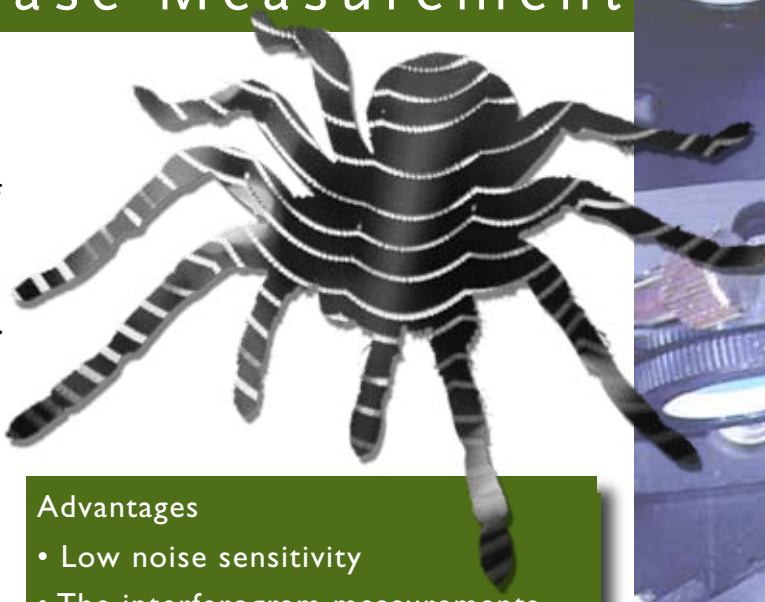
Avoca SPIDER System

Spectral Phase Measurement



Spectral phase interferometry for direct electric-field reconstruction (SPIDER) is one technique that can recover the spectral phase of an input pulse, without needing any reference pulse. SPIDER interferes two pulses which are separated in time and in frequency, and the resultant interferogram is read by a spectrometer.

A thin etalon is used to pick off a portion of the input pulse and split it into two pulses delayed in time. The majority of the input pulse passes through the etalon and is stretched in time with a diffraction grating stretcher. The stretched pulse and the pulse pair off the etalon are recombined in a non-linear KDP crystal. Because the separation of the pulse pair is less than the pulse length of the stretched pulse the two pulses off the etalon will mix with different frequencies in the stretched pulse. This frequency difference is known as the spectral shear and is the frequency equivalent of a temporal delay. The resulting interferogram is then collected with a spectrometer.

By performing a direct analysis of this interferogram, the spectral phase of the input pulse can be recovered. In addition, by independently measuring the pulse spectrum and performing a Fourier transform, the phase and intensity as a function of time can be retrieved. Thus the SPIDER technique offers a direct non-iterative measurement of the electric field of an ultrafast pulse.

Advantages

- Low noise sensitivity
- The interferogram measurements taken with a 1-D spectrometer, lowering cost, and increased simplicity.
- Fast: interferogram reconstruction calculations can be done in milliseconds on a standard PC.
- SPIDER setup involves no moving parts during operation.
- The acquisition of the experimental trace is done in a single-shot.
- Solid theoretical and conceptual background.
- Power supply from PC interface

Wavelength Range	730 - 855 nm (other wavelengths available)	
Pulse Duration	Avoca-30	Avoca-120
	10-30 fs	30-120 fs
Minimum Average Input Power	100 mW at 100 MHz rep-rate	
	1 mW at 1 kHz rep-rate	
Input Polarization	Horizontal	
Input Beam Diameter	< 4 mm	
Input Beam Height	110-140 mm	
Dimensions	320x160x160 mm	

