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Structural Dynamics Studies with Femtosecond Temporal Resolution: Scientific Instrument FXE at European XFEL

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Time-resolved x-ray tools allow measuring electronic and geometric structure changes. X-Ray emission spectroscopy is sensitive to electronic changes, such as oxidation and spin states, while x-ray absorption fine structure tools deliver information about the local geometric structure around the selected absorbing atom. Combining these tools with forward scattering in one single setup allows to extract simultaneous information about the local to rather global structural changes occurring in the reacting system.

We will present case examples, for which pico- and femtosecond x-ray experiments deliver new insight into evolving dynamic processes, including reactive high-valent iron compounds and a class of spin transition systems.

Finally, all these tools can be combined into one single experimental setup, and the Femtosecond X-Ray Experiments (FXE) Instrument at European XFEL will allow just this, while its early operation phase just started in late Summer 2017. We will present the commissioning status of this new instrument at European XFEL [1] together with early results.

[1] Photon Beam Transport and Scientific Instruments at the European XFEL

T. Tschentscher, C. Bressler, J. Grünert, A. Madsen, A. P. Mancuso, M. Meyer, A. Scherz, H. Sinn, U. Zastra, Appl. Sci. 7, 592 (2017)

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