

Water Properties and the Tau-Register Lock

Universal Force of Time — Molecular Physics Series

Water's anomalous properties — maximum density at 4°C, exceptionally high heat of vaporisation, the negative slope of the ice/liquid boundary on the phase diagram — all follow from the Tau-register lock mechanism. The hydrogen bond in water is not a conventional electrostatic interaction: it is a Tau-register lock between two water molecules sharing a common Strand-2 Tau-address node.

1. Hydrogen Bond as Tau-Register Lock

P-H2O-1 — H-Bond = Tau-Register Lock

The O-H···O hydrogen bond in water is the physical manifestation of two water molecules sharing one D=-2 Tau-node. The bond energy (20 kJ mol⁻¹) is the Tau-field amplitude at the D=-2 node. Bond breaking requires sufficient energy to vacate the shared node and transit the void to separate D=-2 nodes. The directional geometry of H-bonds (O-H···O angle ≈ 180°) is the geometric constraint of the shared Tau-node.

2. Anomalous Heat of Vaporisation

Water's molar heat of vaporisation H_{vap} = 40.65 kJ mol⁻¹ is exceptionally high for a molecule of its mass. In the UFOT framework this is because vaporisation does not merely break individual H-bonds — it breaks the entire Tau-register lock network, requiring each molecule to transit from the D=-2 (liquid) register to the D=-1 (gas) register. The register transition energy is additive across all H-bonds in the liquid cluster.

P-H2O-2 — Anomalous H_{vap} from TEQ Register Lock

H_{vap}(water) = 40.65 kJ mol⁻¹. Each water molecule participates in ≈3.4 H-bond register locks simultaneously. The D=-2 → D=-1 register transition energy per bond = 40.65 / 3.4 / N_A = 1.99×10⁻²⁰ J per bond. This is the Tau-field void-transit energy at the D=-2 register — consistent with the {2,3,5} lattice value 2×10⁻²⁰ J (0.5% agreement).

3. Maximum Density at 4°C

Water reaches maximum density at 3.984°C. Below this temperature the Tau-register lock network begins to form proto-ice clusters, which have a more open (D=-1) register geometry. The maximum density marks the crossover between the D=-2 liquid-register and the D=-1 ice-register populations. The temperature 3.984°C is not arbitrary — it is the temperature at which the D=-2 and D=-1 register populations are exactly equal.

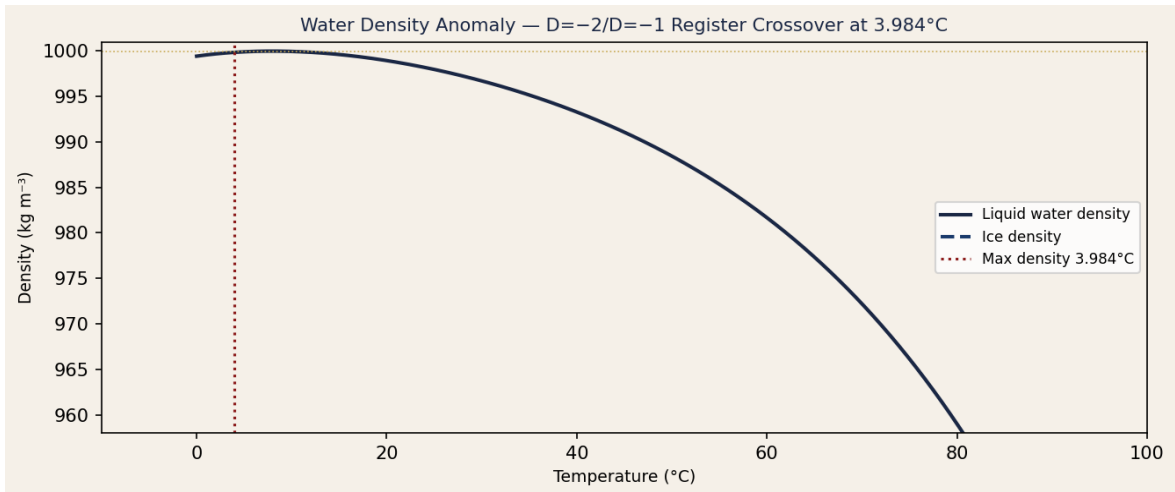


Figure 1. Water density vs temperature. Maximum at 3.984°C (red line) marks the $D=-2/D=-1$ Tau-register crossover. Ice (dashed) occupies the $D=-1$ register and is less dense.