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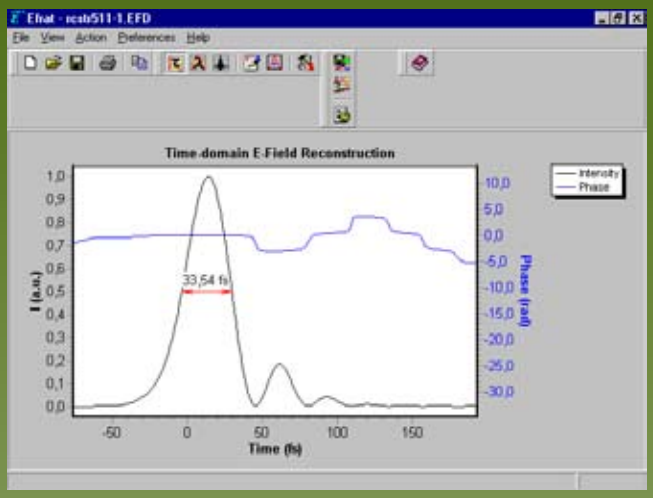
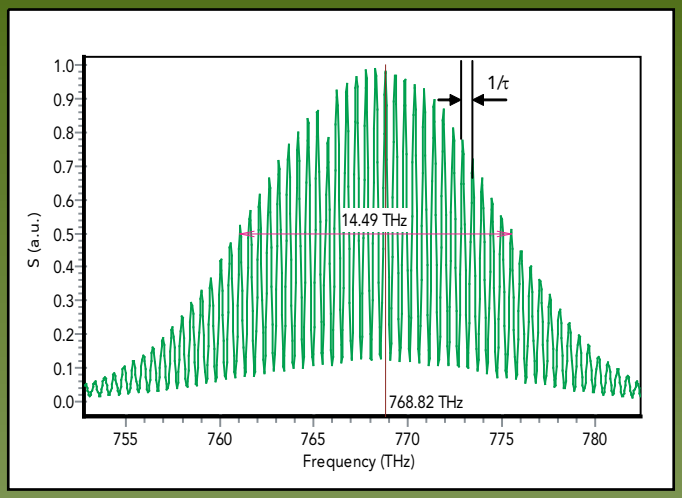
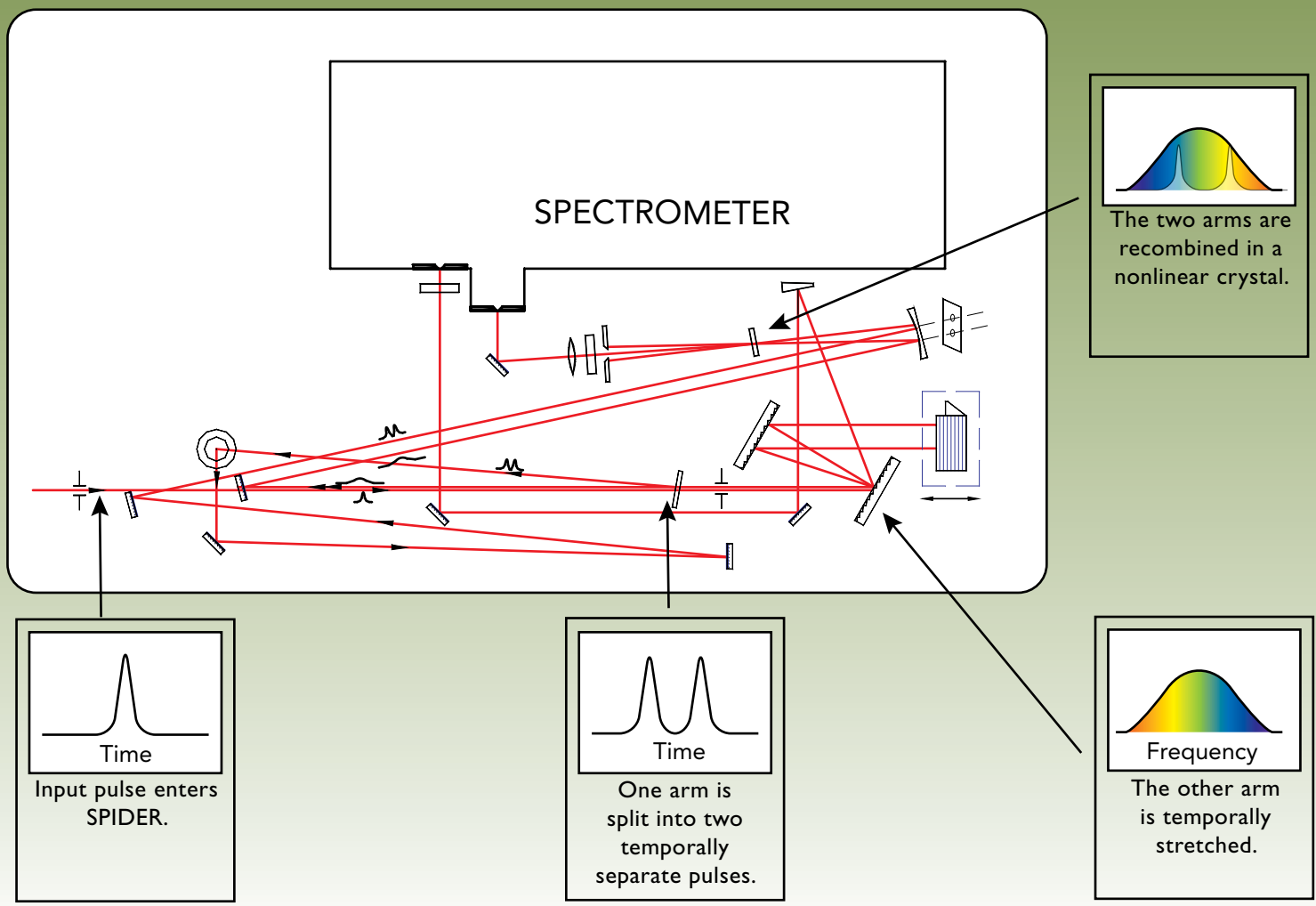


The software infers from the "SPIDERgram" the temporal duration and spectral phase.



After the pulses recombine in the nonlinear crystal, they form a "SPIDERgram" on the spectrometer.



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