantum 15 amino acid chain interaction. Their research laid the foundation for the study of quantum biological molecules, enzymes, DNA, and perhaps even the simplest organisms, such as viruses [5] (Fig.5). Evidence of the orderliness of intracellular water and the special state of water in the cytoplasm of cells are shown the by the process of dynamic changes in the state of water near cell membranes and its effect on conformational transformations of polypeptides as nonlinear effects. Those effects in water associated with the electrical properties of the associated water phase in bulk water and changes of Regulatory functions of reactive oxygen species in blood and water model systems as well as experimental confirmation of oscillators.

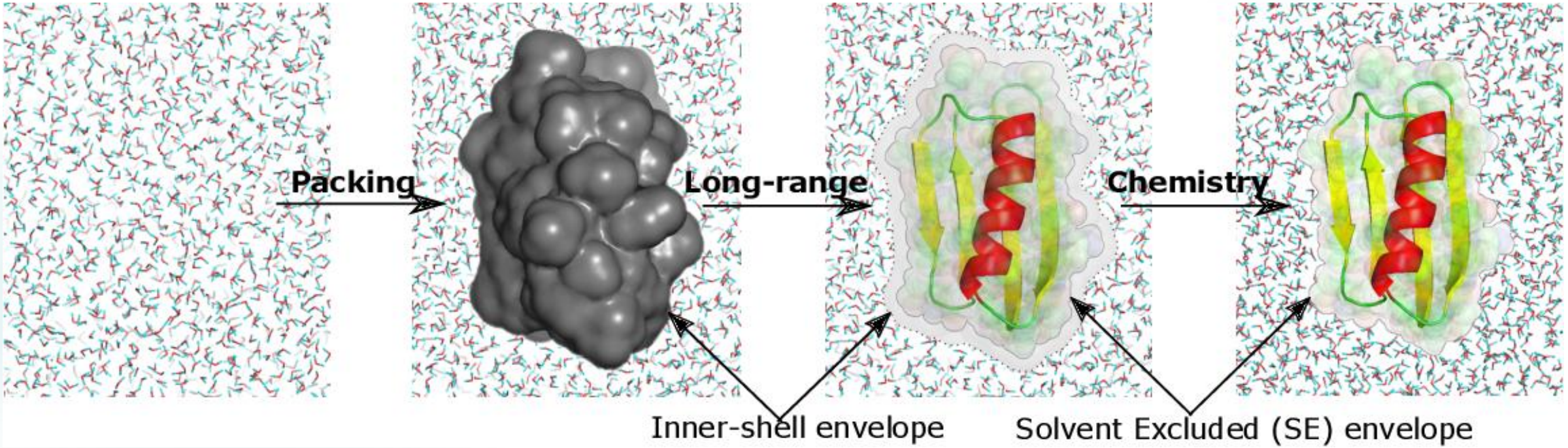


Figure 5: Quasi-chemical organization of the excess chemical potential. The inner-shell identifies the region enclosing the solute for which the solute-solvent binding energy distribution P (ε|φ) is accurately Gaussian. It approximately corresponds to the traditional first hydration shell of the solute. The free energy to create the cavity to accommodate the solute gives the packing (hydrophobic) contribution. The chemistry contribution is zero for the solvent-excluded envelope. The chemistry plus long-range parts determine the hydrophilic contributions. Reprinted from Ref. 28, copyright (2020) American Chemical Society

Pulse sequences in water, which generate multiple- and zero-quantum coherence and suppress the detection of single-quantum coherence have been used to greatly reduce the intensity of the water signal in NMR images. In the experiment, image signals having multiple-quantum behavior add constructively while single-quantum signals, such as the signal arising from water, are canceled. Since the generation of multiple-quantum coherence is only a function of spin-spin coupling, water suppression by this technique is independent of chemical shift. Consequently, suppression of the water resonance in a 1H NMR image can be accomplished in an inhomogeneous magnetic field provided that the excitation profile of the rf pulses is equal for all spins. Recently, two-dimensional NMR experiments have been performed, which were likely to show that a coupling between otherwise uncoupled or equivalent spins was observable, yielding signals originating from multiple-spin multiple-quantum operators in the density matrix [6]. Such results could be interpreted as a consequence of the radiation damping phenomenon (Fig.6).

