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In situ light scattering techniques at neutron instruments at the MLZ - experiences made and challenges ahead

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What is well established at many synchrotron beam lines is still in the development phase at neutron instruments: in situ light scattering techniques for on-beam sample control. Biological samples often show a sufficiently broad spectral range where light absorption does not play a dominant role. This enables in situ sample control using dynamic and static light scattering techniques. Many biological samples undergo a slow aggregation process during the comparatively long neutron data collection times. If the aggregates are staying few in number and/or if their form factor has decayed enough in the relevant q -range, the neutron measurement can be continued. If not, a fresh sample can be used.

Candidates for neutron instruments to be equipped with an in situ light scattering set-up are small angle scattering, spin echo, time-of-flight and backscattering instruments operating sample environments near or at room temperature. We routinely provide in situ dynamic light scattering with one fixed scattering angle at the instrument KWS-2 at MLZ to interested users. For the Jülich spin echo spectrometer J-NSE we have developed a temperature-controlled sample environment which includes two laser colours and three light scattering angles. This not only enables dynamic light scattering but also static light scattering at six different q -values is feasible.

This contribution discusses the experiences made with these in situ set-ups and looks into future developments and improvements.

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