



UltraFast
Innovations

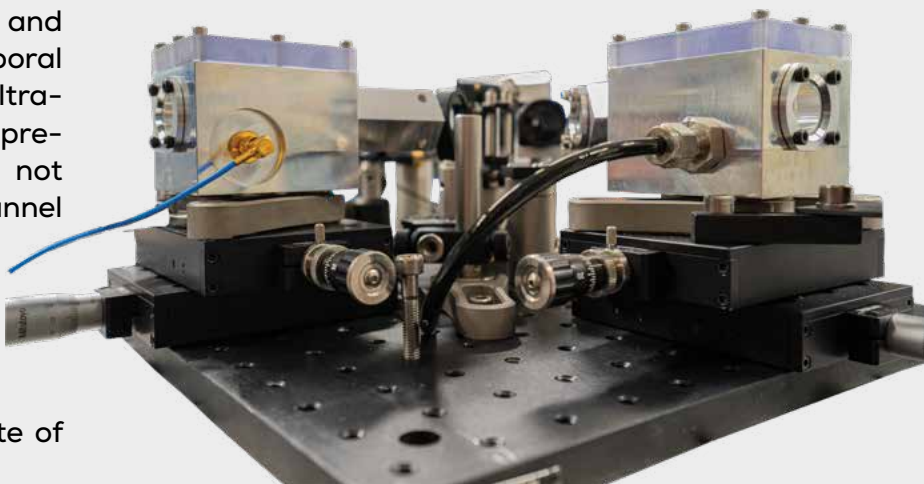


YOUR KEY to innovation and success



Compact single-shot CEP-meter **MADEIRA**

UFI's single-shot phasemeter facilitates single-shot measurements of the carrier-envelope-phase (CEP) of few-cycle femtosecond laser pulses. The ability to characterize the CEP of few-cycle pulses is the backbone of attosecond metrology and key to achieving sub-cycle temporal resolution in a broad range of ultra-fast laser applications. Unlike its predecessor, our new device does not require high vacuum or multichannel plates, which guarantees simple and user-friendly operation. MADEIRA supports center wavelengths ranging from the visible to the near-infrared domain, and operates at a repetition rate of up to 10 kHz.



Key Product Features:

- | | |
|---|--|
|  Wavelength range: 500-1000 nm |  Repetition rate: 10 kHz |
|  Pulse duration: ≤ 4.5 fs @750 nm central wavelength |  Footprint: 35 x 30 cm ² |
|  Input polarization: linear, p-pol |  Phase resolution: down to 200 mrad |
|  Input pulse energy: 10-40 μ J, best performance at 30 μ J | |

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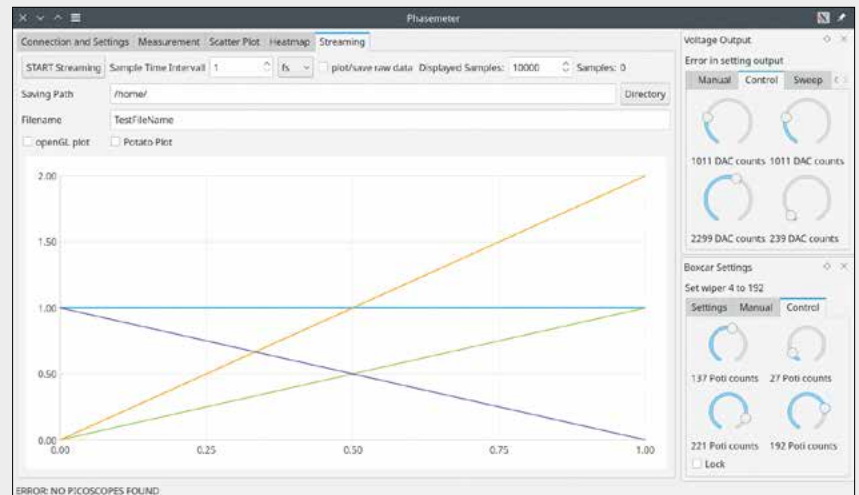
Working principle:

MADEIRA relies on the detection of the light-induced, CEP-dependent current. The current is generated via strong-field ionization of gas-phase ethanol in the focus of the laser pulse and is probed by a pair of electrodes placed on either side of the focus.

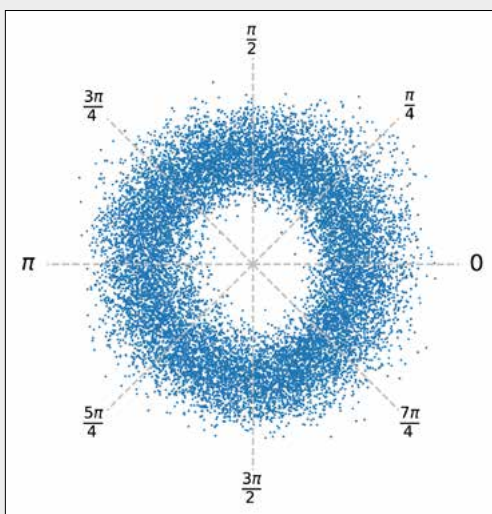
The current flowing between the two electrodes is amplified and converted into a voltage output signal. A second output signal is obtained from a similar measurement of a phase-shifted copy of the pulse in a second focus. The CEP is retrieved from the two output signals, which can be acquired continuously without time limitation.

Data Acquisition Software:

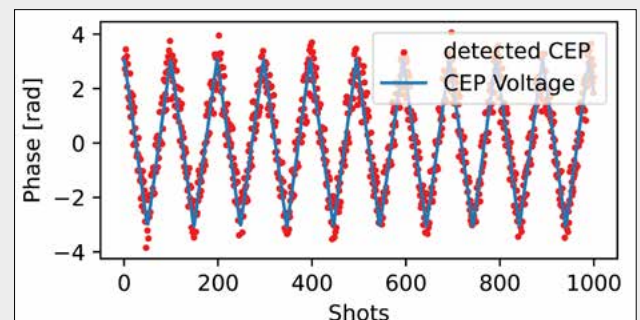
The phasemeter comes with a user-friendly software interface for data acquisition and real-time plotting of the acquired data for diagnostic purposes.



Sample Measurement:



Parametric plot of a single-shot CEP measurement recorded for a laser with random CEP.



Single-shot CEP measurement performed while varying the CEP with a triangular function from $-\pi$ to π .

References:

- [1] B. Bergues, „The circular-polarization phase-meter“, Optics Express **20**, 25317 (2012).
- [2] M. Kubullek, et al., „Single-shot carrier-envelope-phase measurement in ambient air“, Optica **7**, 35 (2020).
- [3] J. Schötz et al., „The emergence of macroscopic currents in photoconductive sampling of optical fields“, Nature Communications **13**, 962 (2022).