

Time-Resolved Soft X-ray absorption Spectroscopy in Transmission Mode on Liquids at MHz Repetition Rates at BESSY II

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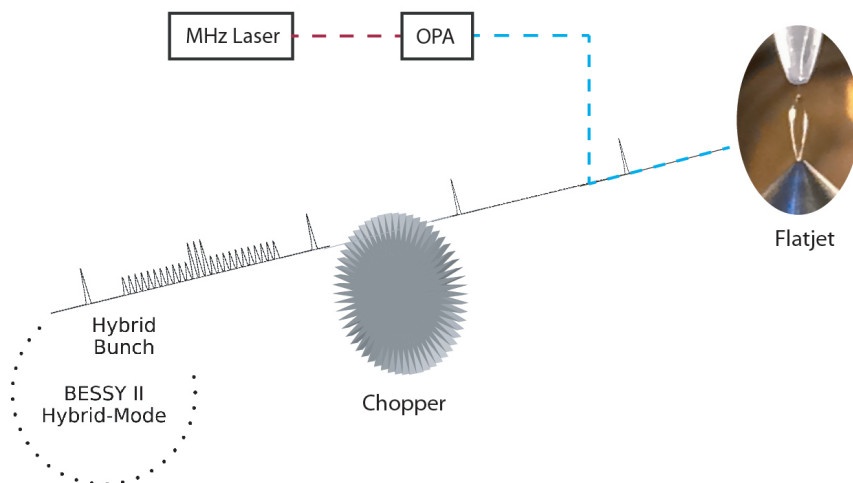
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We present a unique endstation combining a liquid flatjet sample delivery and a MHz laser system for time resolved soft X-ray absorption measurements of liquid samples in transmission mode [1]. With the flatjet system we demonstrate the efficient detection of transient absorption changes in transmission mode enables identification of photoexcited species in dilute systems (< 30 mM). With Iron(II)-trisbipyridine (aq) as a benchmark system, we present present absorption measurements at several edges in the soft X-ray regime as well as transient signatures at the N K-edge and the Fe L-edge. Also high concentrated sample, the O K-edge of liquid water, is possible taking advantage of the high thickness gradient in the liquid sheet ranging from ~ 0.8 to $4.0 \mu\text{m}$. All measurements were performed at the open port high brilliance undulator beamline UE52-SGM at BESSY II yielding unprecedented statistics, in this spectral range. The beamline is at the moment in the phase of planning/installing a 1.25 MHz pulse picking chopper system and will be transformed to a single bunch on demand beamline available for users (Figure). Together with the MHz laser we see great potential for time resolved studies in the picosecond range to be performed at this beamline as well as coincidence user experiments.



Schematic view of pulse picking with chopper, MHz laser and flatjet under experimental conditions.

References

[1] M. Fondell et al., *Structural dynamics*, 4, 054902 (2017)