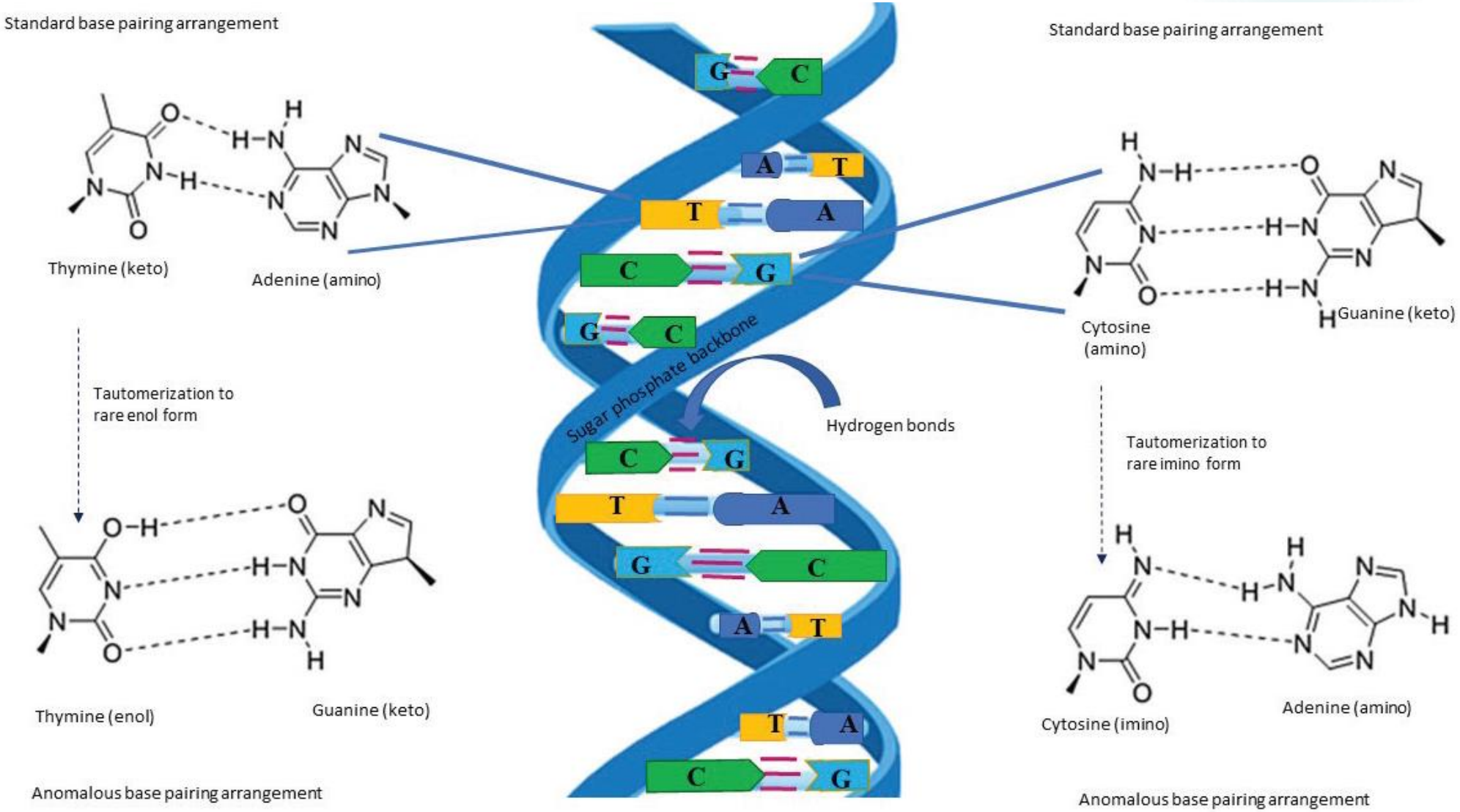


Figure 6. Diagram illustrating double helix structure of DNA molecule with complementary base pairs on the 2 strands, showing the hydrogen bonds between the bases and the changes that take place in tautomerization of the bases which may result in anomalous base pairing which may be the basis of spontaneous mutation.

Bey Hing Goh1, Eng Siang Tong, Priyia Pusparajah. Quantum Biology: Does quantum physics hold the key to revolutionizing medicine? HH Publisher. Perspective article, 2024.

Based on the existing literature, it is evident that nature has been able to evolve mechanisms and structures by which to harness quantum mechanics to aid processes necessary to life in ways that were highly unexpected based on the initial findings of quantum physics where these behaviours were thought to only occur under very tightly controlled environmental conditions. From what has been discovered, it seems likely that we have only just begun to unearth the tip of the iceberg in terms of how quantum phenomena play a role in living organisms — perhaps as more sophisticated equipment and testing become available we may be better placed to explore these further. It seems clear that there are many scenarios where quantum mechanics are at work in the human body, though their exact nature remains to be fully defined. There is also significant debate about whether the phenomena that have been observed truly have a functional purpose thought it seems more and more likely that they do. This then suggests that there are a huge number of potential applications of quantum biology in science and in medicine — in terms of diagnosis as well as treatment of a variety of human maladies.

While there is clearly much more work to be done before we are fully able to understand and apply the principles quantum physics in a practical way in clinical medicine, the fact that it is clearly involvement in so many key processes for life suggests that this field holds significant clues to unlocking many mysteries of biology.

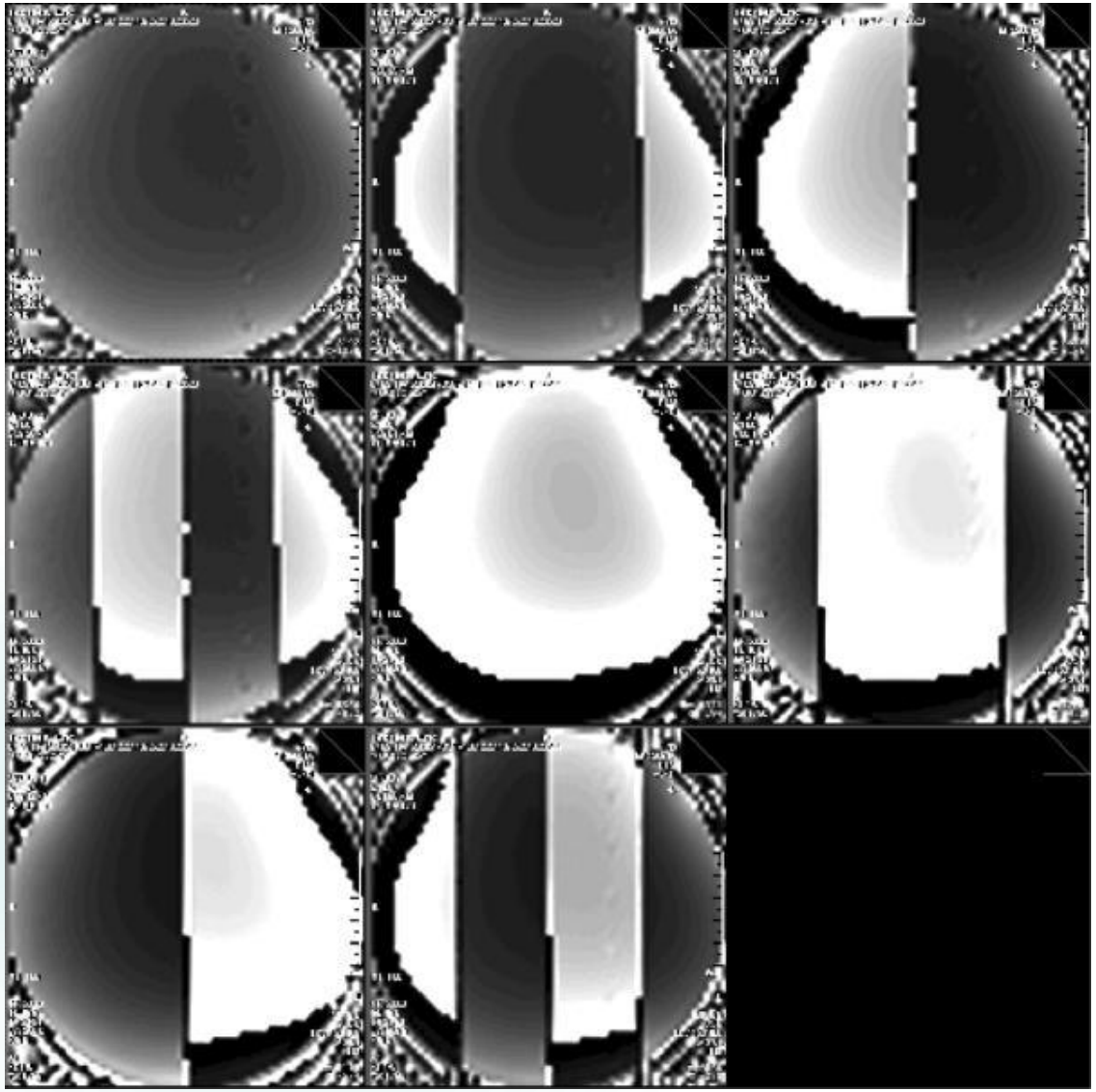
Quantum physics of water

Quantum physics of water generally is based on the study of critical phenomena conditioned by phase transitions in the organizing water phase, and quantum phenomena connected with the macroscopic charge ordering and exchange processes in the open thermodynamic system. A liquid-phase state of water is a heterogenic state characterized by the domain organization by metastable polymorphous structures which is associative water phase represented by polymorphous ices controlling by nano size hollowness and electrostatic charges [7].
As a science of water quantum states, quantum physics of water is very important for adequate understanding of processes directly influencing global earth changes, including climate changes which is strongly depending of the quantum physical processes taking place in water molecules which after integration decrease the electrochemical potential of lithosphere through degradation of electrophysical state of water molecules.
The degree to which water is structured is highly depending of nuclear quantum effects, which are in active correlation with heterogeneity of the hydrogen bond networks of water.

