INSTITUT ZA FIZIKU
SEMINAR

Seminar @Institute of Physics (joint IoPZg & CBS seminar), Tuesday 23rd September 2025 at 11:00
@IoPZg 1st wing lecture hall and Zoom

Understanding Structure, Function and Dynamics in Macromolecules: A Magnetic Resonance Spectroscopist's View

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Henry Wellcome Unit for EPR Spectroscopy, University of East Anglia, Norwich, U.K.

Research in the Henry Wellcome Unit at UEA focuses on the architecture and functional dynamics of macromolecules using magnetic and especially paramagnetic resonance techniques. The main experimental approach focuses on the development and application of advanced Electron Paramagnetic Resonance (EPR) techniques in both the time and frequency domain in combination with NMR and other biophysical methods also including theoretical QM/MM approaches. Our expertise lies in the development and application of novel EPR instruments and experimental techniques to address key questions surrounding the Structure, Function and Dynamics in macromolecules especially nanomachines.

There is increasing evidence that such macromolecules do not act alone, but that they are organised as nano-machineries which function through the concerted action of individual components with high precision and specificity observed in both time and space. We seek to unravel the principles underlying the architecture and dynamics of these nano-machineries as well as their function.

In this presentation I will give a systematic introduction to the wide range of EPR methods, focussing both on instrument and method developments, which have allowed a shift in focus of this technique away from being considered purely a niche technique towards a more universal biophysical tool.

I will use examples from previous, current and planned future work to demonstrate the power of this suite of techniques to deliver key insight into e.g. how to localise and characterise paramagnetic centres in macromoleclues, on surfaces, and in catalytic processes at the molecular level.

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Selected References

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