

# Electron emission from chiral molecules

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## ABSTRACT

Each molecule can be recognized by its chemical composition and its structural conformation that dictates how it will interact with other molecules. Life has found an extra parameter to stock durably information: chirality. This asymmetry property appears at the molecular level when two molecules have the same chemical composition and structure but cannot be superimposed to each other by a mirror transposition. The two mirror images are called enantiomers. Enantiomers are able to regulate different biological mechanisms through their handedness. This chiral recognition is the key element in how we perceive odor and taste and is as well as of major importance in many mechanism for drug action. Chirality is as such, one of the most subtle example of broken symmetry with a huge impact in chemistry, pharmacology and biochemistry and even the origin of life.

In the photoionization of randomly-oriented pure enantiomers by circular polarization light, an asymmetry of the emitted photoelectron is observed along the photon propagation axis. This forward/backward asymmetry can reach several percentage and reverses with the handedness of the enantiomer or the helicity of the light polarization.[1] By comparing different ionization mechanisms, all using femtosecond pulses, we found that PECD exists in all regimes (single photon, multiphoton, tunneling).[2] On the basis of these experiments, we have performed the first (to our knowledge) experimental investigation on time-dependent chiral dynamics. The molecular dynamics investigated are vibronic coupling from Rydberg states in Fenchone and Camphor (C<sub>10</sub>H<sub>16</sub>O). These two molecules are isomers of each other. [3] The time-resolved approach opens new horizons and questions on what are the most important dynamical aspects of the scattering of an electron in chiral potential that is as well evolving.

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