Pulse sequences which generate multiple-and zero-quantum coherence and suppress the detection of single-quantum coherence have ben used to greatly reduce the intensity of the water signal in NMR images. In the experiment, image signals having multiple-quantum behavior add constructively while single-quantum signals, such as the signal arising from water, are canceled. Since the generation of multiple-quantum coherence is only a function of spin-spin coupling, water suppression by this technique is independent of chemical shift. Consequently, suppression of the water resonance in a 1H NMR image can be accomplished in an inhomogeneous magnetic field provided that the excitation profile of the rf pulses is equal for all spins. Furthermore, variations in the T1 and T2 of coupled and uncoupled spins do not affect the efficiency of the multiple-quantum filter.

The very good example is investigation of lactate properties by Nuclear Magnetic Resonance method. Lactate is an important metabolite in normal and malignant tissues. However, it has been difficult to clinically detect the lactate methyl resonance because it is obscured by lipid resonances. The selective homonuclear multiple quantum coherence transfer (SelMQC) technique offers a method for distinguishing lipid and lactate resonances. This study was supported by implementation of 3D SelMQC version with Hadamard slice selection and 2D phase encoding (HDMD-SelMQC-CSI) on a conventional clinical MR scanner (Fig.7).

Hadamard slice selection is explained and demonstrated in vivo. This is followed by 1cm3 resolution lactate imaging with detection to 5 mM concentration in 20 minutes on a 3T clinical scanner. An analysis of quantum selection gradient duration and amplitude effects on lactate and lipid signal is presented. To demonstrate clinical feasibility, a 5 minute lactate scan of a patient with a non-Hodgkin's lymphoma in the superficial thigh is reported. The elevated lactate signal coincides with the T2-weighted image of this tumor. As a test of SelMQC sensitivity, a thigh tourniquet was applied to a normal volunteer and an increase in lactate was detected immediately after tourniquet flow constriction.



Eric A. Mellon, Seung-Cheol Lee, Stephen Pickup, Sungheon Kim, Steven C. Goldstein, Thomas F. Floyd, Harish Poptani, E. James Delikatny, Ravinder Reddy, and Jerry D. Glickson. Detection of Lactate with a Hadamard Slice Selected, Selective Multiple Quantum Coherence, Chemical Shift Imaging Sequence (HDMD-SelMQC-CSI) on a clinical MRI scanner: Application to Tumors and Muscle Ischemia. PMC 2011 Jan 14. Published Magn Reson Med. 2009 Dec; 62(6): 1404–1413.
doi: 10.1002/mrm.22141

Figure 7 . Eight hyperbolic secants used for Hadamard slice selection
To generate each image, one of the eight frequency modulated HS inversion pulses described in Table 1 was transmitted at the beginning of each TR before a spoiled gradient echo sequence. The HS inversion pulse was applied in this case with a gradient in the readout axis of the GRE sequence for visualization of the HS pulse. Displayed here is a scanner screenshot capturing all eight HS pulse results with phase reconstruction. Pulses are ordered from left to right, top to bottom (#1 top left, #8 bottom center).

Quantum properties of water

Electrostatic charges (together with Van der Waals forces) in the associative water phase represent quantum de-localized state and can engage in macroscopic quantum interactions. Biomolecular system is another example of macroscopic quantum system: each cell interacts not only with each other but with similar in properties structures in the environment. It is due to the fact of nonlocal interconnection that health and diseases significantly depend on the electro physical condition of the environment. This reaction is sustained by exchange interactions of quantum oscillators, which yield to electron's charge transport in form of self-similar electron wave packets. For those processes to take place in living organisms, all the cellular structures have to be in the electro physical disequilibrium, i.e. contain excess negative charge

Quantum approach to the water offers a chance to arrive at answers to pressing challenges of modern natural science, from the lowest levels of water cooperative behavior connected with the formation of water metastable phase, to quantum phenomena of non-local electron transport and regulation of cellular microbiological processes, and to global manifestations of water self-organization.

Methodology employed by quantum water contributes to classical ideas of cell biophysics, especially in terms of the regulatory role of water in cellular metabolic processes and exchange electron interactions in an open system. While classical biophysics views cellular metabolism in terms of biochemical processes, quantum biophysics is based on new understanding and acknowledgement of the regulatory role of water in cellular metabolism. This approach opens a novel view on the current problems in regards to, not only cellular metabolism but the state of biosphere including human health subjected to a destructive technogenic impact [8].

Water as a coherent macroscopic system, so called “coherent water phase” initiated research studies on quantum properties of the associative water phase stabilized by nano scale hollowness and de-localized electrostatic charges The terms of quantum coherence and quantum entanglement are playing a central role not only in quantum physics and information but also in biological systems (Fig.8). There are a fundamental processes of macroscopic quantum nature. Like other aspects of quantum science, the phenomenon of entanglement reveals itself at very tiny, subatomic scales [9]. When two particles, become entangled, they remain connected even when separated by distances. Generally entanglement arises from the connection between particles and each particle will be in a state of superposition, or both "spin up" and "spin down" at the same time. A common misconception about entanglement is that the particles are communicating with each other faster than the speed of light, which would go against Einstein's special theory of relativity.

Following this the quantum properties of water are based on the phenomenon when non-equilibrium water with unstable anion-radical forms of active oxygen as electron carriers with structural and spin-oriented organization. These fundamental concepts form the methodological cornerstone for different water activation technology, founded on the principles of naturally occurring processes of electro-physically active water state formation [10,11].

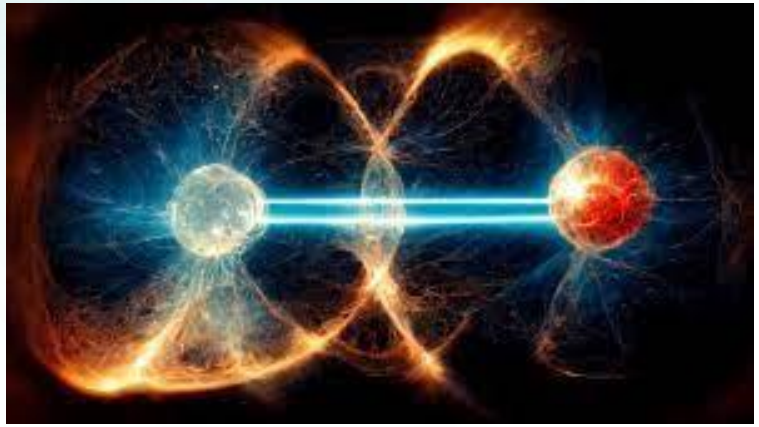


Fig.8. This illustration shows the connectedness of two entangled particles. In early 2023, the first demonstration of entanglement between non-identical particles, a positive and negative pion, not only exists, but can be measured, leveraged and utilized to probe the internal structure of atomic nuclei. (Credit: Augusto / Adobe Stock)

The measurements of water quantum states are based on dynamic processes in the water electron subsystem in a state of exchange interaction with the natural background of electrons' Bose-condensate, as well as changes in water thermodynamic, electrochemical and structural-physical characteristics.

