ARTIFACT-FREE BALANCED DETECTION FOR MEASUREMENT OF CIRCULAR DICHROISM WITH A SUBPICOSECOND TIME RESOLUTION

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Circular dichroism (CD), which is the differential absorbance between left- and right-handed circularly polarized light, is a very popular technique for analyzing the secondary structure of biomolecules at equilibrium in solution. Combination of pump-probe techniques and CD spectroscopy provides a versatile tool to access the conformational and electronic structure changes of chiral molecules over a wide range of time scales. However, despite recent technological advances, time-resolved CD experiments at the femto-picosecond time scale are still challenging, due to their very weak signals prone to artifacts [1]. Taking advantage that the transmission of linearly polarized light by a chiral sample is elliptical, we recently implemented a dual-arm ellipsometry detection on a femtosecond pump-probe set-up, with the combination of a quarter-waveplate and a Wollaston prism (Fig.1). With this balanced detection geometry, the probe ellipticity can be directly accessed with a single laser shot allowing subpicosecond CD measurements with an accuracy of 30 μOD (*i.e.* 1 mdeg) with very short acquisition times (i.e. a few min.) [2-3]. Here, I will illustrate the potential of this new detection and the strategy to eliminate polarization artefacts for the study of proteins and DNA.

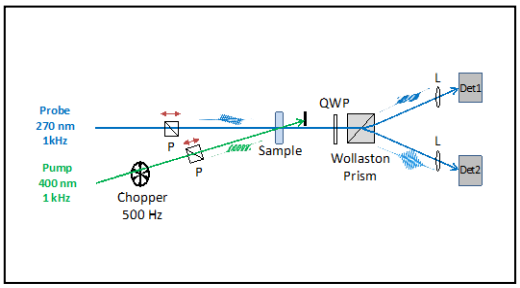

Fig. 1: Sub-picosecond dual-arm ellipsometric TRCD detection. P: Glan polarizer. QWP: quarter-waveplate L: Lens. Det1and Det2: sample probe polarization detectors.

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