

Coincident measurement of photo-ion circular dichroism and photo-electron circular dichroism on 1-Phenylethylamine

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Electronic Supplementary Information

• Analysis of Circular Polarization

The degree of circular polarization of the laser pulses employed has been analysed by the rotating waveplate method. In short, the measurement setup comprised the following element: a quarter waveplate, a polarizer and a power meter. For each (fixed) QWP-Position the polarizer was rotated 360° in steps of 0.9° and the power was recorded at each step. The zero degree position of the polarizer corresponds to the position where the linear polarized light – in this case vertical polarized light – was fully extinguished by the polarizer.

The data is then fitted with

$$y = A * \sin^2(2 * \pi * (x - \text{Phase})) + I_0 \quad (1)$$

where x is the polarizer angle given in radian and y the measured power. The fit-parameters are A , Phase and I_0 .

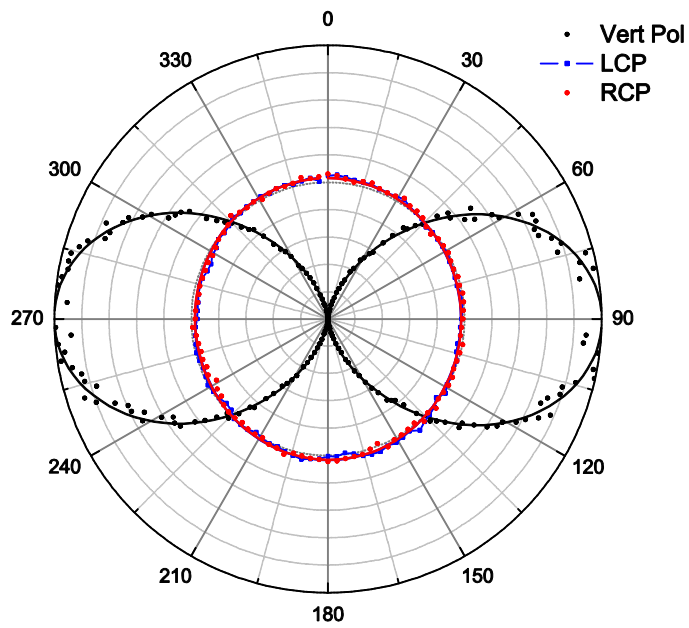
The circular polarization is calculated with

$$R_{\text{circ}} (\%) = (2 * I_0) / (2 * I_0 + A) * 100 \quad (2)$$

To ensure that the measured light corresponds to the light inside the coincidence spectrometer we placed the focus length as well as the entrance window between the quarter waveplate and the polarizer.

The Figure presented below contains the data for left circular polarized light as blue symbols and that for right circular polarized light as red symbols. For comparison the result of the analysis is also shown for vertically linear polarized laser light. The circular polarization of both LCP and RCP was $\geq 95\%$.

Despite the fact that the degree of circular polarization is very similar for LCP and RCP, the ionization rates and the coincidence rates observed are systematically larger for RCP ultimately causing a negative offset of the PICD values. Typical values for ionization rates were 0.21 ± 0.02 ionized molecules per laser shot for RCP and 0.19 ± 0.02 ionized molecules per laser shot for LCP. The ionization rates for linear polarized light was always in between the LCP and RCP values. In fact this is different from the observation in previous work (Lehmann and Weitzel, PCCP, 22, 13707, (2020)) where the ionization rate for linear polarized light was systematically larger than that for both LCP and RCP, but no significant offset in PICD resulted.



^a Fig. S 1: Analysis of the circular polarizer light. Both the left-handed circular polarized light (LCP) and right-handed circular polarized light (RCP) had a polarization that the $\geq 95\%$.