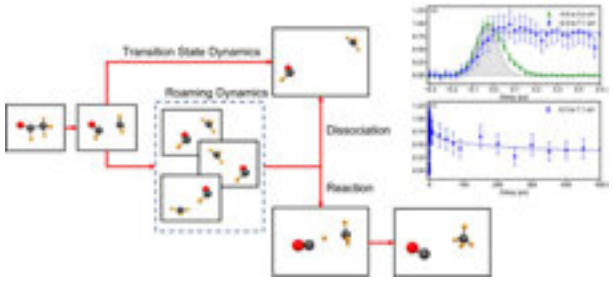
Ultrafast and XUV science

Photoelectron spectroscopy measurements of roaming reactions in acetaldehyde

G.L. Abma, D.A. Horke *(Radboud University, Institute for Molecules and Materials, Nijmegen, The Netherlands)*
M.A. Parkes *(Department of Chemistry, University College London, UK)*
W.O. Razmus, R.S. Minns *(School of Chemistry, University of Southampton, UK)*
Y. Zhang, A.S. Wyatt, E. Springate, R.T. Chapman *(Central Laser Facility, Research Complex at Harwell, STFC Rutherford Appleton Laboratory, Harwell Campus, Didcot, UK)*

The dissociation reaction of acetaldehyde is mediated by a roaming reaction, where the CH_3 and HCO fragments are seen to roam around each other at intermediate distances between that associated with the bound molecule and the dissociated fragments. We have performed time-resolved photoelectron spectroscopy measurement of the roaming reaction where we observe the formation and collapse of the roaming intermediate.

Contact:
R.S. Minns
r.s.minns@soton.ac.uk



Cartoon representation of the photochemical reaction of acetaldehyde following either a transition state or roaming reaction pathway. The inset shows the temporal changes in photoelectron signal for the peaks associated with the initially excited state (green) and the roaming intermediate (blue).

Photoelectron Imaging in the Molecular Frame

J.O.F. Thompson *(School of Chemistry, University of Nottingham, UK; Central Laser Facility, STFC, Rutherford Appleton Laboratory, Harwell Campus, Didcot, UK)*
J. Woodhouse, R.S. Minns *(School of Chemistry, University of Southampton, UK)*
K.L. Reid *(School of Chemistry, University of Nottingham, UK)*
R.T. Chapman, A.S. Wyatt, Y. Zhang, E.L. Springate *(Central Laser Facility, Research Complex at Harwell, STFC Rutherford Appleton Laboratory, Harwell Campus, Didcot, UK)*

The internal conversion of energy in photoexcited molecules is extremely important in the chemistry of several biological processes, such as vision. Developing new tools to monitor these processes is crucial to gain new insights into these complex dynamics. One such tool is photoelectron angular distributions (PADs), which can provide detailed information regarding the electronic character of the states involved in these processes. Traditional methods of obtaining these PADs can, however, provide only a partial and obscured measurement of this character. This report details experiments performed at the CLF's Artemis facility using strong field alignment and HHG photoelectron spectroscopy to overcome these limitations, and measure PADs approaching the molecular frame limit. We highlight the success of the experiments and implications for this new methodology

Contact:
J.O.F. Thompson
james.thompson@stfc.ac.uk