

New opportunities for femtochemistry at Free Electron Lasers

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X-ray based techniques are primary tools to explore where atoms are. X-ray absorption, scattering, diffractions are essential tools for many researchers.

Such small distances usually imply extremely short time scales often measured in femtoseconds ($1 \text{ fs} = 10^{-15} \text{ s}$) that have been inaccessible to X-ray techniques until few years ago.

The advent of X-ray Free Electron Lasers (XFELs) with intense and extremely short pulses (down to few fs) is now unleashing new opportunities to study matter at femtosecond time scale.

During this presentation, a brief introduction to XFELs will be given together with some of the challenges encountered using these machines and ways that have been found to overcome them [1,2].

In the second part of the talk, recent case studies ranging from ultrafast spin crossover in solution [3], to biophysical model systems [4] and solid state physics [5] will be discussed.

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