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Small-Angle Neutron Scattering Instrument Concepts for Second Target Station of SNS

Small-Angle Neutron Scattering (SANS) is a powerful and popular technique widely used for structural characterization in many science and engineering fields. The Second Target Station (STS) of the Spallation Neutron Source (SNS) at Oak Ridge National Laboratory (ORNL) has been specifically designed to provide a broad bandwidth, high-brightness cold neutron source that is ideally suited for SANS instruments. Along with the advancements in neutron optics and computational algorithms, STS maximizes the potential of future SANS instruments at ORNL to provide the user community with unprecedented capabilities. For example, users will be able to perform experiments with ten times less sample, simultaneously measure phenomena at both atomic and mesoscopic scales, and investigate sub-second kinetic processes under in situ/operando conditions.
In this presentation, the current instruments under development are introduced as follows:
CENTAUR, the most developed, is a versatile workhorse in its preliminary design phase. It offers simultaneous wide-angle and diffraction coverage, catering to diverse fields from soft matter to quantum sciences. Still in concept, FocuSANS prioritizes high throughput for rapid, sub-second kinetic studies, ideal for dynamic processes or limited samples. Lab-On-SANS, another concept, focuses on real-world processing, allowing in situ microstructure measurements during processes like additive manufacturing. Finally, Auto-SANS, also conceptual, will integrate AI and robotics for autonomous sample synthesis, characterization, and analysis, even incorporating multi-modal techniques like X-ray scattering for comprehensive insights.

Topical Area

Emerging research and multimodal techniques

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