CFEL SCIENCE

SEMINAR

23th May 2019, 10:00–11:00h

CFEL – Building 99, seminar room I and II (ground floor)

Valery Milner

Department of Physics & Astronomy, University of British Columbia, Vancouver, Canada

Controlled enantioselective orientation of chiral molecules with an optical centrifuge

We report on the first experimental demonstration of enantioselective rotational control of chiral molecules with a laser field. In our experiments, two enantiomers of propylene oxide are brought to accelerated unidirectional rotation by means of an optical centrifuge. Using Coulomb explosion imaging, we show that the centrifuged molecules acquire preferential orientation perpendicular to the plane of rotation, and that the direction of this orientation depends on the relative handedness of the enantiomer and the rotating centrifuge field. The observed effect is in agreement with theoretical predictions and is reproduced in numerical simulations of the centrifuge excitation followed by Coulomb explosion of the centrifuged molecules. The demonstrated technique opens new avenues in optical enantioselective control of chiral molecules with a plethora of potential applications in differentiation, separation and purification of chiral mixtures.

Host: Jochen Küpper/ CFEL Molecular and Ultrafast Science Seminar