

Seminar

24th of October 2024
12:00 h

Zoom Virtual Meeting:

<https://tuhh.zoom.us/j/82631283465>

Meeting-ID: 826 3128 3465

Password: 978444



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Supercooled water probed with laser- and X-ray spectroscopy

Water displays a wide range of anomalous behaviors, many of which become especially prominent in the supercooled state, where its properties deviate significantly from other liquids. These anomalies have sparked considerable scientific interest, leading to extensive investigations into the structural and dynamic origins of water's unique characteristics. Through these efforts, the underlying theory is currently the hypothesis suggesting that water may adopt locally two distinct structural motifs at low temperatures[1]–[3].

In this presentation, I will discuss experimental results from temperature-dependent studies that explore various physical and chemical properties of liquid water. The focus will be on experiments utilizing evaporatively cooled liquid jets in vacuum, examined through techniques such as Raman spectroscopy [4] and soft X-ray emission spectroscopy. These methods allow for precise investigation of both the inter- and intramolecular vibrational modes, offering insights into the molecular dynamics of water as it cools. Additionally, the electronic structure and optical properties, specifically the refractive index [5], will be discussed. These experimental approaches provide a deeper understanding of the temperature-dependent behavior of water, shedding light on the complex interactions that govern its anomalous nature. Through these studies, we aim to further elucidate the mechanisms behind water's unique behavior, particularly in the supercooled regime, contributing to the broader understanding of its structural transformations and physical properties.

- [1] P. H. Poole, F. Sciortino, U. Essmann, and H. E. Stanley, *Nature*, 360, 6402, 324, (1992)
- [2] P. Gallo et al., *Chem. Rev.*, 116, 13, 7463, (2016)
- [3] A. Nilsson, *J. Non-Crystalline Solids X*, 14, January, 100095, (2022)
- [4] C. Goy et al., *Phys. Rev. Lett.*, 120, 1, 2, (2018)
- [5] C. Goy et al., *J. Phys. Chem. Lett.*, 13, 51, 11872, (2022)

