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Spherical harmonics expansion: excellent tool for analysis of anisotropic small-angle scattering data

With small-angle scattering, we may study the structure of (soft) matter, e.g. polymer melts, on length scales of ~1-100 nm. If there is alignment in the system on these length scales, the small-angle scattering pattern will be anisotropic.

The anisotropy of the scattering patterns can be quantified by expansion in spherical harmonics which separates contributions based on their symmetries.

We demonstrate the power of the spherical harmonics expansion framework [1], by analyzing small-angle neutron scattering data for the relaxation of a polymer melt following fast uniaxial extension, previously published in [2]. We see that the chains initially retract which was proposed in 1978 [3] and has been debated since [1, 4-7].

References

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