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Neutron scattering experiments under illumination and with time-resolution

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The structure-dynamics-function relationship in proteins is still a field of great scientific interest. Photoactive proteins form a specific class, whose function can be activated by illumination. Depending on application, samples can be activated by permanent illumination or by light pulses in time-resolved experiments. Subsequently, modulated structure and dynamics can be observed e.g. by small angle and quasielastic neutron scattering (SANS and QENS, respectively). Illumination of samples, with and without time resolution, requires a dedicated setup with light source, focusing optics, optical fiber, and active cooling of the sample in order to prevent efficient back-transfer to the ground state. Time-resolved experiments impose further needs, e.g. temporal synchronization of actinic light pulse and neutron probe as well as selective data storage. We will discuss the examples of Orange Carotenoid Protein and Bacteriorhodopsin.

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