

On the generation, characterization and applications of intense attosecond pulses

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Real-time observation of ultra-fast dynamics in all states of matter requires temporal resolution on the atomic unit of time (24.189 *asec*) ($1 \text{ asec} = 10^{-18} \text{ s}$). Tools for tracking such ultra-fast dynamics are ultra-short light pulses. During the last decade, continuous efforts in ultra-short pulse engineering led to the development of light pulses with duration close to the atomic unit of time. Attosecond (*asec*) pulses have been synthesized by broadband coherent extreme-ultraviolet (XUV) radiation generated by the interaction of gases or solids with an intense IR fs pulse. For the realization of studies of ultra-fast dynamics intense *asec* pulses are preferable. If the pulses are intense enough to induce a non-linear process in a target system, they can be used for ultra-fast dynamic studies in an XUV pump-XUV-probe configuration.

Here, I'll review on the recently developed approaches, on the generation and the temporal characterization of intense *asec* pulses. The utilization of these pulses on tracking ultrafast dynamical processes in an XUV-pump-XUV probe configuration will be also presented.