

SEMINAIRE LIDYL

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Le Jeudi 19 Janvier 2023 à 11h

Orme des Merisiers, Bât.701, Pièce 17 (salle de séminaires)

The seminar will be accessible online on Zoom at the following address:

<https://cnrs.zoom.us/j/95225615255?pwd=QURjVXIRdTRZWDFaUUQvVjJSN1c4Zz09>

Meeting ID : 952 2561 5255 / Passcode : B0taQu

From highly efficient XUV generation through high-order frequency mixing to chiral steering of free-induction decay

In my seminar I will present two examples from two current directions of development of ultrafast physics and attophysics.

The first direction is the advancement of attosecond sources: generation of more intense XUV pulses with a shorter duration. Here I will present a study of the generation of coherent XUV using intense laser fields in a rapidly ionising gas. We show that the blue shift during propagation is a dominant limitation for the high-harmonic generation efficiency for visible or near-UV drivers. We introduce a new spatial scale, the blue-shift length, which sets the upper bound for the quadratic growth of the harmonics. Moreover, we show that this restriction can be overcome by adding a weak mid-IR field: the phase-matched high-order frequency-mixing process does not suffer from this blue shift, and the generated XUV intensity grows quadratically.

The second direction in which the attoscience progresses is a discovery of new physical processes becoming accessible at these ultrafast timescales. In this part of my talk, I will give you an example of a new process we proposed – chiral steering of free-induction decay. Chiral discrimination has recently become an emerging frontier in ultrafast physics, with vivid progress achieved in multiphoton and strong-field regimes. Here we introduce a new phenomenon, enantiosensitive free-induction decay, steered by a tricolour chiral (TRICC) field structured in space and time. We demonstrate theoretically that an excited chiral molecule accumulates an enantiosensitive phase due to perturbative interactions with the TRICC field, resulting in a spatial phase gradient that steers the free-induction decay in opposite directions for opposite enantiomers.