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Protein dynamics of a thermophile photosystem

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Photosynthesis is the key mechanism in utilization of solar radiation for living organisms and thus provides the base for most food chains and all fossil fuels. The functionality of photosynthetic proteins is -in part- critically influenced by dynamics on a timescale of pico- to milliseconds and on sub-nanometer length scale. The neutron time of flight spectrometer TOFTOF at MLZ-Garching is well suited to study such dynamics, and we currently develop a laser pump setup for TOFTOF allowing us to trigger photoreactions and subsequently probe the dynamics of specific functional states with neutrons. In a first step towards time-resolved measurements, static quasielastic neutron scattering (QENS) experiments were performed on photosystemII (PSII) complexes of the thermophile bacterium thermococcus elongatus, whose protein dynamics is expected to play a pivotal role in thermal adaptation. Using QENS, we have directly investigated PS II protein dynamics on the picosecond timescale in a range from 200 K to 340 K. The results suggest a shift of the onset of protein dynamics towards higher temperatures in thermophile PSII.

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