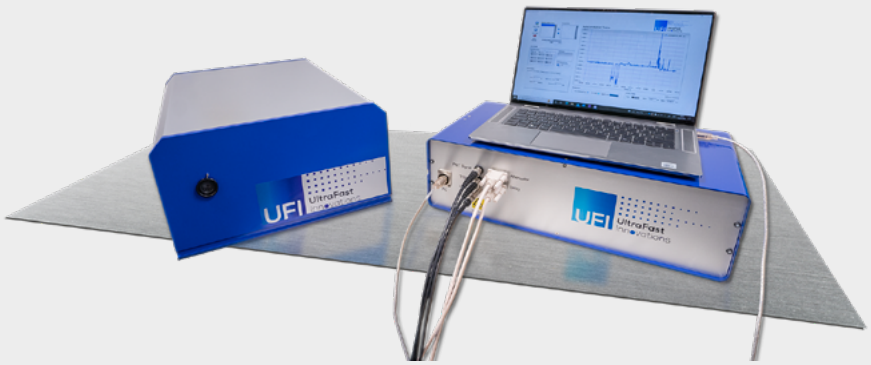
UltraFast Innovations

YOUR KEY to innovation and success

Ultra-high Contrast Third-order Autocorrelator

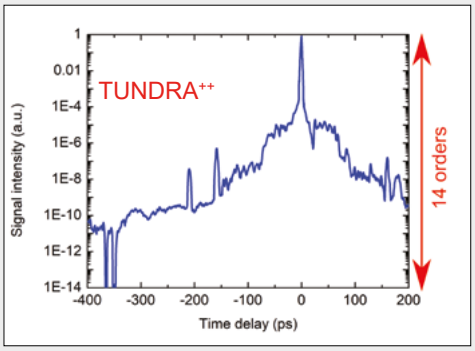
TUNDRA®

Our third-order autocorrelator serves as a highly sensitive diagnostic tool for laser pulse contrast measurements. After further development [1], the dynamic range reaches up to 14 orders of magnitude, enough to characterize the background or trace the tiniest pre- and post-pulse replicas of the most powerful lasers in the world. The autocorrelator employs all-reflective components (apart from signal generating non-linear crystals), guaranteeing correlation traces free of measurement artefacts. It can be employed in a wide range of applications. In particular, high intensity experiments in plasma physics require in depth understanding of the pulse contrast and possible parasitic pulse structures. Contrary to second-order autocorrelators, pre- and post-pulses can be distinguished due to the third-harmonic nature of the signal. These features make our specialized fully automatized autocorrelator an invaluable tool for state-of-the-art contrast characterization of ultrashort and intense laser pulses.



Key Product Features:

- Ultra-sensitive pulse contrast measurement
- Tundra⁺: 10^{12} (10^{11}) dynamic range with 50-150 µJ input pulses at 800 nm (1030 nm)
- Tundra⁺⁺: Up to 10^{14} dynamic range with 1-3 mJ input pulses at 800 nm or 1030 nm
- Up to 3.8 ns scan range
- No ghost pulse artefacts
- Available wavelengths: 800 nm, 1030 nm & 1053 nm. More upon request.
- Easy to set up and use.
- Full user-friendly software package
- Customizable according to laser specifications



Sample Measurement:

Laser intensity contrast measurement of the PHELIX Laser at GSI, Germany. The laser signal (at 10^{-11} level) pulls off about 3 orders of magnitude above the detection limit.

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UltraFast Innovations is a spin-off from the LMU Munich and the Max Planck Society.

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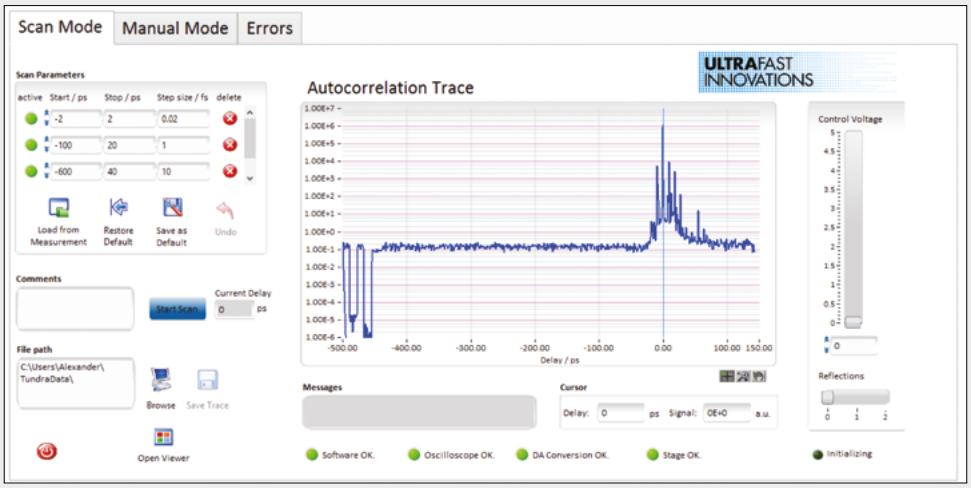
Characteristics:	TUNDRA	TUNDRA⁺	TUNDRA⁺⁺
Single dynamic range (orders of magnitude)	11 @ 800 nm 10 @ 1030/1064 nm	12 @ 800 nm 11 @ 1030/1064 nm	up to 14
Delay scan range	633 ps, 1.9 ns or 3.8 ns		
Time zero position	customizable (633 ps/ 3.8 ns), user-selectable on-site (1.9 ns)		
Input pulse energy	50-150 µJ		1-3 mJ
Scan step resolution	2 fs @ 633 ps range 4 fs @ 1.9 ns / 3.8 ns		
Input polarization	s-polarized beam (vertical)		
Footprint	54 x 37 cm^2	54 x 52 cm^2	54 x 52 cm^2

User-Friendly Software Interface:

TUNDRA comes with a user-friendly software interface that makes it easy to set up a measurement. Furthermore, different measurements can be compared, the traces can be analyzed and the thickness of the optical elements generating pulse replica can be calculated with the software. The scan resolution can be set to different values throughout the measurement to minimize the acquisition time.



Main window of the software.

Reference Measurements:

TUNDRA autocorrelators have been used successfully to characterize some of the most powerful and unique Terawatt and Petawatt laser systems in the world, including:

ATLAS, MAP, Garching, Germany (50-250 TW, 25 fs)	PFS, MPQ, Garching, Germany (100 TW, < 10 fs)	SYLOS, ELI-ALPS high-contrast OPCPA laser (5 TW, 9 fs)
SALLE JAUNE, LOA, Palaiseau, France (200 TW, 26 fs)	APOLLON, Palaiseau, France (up to 5 PW, 15 fs)	PHELIX, GSI, Darmstadt, Germany (500 TW, 500 fs)

References:

[1] V. A. Schanz, F. Wagner, M. Roth, and V. Bagnoud, "Noise reduction in third order cross-correlation by angle optimization of the interacting beams," Optics Express **25**(8), 9252-9261 (2017).