19 de Diciembre de 2023

11.00 h, Aula 4
Facultad de Ciencias A- Física

Soft and hard matter high-resolution neutron spectroscopy at the Australian Centre for Neutron Scattering.

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The Australian Centre for Neutron Scattering operates a suite of 15 neutron instruments distributed across the thermal- and cold-sources of the OPAL reactor, ANSTO. Two of the cold instruments are optimized for quasielastic neutron scattering (QENS) measurements.

This presentation will highlight the scientific capabilities of the Emu backscattering spectrometer enabling access to microscopic, molecular dynamics up to about 5 ns time scale. Investigations of diffusive processes in organic make up the bulk of applications with that technique, while nuclear hyperfine splitting and quantum rotational tunneling studies are also possible.

A few examples from biophysics and polymer science will be presented [1,2]. There is also growing interest in understanding transport-related diffusion in inorganic materials related to energy applications, such as ionic conductors [3]. In addition to fully-fledged QENS studies, elastic- and inelastic- fixed window scans add versatility to backscattering spectroscopy, as further illustrated by a handful of recent high impact studies [4]. Finally, complementarity with other techniques, available ancillary equipment, and beam-time access will be discussed.

[1] S Kim et al, "QENS study on local segmental dynamics of polyelectrolytes in complex coacervates", Polymer 264 2023 125525. [2] K Shou et al, "Effect of red blood cell shape changes on haemoglobin interactions and dynamics: a neutron scattering study", Royal Soc Open Science 7 2020 201507. [3] EA Cheung et al, "Structure and dynamics in Mg2+-stabilized γ-Na3PO4", J Am Chem Soc 143 2021 17079. [4] W Zhao et al, "Proteome-wide 3D structure prediction provides insights into the ancestral metabolism of ancient archaea and bacteria", Nat Commun 13 2022 7861

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