



## LABORATOIRE D'OPTIQUE ET BIOSCIENCES

Unité INSERM U1182 - UMR CNRS 7645 - Ecole Polytechnique

Ecole Polytechnique, 91128 Palaiseau cedex

**Jeudi 6 Juin 2019 à 11h00**

Ecole Polytechnique  
*Amphithéâtre Curie*

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## **Chiral vs multidimensional spectroscopy of biomolecules: IR and UV spectral labelling**

One of the main motivations for developing broadband non-linear spectroscopies in the infrared (IR), visible and more recently the ultraviolet (UV), was to be able to monitor the couplings between chromophores and their evolution as a function of time. Nevertheless, quantifying these couplings and extracting structural parameters of peptides and proteins has proven to be difficult even in the IR, where isotope labelling can isolate individual peptide bonds and provide local information. The same exciton coupling models used to understand these multidimensional spectra also describe circular dichroism (CD) signals, which show very characteristic signatures even in the case of highly congested absorption spectra. This makes it very interesting to record broadband time-resolved CD spectra, which we have originally attempted in the mid-IR, where typical femtosecond laser pulses cover the characteristic amide I region of the peptide backbone.<sup>1,2</sup> However, the difficulties caused by the small couplings and CD signal strengths in the mid-IR have led us to transfer the concepts of spectral labelling and local coupling into the UV spectral range. We could recently show that ultrafast changes to the backbone CD signal can thus be recorded<sup>3</sup>, reflecting changes in local coupling that are not resolved in 2D-UV spectroscopy.

- (1) Bonmarin, M.; Helbing, J. A Picosecond Time-Resolved Vibrational Circular Dichroism Spectrometer. *Opt. Lett.* **2008**, *33* (18).
- (2) Dutta, B.; Helbing, J. Optimized Interferometric Setup for Chiral and Achiral Ultrafast IR Spectroscopy. *Opt. Express* **2015**, *23* (12), 16449.
- (3) Oppermann, M.; Spekowius, J.; Bauer, B.; Pfister, R.; Chergui, M.; Helbing, J. Broad-Band Ultraviolet CD Spectroscopy of Ultrafast Peptide Backbone Conformational Dynamics. *J. Phys. Chem. Lett.* **2019**, *10*, 2700–2705.

Renseignements complémentaires

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