Session 5

Posters:

FULL FIELD COMMON PATH OPTICAL COHERENCE TOMOGRAPHY SYSTEM

Ron Friedman and I. Abdulhalim*

Department of Electro-optic Engineering

Ben Gurion University, Beer Sheva 84105, Israel

Optical coherence tomography (OCT) has developed rapidly since its potential for applications in clinical medicine was first demonstrated in 1991. OCT performs high-resolution, cross-sectional tomographic imaging of the internal microstructure in materials and biological systems by measuring the backscattered light. A possible method to increase the system sensitivity and stability is investigated, through the use of a common path full field interference microscope system. High axial resolution (down to few μm) tomograms have been acquired and 3D imaging results will be presented from biological samples. The common path OCT setup uses a broad band (300nm FWHM) light including the visible and NIR wavelengths up to 800nm in combination with a 10bit CCD camera. Distinction between spatial and temporal coherence characteristics of the interferogram is also investigated and experimental interferrograms from plane mirror are compared to theoretical model that takes into account both spatial and temporal coherence.

Generation of a dark nonlinear focus by spatio-temporal coherent control

Haim Suchowski, Dan Oron, and Yaron Silberberg

Department of Physics of Complex Systems,

Weizmann Institute of Science, Rehovot, Israel 76100

haim.suchowski@weizmann.ac.il

Quantum control has been used to manipulate the quantum dynamics of atoms and molecules using the temporal coherence properties of light. In this work we expand the principles of coherent control into the spatial domain. Rather than manipulating the temporal distribution alone, a *spatio-temporal* control scheme is analyzed and demonstrated.

In the experiment, the transition probability of a two-photon absorption (TPA) process in atomic Cesium is excited by phase-controlled temporally focused ultrashort pulses. The effect of chirp and π-step modulations on the spatial distribution is observed and explained. We have shown that by applying GVD (linear chirp) to the phase, the location of the temporal focus is shifted linearly along the propagation axis, shown in Figure 1 left. Also, by modulation of the phase with a π-step, we have demonstrated the generation of a dark nonlinear focus, i.e. the creation of a region in space where the TPA rate vanishes, flanked by bright regions (shown in Figure 1 right). By combining a dark pulse and GVD modulation, a dark nonlinear focus at a controlled coordinate along the propagation axis is formed.

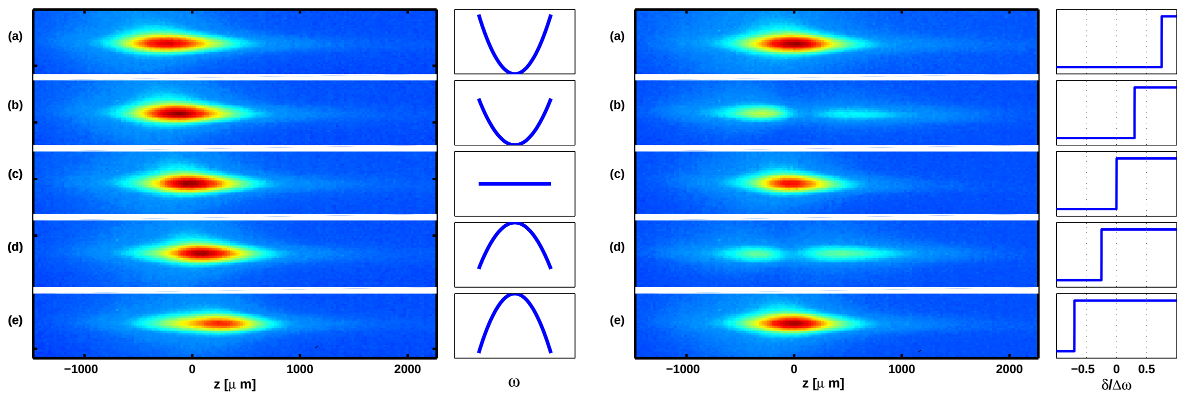

Fig. 1: Spatio-temporal manipulation of the TPA rate. Shown for each image is a schematic of the spectral phase function applied on the SLM. **Left:** The effect of GVD on the TPA spatial distribution. Images correspond to GVD values ranging from (a) $-10^4[fs^2]$ to (e) $10^4[fs^2]$. The net effect of the applied GVD is to move the location of the temporal focus along the propagation axis. **Right:** The effect of a π phase step on the TPA spatial distribution for several values of step spectral location δ. Images (a) and (e) denote a transform limited pulse. For $\delta/\Delta\omega = \pm 0.31$ (b,d) a dark nonlinear focus appears at z=0. For δ=0 (c) the transform limited result is reproduced.