CFEL SCIENCE

SEMINAR

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CFEL-bldg. 99, seminar room I (ground floor)

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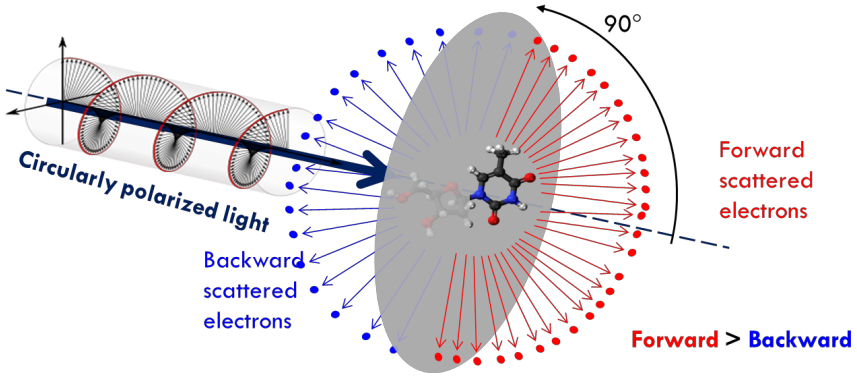
Distinguishing Enantiomers using Photoelectron Circular Dichroism and Time of Flight Mass Spectrometry

Theoretically predicated in 1974 [1], Photo Electron Circular Dichroism (PECD) did not present itself observationally until the experimental tools where sufficiently developed 30 years later. This asymmetry in the forward/backward emission from randomly orientated chiral molecules was initially studied using large synchrotron sources for the Single Photon ionisation case [2]. Development of table top laser sources of sufficient pulse duration, Intensity and repetition in recent years has opened the possibility of smaller scale devices to probe these dynamics.

Several notable studies of PECD in the multiphoton ionisation regime have been undertaken in the last few years [3]. Fundamental studies of the electron dynamics can be probed, in addition, the possibility of using this in industrial solutions to determining enantiomeric excess is now feasible.

This project concerns itself with the assembly, characterisation and initial testing of a novel device in measuring PECD. The Chiral ElectRon Seperator for Enantiomer Identification, (CERSEI), takes a more elegant approach on a much smaller scale, to measure the PECD signal for a given sample. It does so using confinement of charged particles in electric and magnetic fields. It is also hoped to extend these studies into coincidence measurements using pulsed time of flight mass spectrometry of the ion fragments alongside detection of the liberated electrons.

In the coming weeks the device will be tested further at facilities in Edinburgh and Sweden using femtosecond laser systems where the first benchmark results of CERSEI are expected to be obtained.



[1] Burke, Ritchie. Phys. Rev. A 13, 1411 (1976)
[2] L. Nahon, G.A. Garcia, I. Powis, Valence shell one-photon photoelectron circular dichroism in chiral systems, Journal of Electron Spectroscopy and Related Phenomena (2015), http://dx.doi.org/10.1016/j.elspec.2015.04.008
[3] M. Janseen, I. Powis, Phys. Chem. Chem. Phys., 2014,16,856 (2013)

Host: Jochen Küpper, CMI Seminar