

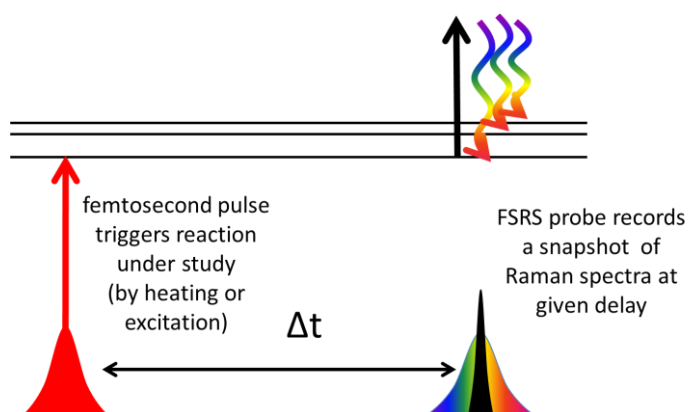
Femtosecond Stimulated Raman Scattering and transient optical absorption spectroscopy

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Brief description of the available set ups

Femtosecond Stimulated Raman scattering (FSRS)

Femtosecond stimulated Raman spectroscopy is an experiment that allows monitoring Raman vibration spectra of molecules with sub-ps time resolution. When used with reactions that can be triggered, ideally photo-triggered, it is powerful tool to follow reaction dynamics and structural changes with high time resolution and high acquisition speed.



Stimulated Raman probe:

Time resolution	~100fs
Spectral resolution	~1 cm ⁻¹
Observed spectral window	30 - 4000 cm ⁻¹
Raman pulse wavelength	760-840 nm

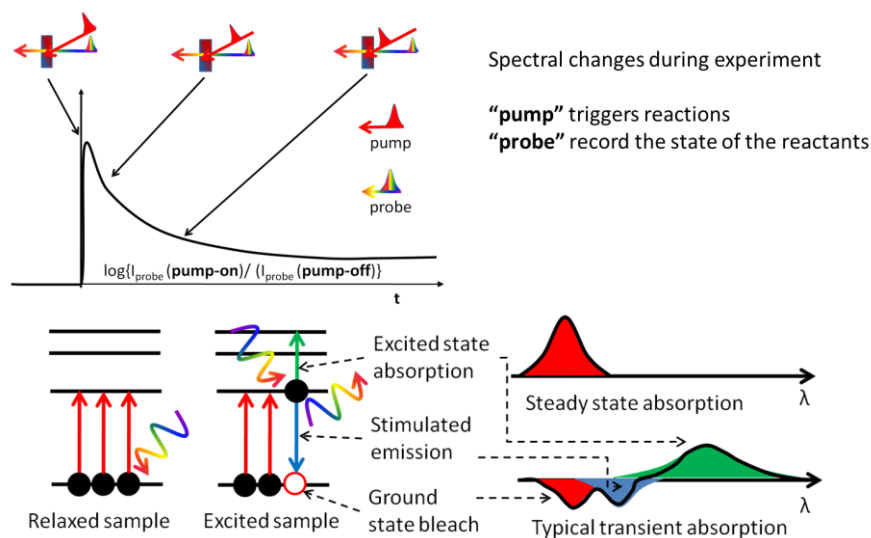
Triggering pulse pump:

Time resolutions	~ 30fs
Spectrum	~ 50 nm
Available wavelengths	266 nm, 400 nm, 800 nm (being extended to 230-2600 nm)
Pump-probe delay	0 – 6 ns, 10 fs resolution (Coherent Astrella as drive laser)
Pump-probe delay	0 – 1 ms, 10 fs resolution (Femtopower/Solstice doublet as drive laser)

Optical transient absorption

Optical transient absorption is an experiment where changes in the sample absorbance are recorded with high time resolutions. It is very robust technique for characterization of excited and transient states of molecules, atoms and materials.

Pump – probe experiment



Probe pulse:

Time resolution	~20fs
Spectral resolution	~1 nm
Observed spectral window	266 – 2500 nm

Triggering pulse pump:

Time resolutions	~ 30fs
Spectrum	~ 50 nm
Available wavelengths	266 nm, 400 nm, 800 nm (being extended to 230-2600 nm)
Pump-probe delay	0 – 6 ns, 10 fs resolution

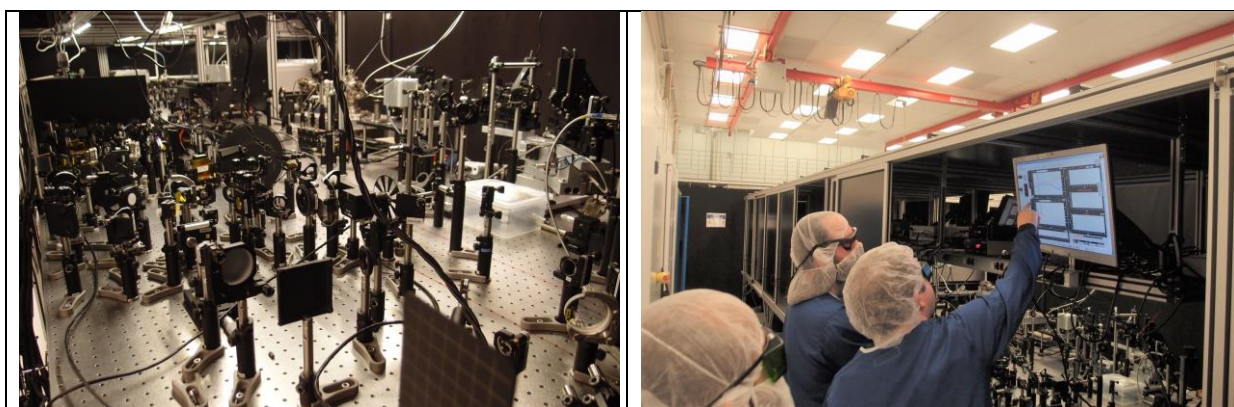


Fig: Set up for fs Stimulated Raman Scattering in operation in the E1 experimental hall.

Selected Publications

[1] Structural dynamics upon photoexcitation-induced charge transfer in a dicopper (i)-disulfide complex, M Naumova, *et al.*, *Physical Chemistry Chemical Physics* 20 6274-6286 (2018)

[2] Comparative ultrafast spectroscopy and structural analysis of OCP1 and OCP2 from *Tolypothrix*, V. Kuznetsova, *et al.*, *Biochimica et Biophysica Acta (BBA) - Bioenergetics* Volume 1861, Issue 2, 1 February 2020, 148120 (2020)

[3] Femtosecond-to-nanosecond dynamics of flavin mononucleotide monitored by stimulated Raman spectroscopy and simulations, P. C. Andrikopoulos, *et al.*, *Physical Chemistry Chemical Physics: PCCP*, 29 Jan 2020, 22(12):6538-6552 (2020)

[4] Time-Resolved Femtosecond Stimulated Raman Spectra and DFT Anharmonic Vibrational Analysis of an Electronically Excited Rhenium Photosensitizer, M. Pižl, *et al.*, *Journal of Physical Chemistry A*, 2020 Feb 20; 124(7):1253-1265 (2020)