To evaluate the state of physically altered water that has undergone activation by physical methods it is possible to use a complex of structural-energetic values which indicate drinking standards of water based on its bioenergetic activity. All values are divided into principal and additional (confirming presence of significant physico-chemical, thermodynamic and structural changes in water after processing). The principal values include:

- Redox potential (an electrochemical value indicating electron saturated water),
- Perhydroxyl ion-radical content indicating catalytic water activity and electron binding energy in ion-radical complexes,
- Dynamic viscosity (a value reflecting thermodynamic changes in water),
- Water structural organization parameters reflecting the associative water phase content in the volumetric water and the phase distribution density according to energy levels (measures).

To prove structural-energetic water changes, besides the principle indicators, it is also necessary to use a host of additional values characterizing identical water changes (Fig.9).

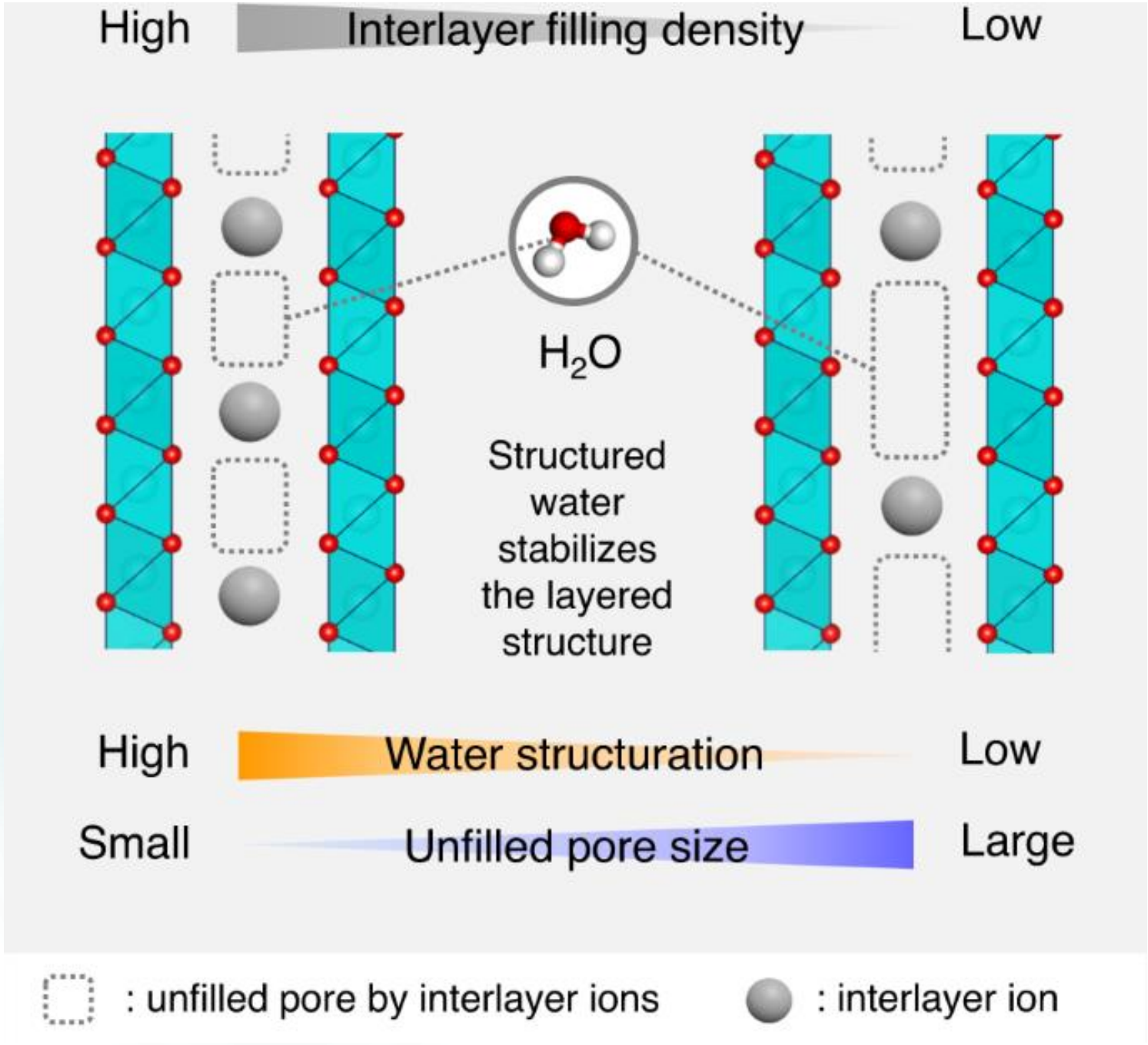


Fig. 9: Scheme of the interlayer structure in layered metal oxide/hydroxides with different interlayer filling densities of ions [12].

Thus, hydrogen ion concentration and electro conductivity change their values under electron water saturation. Structural changes in processed water can be measures by changes in its absolute viscosity. This indicator, reflecting thermodynamic changes in water correlates with the associative water phase indicators and can be used when assessing structural changes in the physically processed water.

Additionally, to assess electro physical changes in water, various methods can be used: gas discharge visualization assessing specifics of water transition into donor or electron acceptor states by observing light emission dynamics; the nuclear magnetic resonance method - magnetic resonance characterizing changes in water structural state based on the electronic screening degree; spectroscopy methods (fluorescence, Mie scattering, combinational scattering) allowing to assess structural-energetic water changes and parameterization of water associates (Fig. 10).

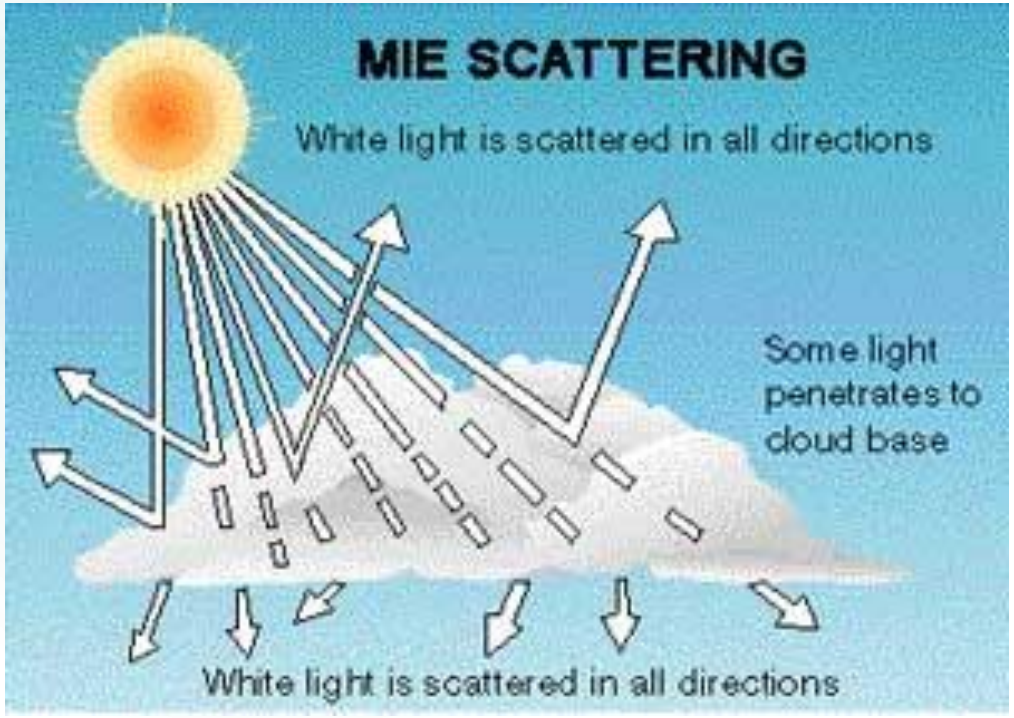


Fig. 10. Non-wavelength selective process, called Mie scattering, produces white-colored light, making clouds appear white, for example. So, if you look into the sky and see a deep blue color, you know it is relatively free of dust, pollen, and other particles that cause Mie scattering.

