Wizzler

Single-shot, high contrast ultrafast pulse measurement

Wizzler products provide high contrast and single shot spectral phase and intensity measurements of nearly compressed ultrafast laser pulses.

Wizzler products are extremely easy to install and to operate, and have become the reference tool for the high intensity laser physics user community.

Principle - Key benefits

The Wizzler measurement technique is named ”Self-Referenced Spectral Interferometry” (SRSI).

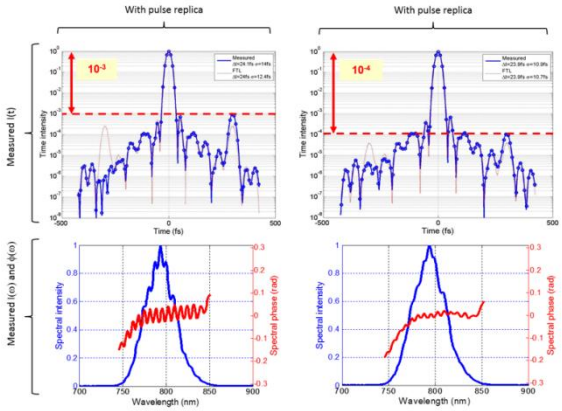
In this technique, a reference pulse with a flat spectral phase and a broad spectrum is collinearly generated from the pulse to measure by cross-polarized wave generation (XPW). Fourier-Transform Spectral Interferometry treatment of the single shot interferogram between the 2 delayed pulses provides high-dynamic spectral phase and intensity measurement, as well as a confirmation of the measurement validity.

- High dynamic range

SRSI takes advantage of the temporal contrast enhancement inherent to the XPW process to provide more than 40dB of temporal dynamic range, using a standard spectrometer with only 20dB spectral SNR.

As shown below, Wizzler products can measure small temporal structures in the sub-ps range, thus providing a unique single-shot coherent contrast information.

Data below shows a pulse replica, at 300fsec after the main pulse, introduced with a Dazzler to evidence the 40dB dynamic range of the Wizzler.



- User-independent measurement

With a design based on collinear geometry, with no beam splitter or delay line, Wizzler products are extremelly easy to align, making the measurement fast and reproducible.

SRSI technique is also user-calibration free, thus enabling user-independent measurements.

- Single shot – fast processing

Unlike scanning measurement techniques, single-shot techniques do not suffer from artifacts coming from the laser stability. On the contrary, single-shot techniques, combined with a fast and non-iterative processing, can be used to quantify the pulse duration stability of the laser system.

Since the SRSI algorithm relies on direct phase retrieval, without any assumption or integration step, it can combine accuracy with fast phase processing. Datalogging functionalities enable real-time pulse duration monitoring and pulse data collection up to 10Hz.

Applications

- High intensty lasers measurement

The unique high dynamic range of the Wizzler has gathered huge interest from the the high intensity laser physics community, where contrast in the sub-ps range has a strong impact on experiments.

As a result, Physicists using TW or PW scale laser systems are now using the Wizzler on a daily basis for pulse characterization, data collection, as well

as compression and contrast improvement using the Dazzler / Wizzler feedback loop.

- Few-cycle pulse generation

Attosecond science requires to generate ultra-broadband and well compressed laser pulses, down to few optical cycles.

Wizzler unique features have made it an essential tool for both the generation and the characterization of these pulses.

In the most classic setup, consisting of a sub-30fs Ti:Sa amplifier followed by a hollow-core post compression fiber, the quality of the Ti:Sa amplifier pulse compression has a strong impact on the non-linear effects occuring in the fiber. A careful compression of the amplifier using the Dazzler / Wizzler feedback loop allows to obtain shorter, more easily compressable few-cycle pulses.

In its USP version, the wizzler is also an excellent tool to perform single-shot, high contrast characterization of pulses down to 4fs.

Specifications

Standard Wizzler models are available from 400nm to 1µm, and for pulses from 4fs to 1ps.

Click on the image to download the standard Wizzler specification sheet.

Wizzler models for SWIR pulses are also available.

Click on the image to download the standard SWIR Wizzler specification sheet.

Custom Wizzlers, for other pulse durations or other wavelength ranges are available upon request. Please contact Fastlite for more information.

Options

- Vacuum compatibility

On target spectral phase measurement of few-cycle or high intensity pulses is always challenging, as these experiments are performed under vacuum conditions.

Although Wizzler software includes a vacuum chamber window dispersion compensation calculation module, it may be of interest to perform this measurement directly under vacuum.

Vacuum-compatible Wizzler hardware is now available as an option. Please contact Fastlite for more information.