"Attosecond spectroscopy of inert gas electron state dynamics" Diploma thesis abstract.

In this work we perform a numerical simulation of two-photon excitation of neutral xenon atom p-level triplet by subfemtosecond laser pulse with a several-octave-wide spectrum and visualise the ensuing electron dynamics. For probing the system, we use a probe pulse identical to the pump pulse with a controlled delay. We obtain beats of probe pulse absorption spectrum versus delay at the wavelength of 149 nm. We show their similarity with beats obtained by means of time-resolved attosecond spectroscopy of probe pulse absorption in a pump-probe experiment by E. Goulielmakis et al., Max Plank Institute, Germany. We propose a method for selective excitation of xenon electron states by introducing a second pump pulse with a controlled delay relative to the first one. At delays of half a coherence oscillation period we show the damping of coherences by a secondary excitation with a reversed phase with respect to already existing oscillations. In perspective this method may be expanded to include molecular systems and taking into account the contemporary technology of wideband pulse generation, control of nearly any valence system becomes feasible.

A work by
Denis V. Meshchankin, group 625

Supervisor
professor Aleksei M. Zheltikov