Taking advantage of existing capabilities in current water physical treatment technologies to assess water bio-energetic activity, a 4-level differentiation is suggested to measure water activity levels. There, water activity level is determined according to one or several principal value indicators confirmed by indicators of the additional value parameters. This approach allows registering dynamic changes in the activated state of water, characterized by kinetic parameters of temporary water transformation under the influence of environmental triggers.

The necessity in using this method to evaluate levels of activity in water arises from a few predicaments: present differences in water structuring kinetics, which lasts for a prolonged period of time, manipulation of structuring parameters by intense mechanical agitations, sudden fluctuations in temperature and, relaxational processes of chemical and electrochemical activity undergoing critical concentration states characterized by phase instability in water (Fig. 11).

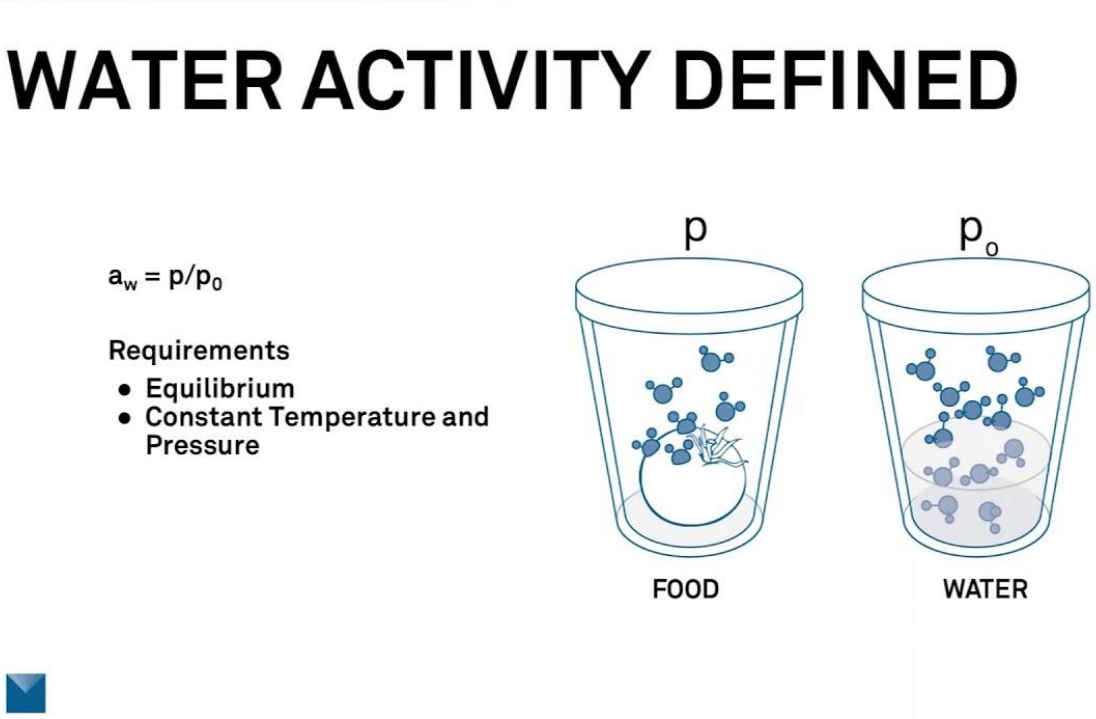


Fig.11. Water Activity: Mastering the Basics of Water Activity.

The results of the experiment (Pawan K J KurapothulaSam ShepherdSam ShepherdDavid Mark WilkinsDavid Mark Wilkins. Competing Nuclear Quantum Effects and Hydrogen-Bond Jumps in Hydrated Kaolinite. February 2023The Journal of Physical Chemistry Letter, 14(6):1542-1547, DOI: 10.1021/acs.jpclett.2c03896. Fig.12) have shown that water bordering a surface has greater conductivity and less heat capacity in comparison with ordinary water; this points to less freedom potential of water molecules in the given layer in comparison with the volumetric water. Furthermore, when approaching the surface in the bordering layer, a non-linear change appears in the electrical potential; this fact proves the monopolar character of hydrate structures. This works support the relations of oscillatory processes in water with its macroscopic quantum properties and charge disequilibrium. Research studies on changes in the electrons' Bose-condensate natural background confirm presence of electron deficiency in the environment.

