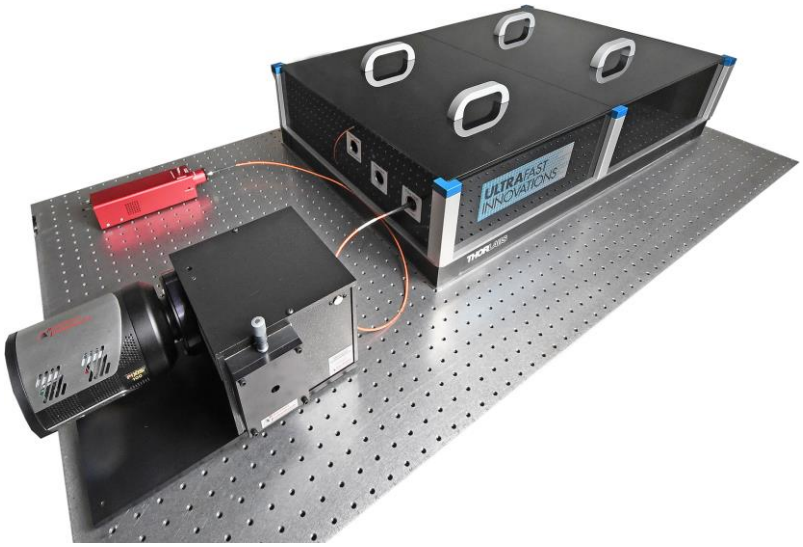
UltraFast Innovations GmbH
Am Coulombwall 1
85748 Garching
Germany
tel. +49 89 289 -14097
fax. +49 89 289 -14141
mail. info@ultrafast-innovations.com
www. http://www.ultrafast-innovations.com

White Light Interferometer for Ultrafast Optics Dispersion Measurement



Our White Light Interferometer uses spectrally resolved interferometry to accurately measure the Group Delay Dispersion (GDD) of multi-layer ultrafast optics. The device has been developed at the Max-Planck Institute for Quantum Optics (Garching, Germany) to characterize and refine some of the most advanced coatings to date.[1-4] Combining spectral with temporal information and the possibility to accumulate multiple passes over the same optic ensures reliable results with unique spectral coverage of up to 250-1100 nm (UV/vis/NIR version) and 900-2100 nm (IR version). Spectrally resolved detection makes reference lasers together with any related test sample restrictions on specific reflection or transmission bands obsolete. This opens the full spectral range to characterize even ultra-broadband or advanced narrowband coatings. The flexible optical setup can measure mirrors and transparent samples under angles of incidence variable between 0 and 70 degrees.

Key Product Features:

- Ultrabroad spectral coverage:
  up to 250-1100 nm (UV/vis/NIR version)
  900-2100 nm (IR version)
- Direct spectrally dispersed measurement with a spectrometer
- No need for reference lasers, no requirements on specific reflectivity
- 0-70 degree angle of incidence, measurement of single mirrors or mirror pairs
- s and p polarization
- Complete with laptop and user-friendly software interface

Specifications:

- Spectral coverage:
  470-1100 (vis/NIR basic version)
  250-1100 (UV/vis/NIR version)
  900-2100 nm (IR version)
- Spectral accuracy: 1 nm
- GDD accuracy ±5 fs^2
- Angle of incidence: 0-70 degree
- Polarization: s and p
- Optics size: 1 inch,
  other sizes upon request

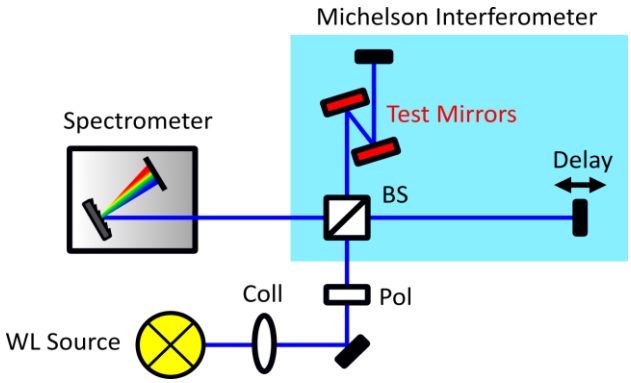


Figure 1: Scheme of the White Light Interferometer Setup. WL: White Light; Coll: Collimation; Pol: Polarizer; BS: Beam Splitter.

