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In situ Dynamic Light Scattering at Small Angle Neutron Scattering and Spin-Echo Instruments

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Dynamic light scattering (DLS) is based on the temporal analysis of the intensity fluctuations of the scattered light caused by the Brownian motion of particles (protein molecules, aggregates, polymer particles etc.) in solution. It provides information on the translational diffusion coefficient, allowing the characterization of particles with average radii in a broad range from a few nanometers up to several microns. If several particles are present in the solution, they can be distinguished if they are at least one order of magnitude different in size. Monitoring the sample composition on the minute-time scale *in situ* during the neutron scattering experiment is crucial in case of biological samples, which are sensitive to slight changes of temperature, pH of the solvent, radiation damage etc. In case aggregates are found by DLS, the user can decide whether to prepare a fresh sample or disregard the data at some point, thus improving the neutron beam time usage.

Polymer and protein systems were investigated using small-angle neutron scattering and neutron spin echo spectroscopy with the in-situ DLS option. Technical aspects behind the adjustments of the standard sample holders at KWS-2 and the development of the two new sample holders for J-NSE Phoenix are presented, complemented by preliminary results. As this project is about to enter the standard user routine, the authors are grateful for any comments.

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