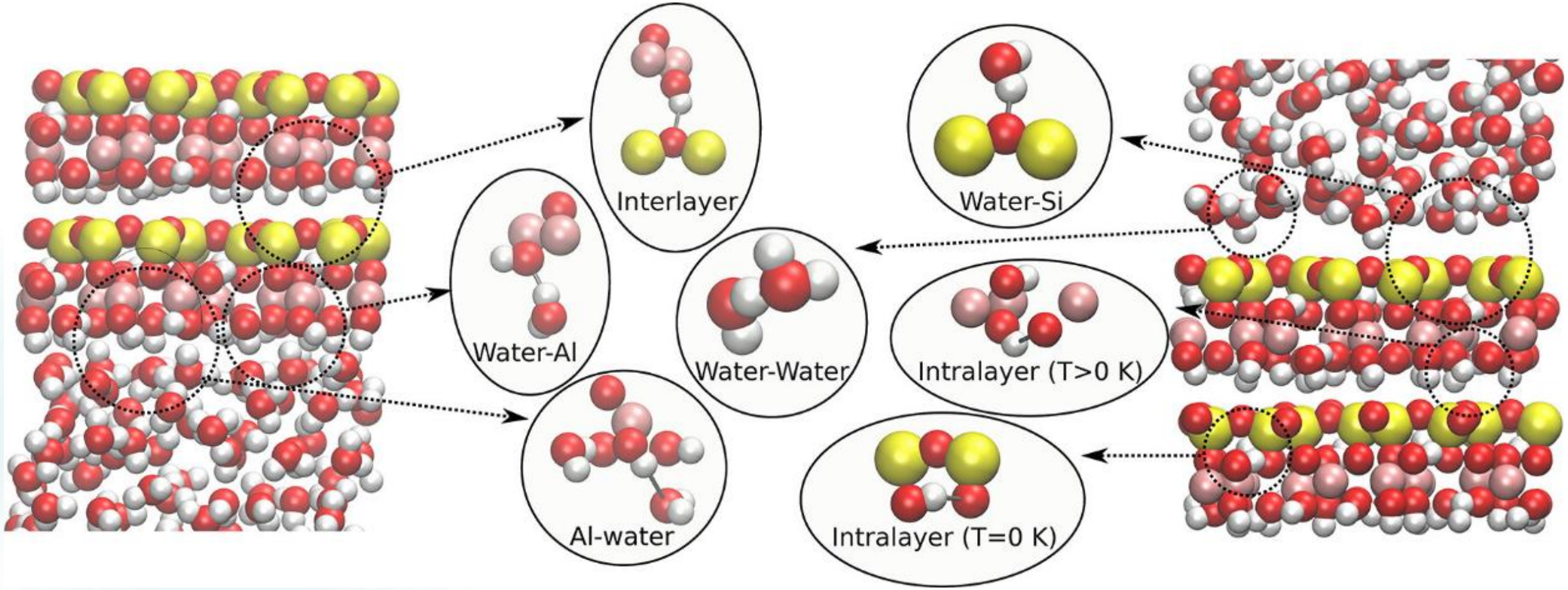


Fig. 12. Types of hydrogen bonds. The left-hand figure shows the water–alumina surface and the right-hand figure the water–silica surface.

The 2D Raman–terahertz (THz) response of liquid water in dependence of temperature and isotope substitution shows the inhomogeneity of the low-frequency intermolecular modes and hence, on the heterogeneity of the hydrogen bond networks of water induced by nuclear quantum effects Fig.13). X-ray and neutron scattering confirmed that the oxygen–oxygen and oxygen–hydrogen radial distribution functions are more structured in DOD than those of HOH. However, more elaborate models of competing quantum effect recently shown that the anharmonicity of the OH stretch potential renders the quantum-mechanical expectation value of the bond length longer in HOH, thereby increasing the Coulombic interactions of the proton to a hydrogen-bonded water. This effect causes the lattice constant of HOH ice to be smaller than that of DOD ice, and the question of whether hydrogen bonding is stronger or weaker in HOH does depend on the structure of the hydrogen bond networks [13,14].

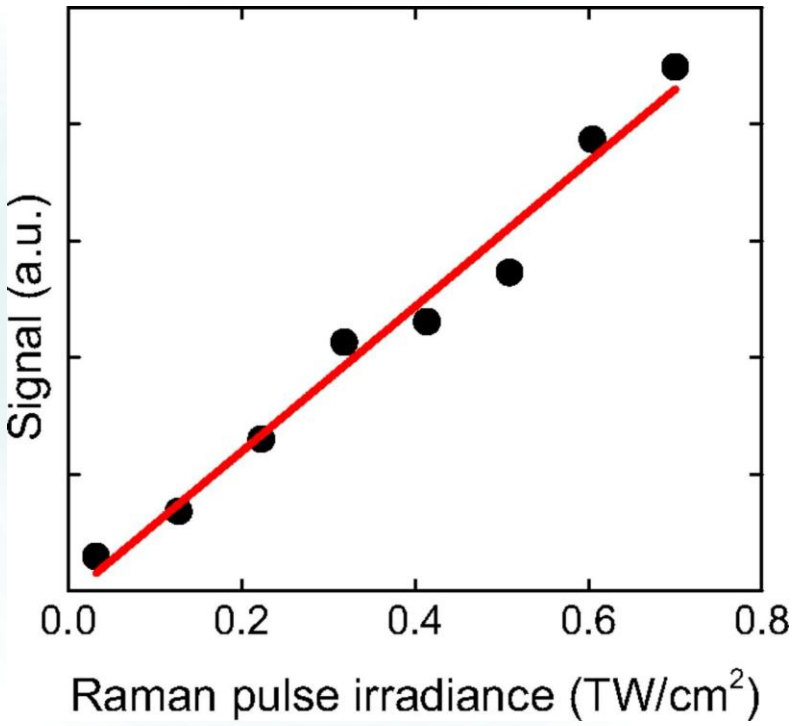


Fig.13 a: Raman-pulse irradiance dependency of the peak of the 2D Raman-THz signal.

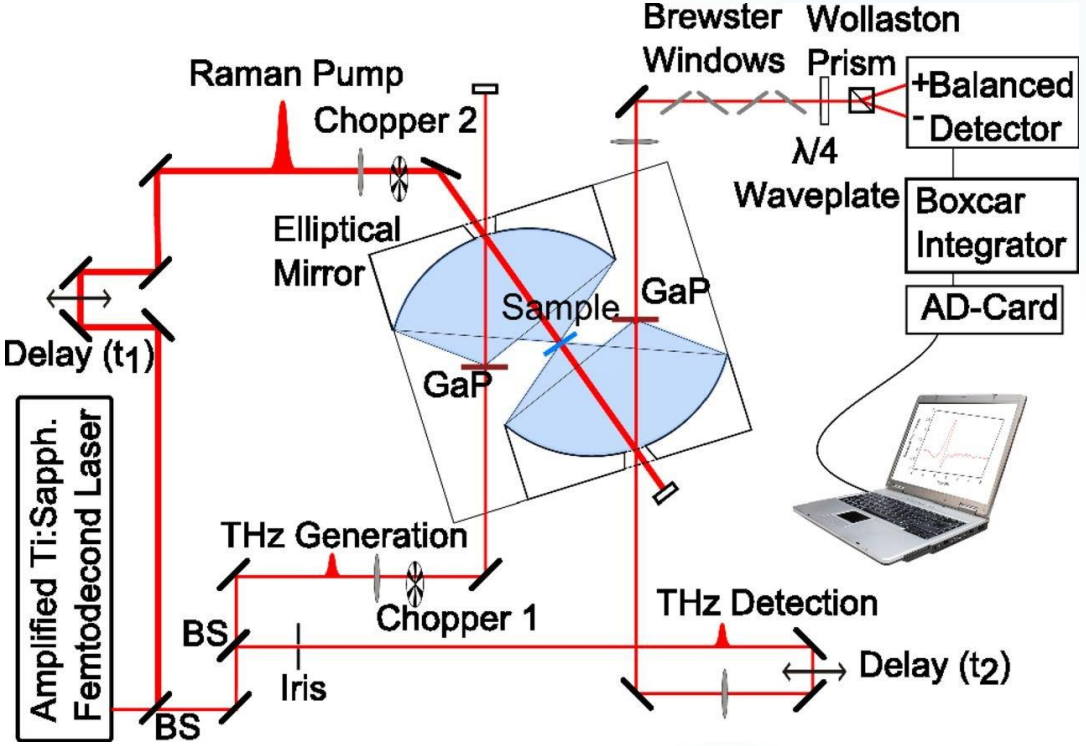


Fig.13 b: 2D Raman-THz experimental setup.

