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, sufficient to characterize the background and detect even the tiniest pre- and post-pulse replicas of the most powerful lasers in the world. The autocorrelator employs all-reflective components, guaranteeing correlation traces free of measurement artefacts. It can be used in a wide range of applications. In particular, high-intensity experiments in plasma physics require an in-depth understanding of pulse contrast and possible parasitic pulse structures. In contrast 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 automated autocorrelator an invaluable tool for state-of-the-art contrast characterization of ultrashort and intense laser pulses.

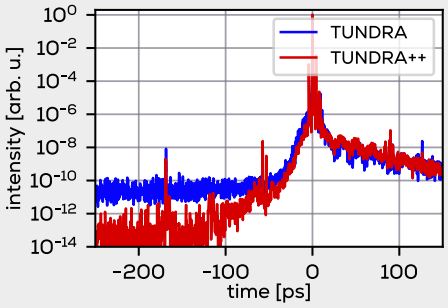
Key Product Features:

- Ultra-sensitive pulse contrast measurement
- TUNDRA+: 10^{12} dynamic range with 50-150 µJ input pulses at 800 nm (10^{11} at ~ 1µm)
- TUNDRA++: Up to 10^{14} dynamic range with 0.25-1 mJ input pulses at 800 nm or 1030 nm
- Up to 3.8 ns scan range
- No ghost pulse artefacts
- Easy to set up and use.
- Full user-friendly software package
- Customizable according to laser specifications

Available for the following laser types:

- Ti:Sa – 800nm
- Cr3+ -based: 690-850 nm (e.g., ruby, alexandrite, colquiriite lasers)
- Nd-based: 1053-1064 nm (e.g., Nd:YAG, Nd:YLF, Nd:Glass)
- Yb-based: 1007-1079 nm (e.g., Yb:YAG, Yb:LuAG, Yb:YLF, Yb:KGW, Yb:CALGO, Nd:YAP)
- Custom wavelengths are available upon request.

Sample Measurement:



Laser intensity contrast measurements of the 10 PW Laser at ELI-NP, Romania, comparing the performance of TUNDRA and TUNDRA++.

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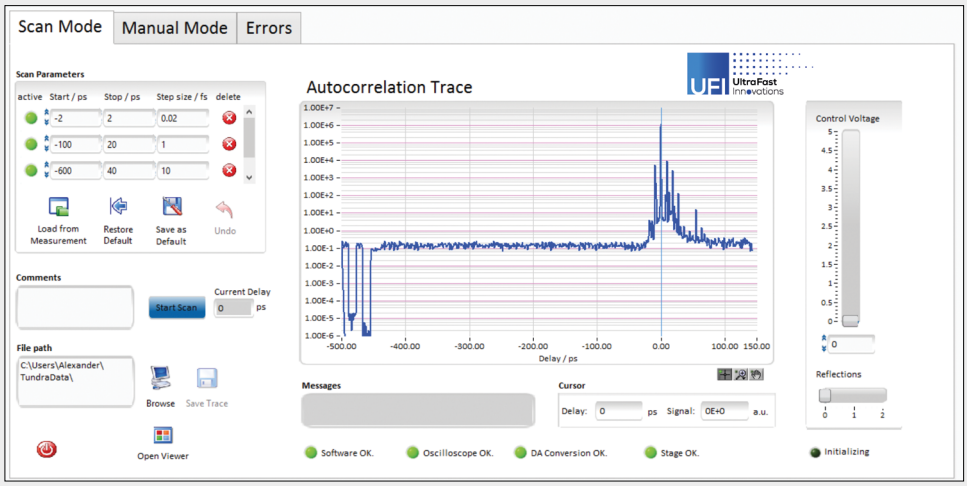
Characteristics:	TUNDRA	TUNDRA⁺	TUNDRA⁺⁺
Single dynamic range (orders of magnitude)	11 @ 800 nm 10 @ 1030/1064 nm	12 @ 800 nm 11 @ 1030/1064 nm	up to 14
Delay scan range	633 ps, 1.9 ns or 3.8 ns		
Time zero position	customizable (633 ps/ 3.8 ns), user-selectable on-site (1.9 ns)		
Input pulse energy	50-150 µJ		0.15-0.75 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 cm² 54 x 52 cm²	54 x 37 cm² 54 x 52 cm²	54 x 52 cm² 54 x 67 cm²

TUNDRA comes with a user-friendly software interface that makes it easy to set up measurements. Furthermore, diferent measurements can be compared, the traces can be analyzed, and the thickness of the optical elements generating pulse replicas can be calculated using 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 successfully used to characterize some of the most powerful and unique terawatt- and petawatt-class 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).