The device is based on a Michelson Interferometer with the Test Optics in one arm (Fig. 1), illuminated by an incoherent white light (WL) source. A measurement involves scanning the delay of one arm and recording the evolving interference pattern with a spectrometer. Fully automated analysis yields the spectral phase and GDD. The spectrometer directly provides the spectrally resolved information avoiding artefacts from time-domain reconstruction, and also provides an intrinsic calibration reference for the delay scan, so that no additional reference lasers are required. This makes our white light interferometer suitable for any optics measurements in the detection range without the need to cover a reference laser wavelength in transmission or reflectance. Examples for typical GDD measurements are shown in Fig. 2. Note that differences between measured and theoretical curves reflect tolerances in the manufacturing process.

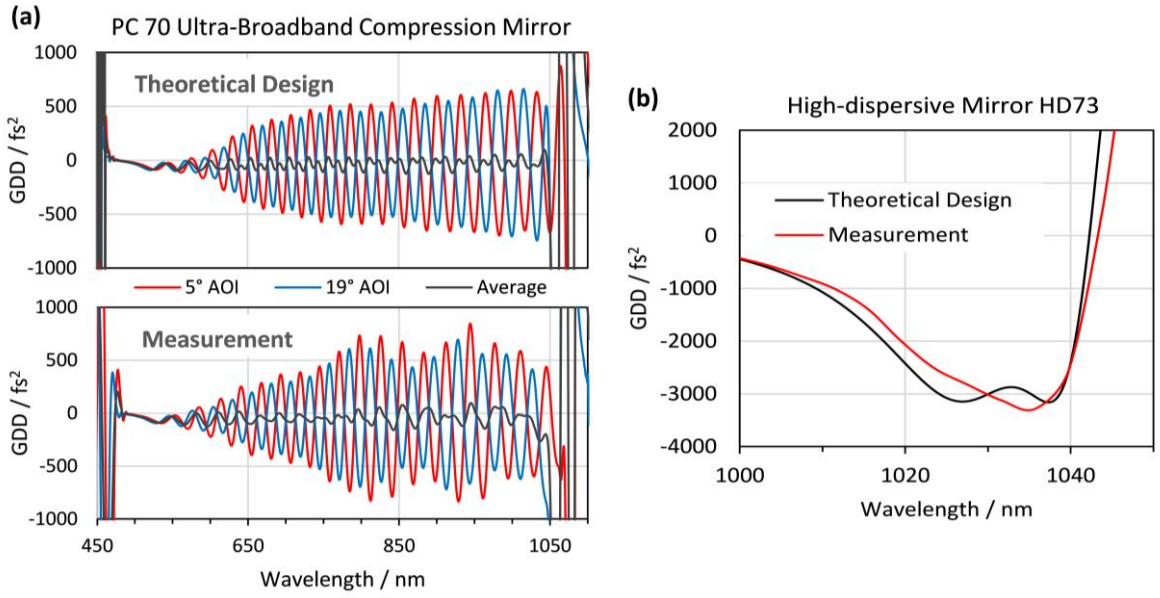


Figure 2: Examples of Group delay dispersion (GDD) measurements with the White Light Interferometer, and comparison to the theoretical design curves. (a) Ultrabroadband PC70 mirrors with our propriatary double-angle design, measured at 5 and 19 degree angle of incidence, together with the average. (b) High dispersive HD73 compression mirror with -3000 fs^2 per bounce at 1030 nm.

[1] M. Th. Hassan *et al.*, Nature 2016, *530*, 66.
[2] E. Fedulova *et al.*, Opt. Expr. 2015, *23*, 13788.
[3] V. Pervak, *Appl. Opt.* 2011, *50*, 55.
[4] T. V. Amotchkina *et al.*, Appl. Opt. 2009, 48, 949.