Due to the low mass of the proton and the central role of hydrogen bonding Nuclear Quantum Effects (NQEs), such as Zero-Point Energy (ZPE) and tunneling, can play an important role in determining water's static and dynamical properties. Understanding these effects and developing methods to efficiently simulate them are thus vital to obtain an accurate description of water's properties from simulations, and to elucidate experimentally observed static and kinetic isotope effects (15).
In reality, the competing quantum effects picture has provided significant insights into the interplay between different NQEs in the hydrogen bond. This concept is based around the observation that NQEs lead to an extension of the Oxygen (O) – Hydrogen (H) covalent bond allowing the protons to be more shared (delocalized) between hydrogen bonded pairs of water molecules. This effect acts to strengthen the hydrogen bond [16]. However, quantum fluctuations also allow the protons to spread in the other directions. Which of these effects dominates is strongly determined by the distance between the oxygen atoms of the hydrogen bonded water molecules with short hydrogen bonds being made stronger upon the inclusion of NQEs while long ones are made weaker.
The concept of "competing quantum effects", has been shown during the last decade to be a highly useful organizing principle to provide a much clearer understanding of the large variation in the magnitude of isotope effects observed in water. This theoretical picture has been coupled with new algorithms, which have greatly reduced the cost of performing simulations that include NQEs – in some cases yielding schemes with costs comparable to those of the corresponding classical simulation.

In addition, experimental techniques such as deep inelastic neutron scattering (DINS) are now able to probe the proton and oxygen momentum distributions and quantum kinetic energies, providing intriguing new observations of these quantum properties of the nuclei at thermodynamic conditions ranging from supercooled to supercritical water, and environments ranging from the bulk to hydrophobic confinement (Fig14). Given the vast range of environments and aqueous systems in which NQEs can occur It is necessary to summarize experimental isotope effects observed in the static and dynamic properties of water with an emphasis on large and seemingly anomalous effects to obtain static and dynamical properties of water.

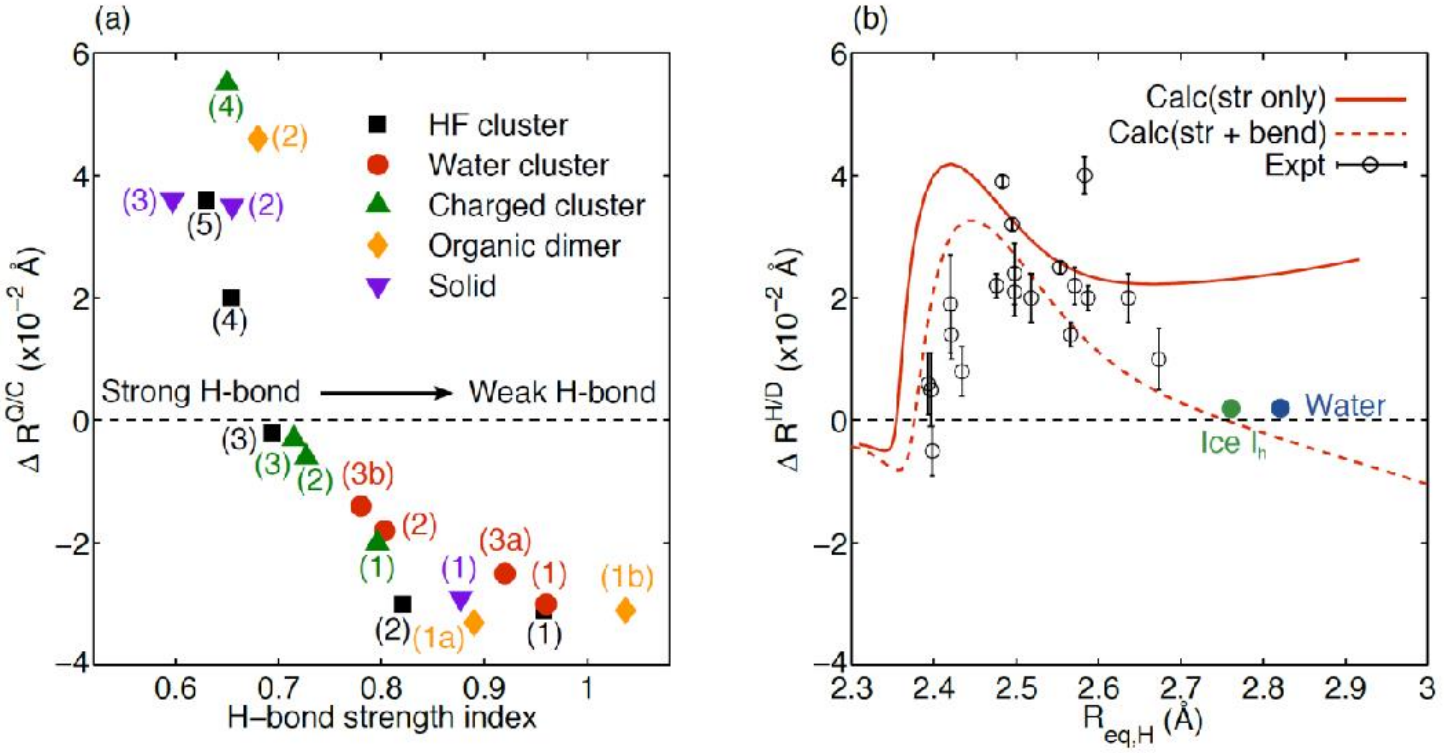


Figure 14. Secondary geometric NQEs in H-bonds. (a) Differences between the heavy-atomdistances (R) in a H-bond from MD (with classical nuclei) and PIMD simulations (with quantumnuclei) (RC-RQ) vs. H-bond strength (defined as the ratio of the X-H stretching frequency in theH-bonded cluster to that in the free monomer).

Michele Ceriotti, Wei FangWei, Peter G Kusalik, Thomas E Markland
Nuclear Quantum Effects in Water and Aqueous Systems: Experiment, Theory, and Current Challenges. https://www.researchgate.net/publication/299942938. April 2016, Chemical Reviews 116(13), DOI: 10.1021/acs.chemrev.5b00674.

Discussion

While many experiments suggest that NQEs act to weaken the hydrogen bond, leading to a less structured liquid and a more mobile hydrogen bonded network in HOH than in the less quantum mechanical DOD, this is not always the case, and can depend both on the conditions and the property of interest. Energy Scales of Quantum Effects in Water Isotope effects in water range from those observed at ambient conditions, which can often be attributed to the ZPE in the O-H stretch or other degrees of freedom, to those at high pressures 7 or low temperatures where tunneling and proton delocalization become particularly important [17,18]. The ZPE of the O-H stretch is equivalent to a ~2000 K rise in temperature along that coordinate and is modulated by the local hydrogen bonded structure of water, for example in different phases, at interfaces or in the presence of solutes. At high pressures and/or low temperatures, the uncertainty in the proton's position becomes comparable to the distance between the minima in the potential energy surface. This can lead to proton tunneling and extensive delocalization that are strongly coupled to changes in the distances between oxygen atoms. NQEs manifest as isotope effects upon substitution of H for D or T, or 16O for 18O. While it is common to view deuterated water as a "classical" analogue of water, it is important to note that although D2O and T2O have smaller NQEs, they are not classical species. These estimates give an idea of the energetic scale of NQEs at room temperature, as compared to the classical contribution to the (intramolecular) kinetic energy of 3.7 kJ/mol at 300 K. In addition, while 16O/18O substitution generally gives rise to small isotope effects, they are widely used in atmospheric isotope fractionation studies that form crucial inputs to climate modeling. The covalent bond energies exhibit a quantum effect, with the O-D bond being about 1.6% stronger than the O-H bond. For example, the critical temperatures of D2O and T2O are lower than those for H2O, suggesting that at these higher temperatures NQEs act to strengthen hydrogen bonds – in contrast to the observed behavior at lower temperatures.

