SEMINARIO
DEPARTAMENTO DE QUÍMICA FÍSICA

Jueves 26 de Octubre de 2023 – 11:30 h
Salón de Actos de la Biblioteca

Anders Nilsson
Department of Physics, Stockholm University
andersn@fysik.su.se

Experimental Evidence of a Liquid-Liquid Critical Point in Bulk Supercooled Water

The finding that the thermodynamic response and correlation functions appear to diverge in supercooled water towards a singular temperature estimated by power-law fits of about 228 K has led to several hypotheses about the origin of waters anomalous properties. One hypothesis to explain the apparent divergence is that there exists a liquid-liquid transition with a liquid-liquid critical point at rather high positive pressures. In this scenario the Widom line, defined as the locus of correlation length maxima in the P-T plane, emanates from the critical point as a continuation of the liquid-liquid transition line into the one-phase region and the divergence in the response functions is towards this line.

The challenge is that the temperature T lies below the homogeneous ice nucleation temperature 232 K, a region of the phase diagram that has been denoted as *no man's land*, since ice crystallization occurs on much faster time scale compared to the experimentally accessible time scale in a typical laboratory setting.

Here I will present how x-rays from x-ray lasers and synchrotron radiation sources have been used to probe the liquid phase of water from hot to the deep supercooled water regime inside *no man's land*. In particular, I will discuss if a liquid-liquid transition, Widom line and a critical point exists in deep supercooled water based on experimental data.