



22nd January 2026, 10:00–11:30h
CFEL – Building 99, seminar room I and II (ground floor)

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Investigating Metal-Insulator Transitions in the liquid phase

Metal-insulator transitions (MITs) are among the most fascinating phenomena in materials science. They are associated with strong correlations and large fluctuations, as well as other features that are relevant to applications in electronics, spintronics and optics. For instance, dissolving alkali metals in liquid ammonia produces solvated electrons. These are localised in dilute solutions, but exhibit metallic behaviour at higher concentrations, forming a disordered liquid metal. Although some of these systems and transitions have been observed and investigated for decades, it was only recent developments in liquid-jet photo-electron spectroscopy (PES) that enabled direct probing of the changes to the electronic structure that occur during MIT.

In this talk, I will discuss how our joint experimental and theoretical research is combining the powerful methods of solid-state physics, which offer atomistic descriptions of insulators, semiconductors and metals, with the concepts of electrochemistry, which describe the conductivity of solutions at a molecular level. Finally, I will present our latest findings on the transformation of water into a liquid metallic solution.