Comparison of the liquid/vapor surface tension also indicates a seemingly anomalously smaller value for D2O relative to H2O. With H/D substitution the volume of liquid water and of ice Ih increases by 0.1%. This increase is anomalous as many liquids and solids exhibit a volume decrease upon substitution with a heavy isotope. Furthermore, the magnitude of the change for water is anomalously small for a hydrogen bonded compound.

Water-hydroxyl complexes were produced on Cu(110) and characterized by a scanning tunneling microscope (STM) and first-principles calculations [19]. A water molecule was brought to a fixed hydroxyl (OH) group in a controlled manner with the STM (Fig, 15). A side-on complex, in which a water molecule is bonded to an OH group along the atomic row, is metastable with relatively weak hydrogen bond (0.13 eV). On the other hand, a bridge complex, in which a water molecule is bonded to an OH group across the atomic trough, is most stable and characterized by the strong hydrogen bond (0.44 eV) and the short distance between oxygen atoms (2.5 angstrom). The distance is in the range of the "low-barrier hydrogen bond," and a symmetric hydrogen bond (HO-H-OH) is formed in the bridge complex, wherein zero-point nuclear motion plays a crucial role.

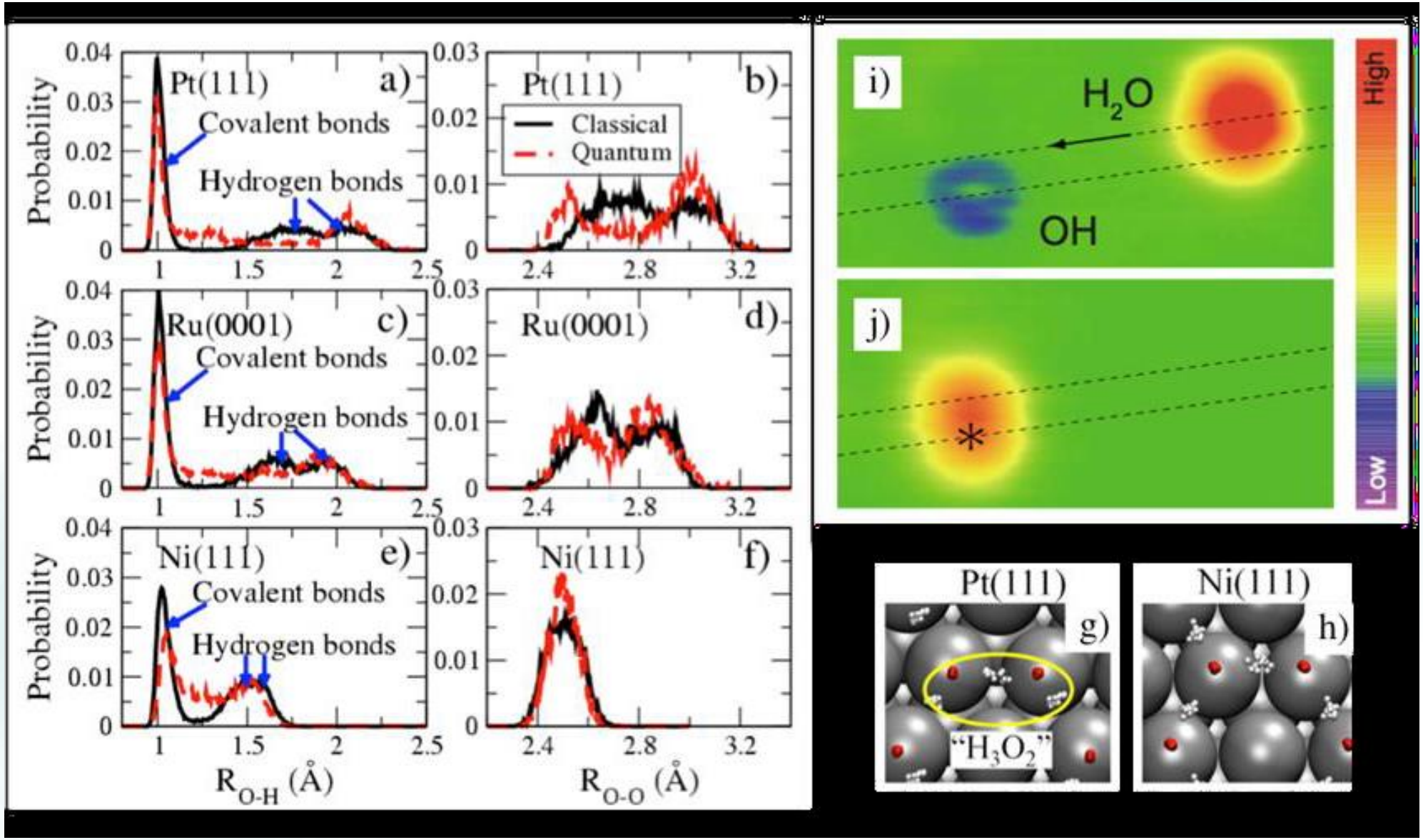


Fig. 15. Evidence for strong quantum effects for water adsorbed on metal surfaces. Left: Simulation results for selected structural properties of extended water-hydroxyl overlayers on metal surfaces [16]. The symmetric nature of the dimer in j implies that the hydrogen between the two oxygens in this structure is shared symmetrically.

Instead of conclusions

In 1935, Erwin Schrödinger gifted us the term “entanglement” to describe the behaviour of two bound-together individual particles, later behaving as a single entity. His thought exercise was like a criminal story involving a cat, a box and some poison. Thirty years later, John Bell proved what Schrödinger’s cat suggested: the existence of an instantaneous connectedness—what Einstein called “spooky action at a distance.” Today it is obvious that biological processes from bird migration to photosynthesis use quantum processes.

It is also well visible that Water displays a high degree of coherence as do most living systems. This has led researchers to connect entanglement with feelings of connectedness and clear awareness about something similar to synchronicity and collective thinking.

Recently discovered that the universe is made of energy waves and every moment of our human reality is a wave function. This might be mean that our world is a product of our consciousness. Realities aren’t fixed but ever-changing creations we bring forth, both individually and collectively through our actions. It’s more like a storytelling universe that we iteratively express rather than a stable physical entity in which we grope our way through. So, the universe looks like the complicate system which includes both thoughts and real actions and things.

The new achievements revealing behavior of conscious Universe and a living Earth where we are co-creators, brings us to understanding our destiny.

Fig. 7. Coherent waves of water and synchronized coherent thinking.

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THANK YOU VERY MUCH