



Ultra-high Contrast Third-order Autocorrelator **TUNDRA**

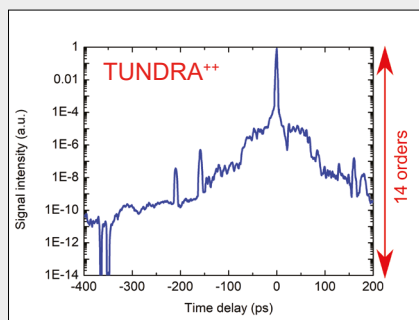
Our third-order autocorrelator serves as a highly sensitive diagnostic tool for laser pulse contrast measurements. After further development [1], the dynamic range reaches up to 14 orders of magnitude, enough to characterize background or trace tiniest pre- and post-pulse replica of the most powerful lasers in the world. The autocorrelator generates the third harmonic signal in nonlinear crystals and is set up with all-reflective components, guaranteeing correlation traces without measurement artefacts. It can be employed in a wide range of applications. In particular, high-field experiments in plasma physics require the in-depth measurement of the pulse contrast behavior and possible parasitic pulse structures. Compared to second-order autocorrelators, the signal's third-harmonic nature allows to distinguish between pre- and post-pulses. All these features make our specialized fully automated autocorrelator an invaluable tool for state-of-the-art characterization of ultrashort laser pulse contrast.



Key Product Features:

- **Ultra-sensitive pulse contrast measurement**
- **Tundra⁺: 12 (11) orders of magnitude dynamic range with 50-150 μJ input pulses with 800 nm (1030 nm) and customizable according laser specifications**
- **Tundra⁺⁺: Up to 14 orders of magnitude dynamic range with 1-3 mJ input pulses with 800 nm and 1030 nm, and customizable according laser specifications**
- **up to 3.8 ns scan range**
- **No ghost pulse artefacts**
- **Available wavelengths:**
E.g. 800 nm, 1030 nm, 1053 nm, and numerous more
- **Easy to set up and use.**
- **Full user-friendly software package**

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.



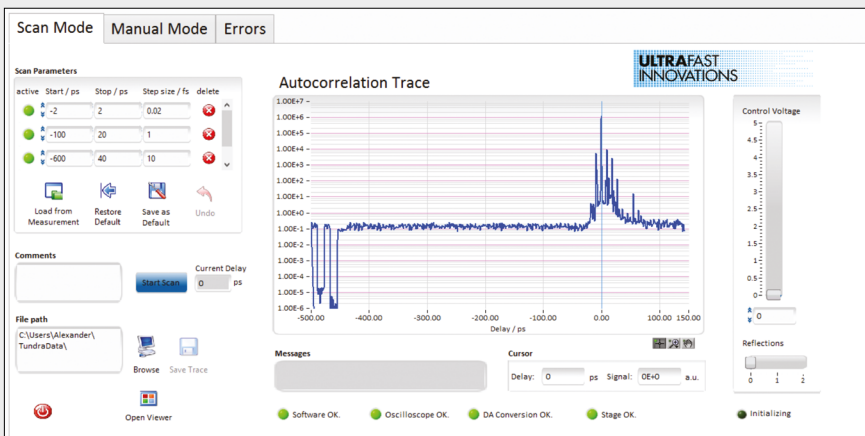


UltraFast
Innovations

Characteristics:	TUNDRA	TUNDRA ⁺	TUNDRA ⁺⁺
Single dynamic range (o.o.m.)	11@800 nm 10@1030/1064 nm	12@800 nm 11@1030/1064 nm	up to 14
Delay scan range	633 ps, ≈ 2 ns or ≈ 4 ns		
Time zero position	customizable (633 ps/ 4 ns), user-selectable on-site (2ns)		
Input pulse energy	50-150 μJ		1-3 mJ
Scan step/resolution	2 fs @ 633 ps range 4 fs @ 2 ns / 4 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 very user-friendly software interface to set up a measurement including variable options. Different measurements can be compared, traces can be analyzed or the thickness of optical elements generating pulse replica can be calculated with our software.



Screenshot of our user-friendly control 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).