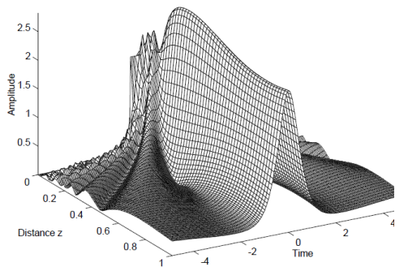
Ultrafast Optical Physics II

Nils Huse & Franz X. Kärtner — SoSe 2014 — STiNE 66-370

Understanding ultrafast optics, lasers, & their applications in science

- Linear & nonlinear pulse propagation: Optical solitons & pulse compression
- Laser dynamics: Single-mode, multi-mode, Q-switching, mode locking
- Pulse characterization: Autocorrelation, FROG, SPIDER and 2DSI
- Noise in mode-locked lasers and frequency combs
- Laser oscillators& conventional and parametric amplifiers
- High-harmonic generation & attosecond pulse generation
- Nonlinear polarizations in matter: understanding perturbative expansions
- Ultrafast Fourier-transform spectroscopy: two and more dimensions
- From GHz to the ultraviolet: investigating transient states of matter with light
- More ways to see: Raman, CARS & fluorescence - also good for imaging
- Soft and hard X-ray sources: synchrotrons, table-top lasers, X-ray lasers
- Ultrafast X-ray science: femtosecond molecular movies w/ atomic resolution

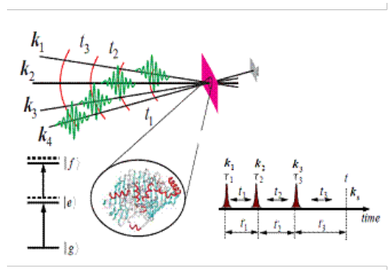


Soliton-like pulse shaping in mode-locked lasers.

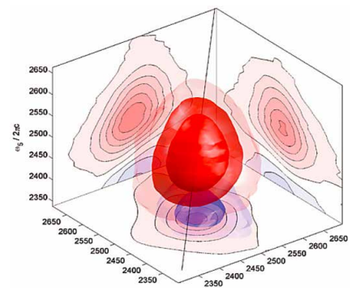
High repetition rate Kerr-Lens Mode-locked Ti:sapphire laser.

Superfluorescence cone in optical parametric amplifiers.

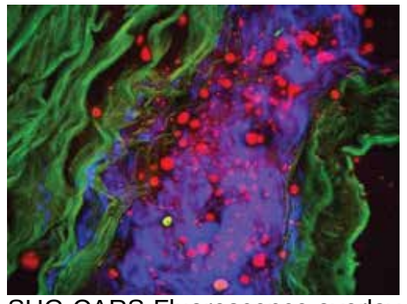
Methane-stabilized HeNe-Laser in a molecular optical clock.



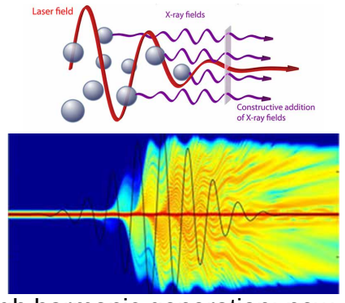
Nonlinear Spectroscopy: separating quantum pathways in space.



Femtosecond 3DFT vibrational spectroscopy with infrared light.



SHG-CARS-Fluorescence overlay-image using FT-spectromicroscopy.



High harmonic generation: new sources for ultrafast X-ray science.

Lectures: Fr. 08.30-10.00 Jungiusstraße - SemRm 2
Excercises: Fr. 10.30-12.00 Jungiusstraße - SemRm 2
Start: 4. April. 2014

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