

Diploma thesis abstract

**“Ionization of single hydrogen atom by laser pulse
of near-atomic field strength”**

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Process of ionization of atom by the laser pulse of the intra-atomic field strength is investigated. The applied approach is based on the theory, that provides the exact analytic solutions of a boundary value problem for an atom in the external field. By this reason, this theory can be considered as non-perturbative one. The eigenfunctions of the above problem are expanded into the series of the free atom eigenfunctions, and the expansion coefficients are calculated analytically. As a result we show the violation of the traditional selection rules in the region of the intra-atomic field strength of the laser field. Photoelectron angular distribution, photoelectron spectra, photoemission spectra, total ionization rate were calculated numerically. The obtained results are in the qualitative agreement with the results of theoretical and experimental studies in the region of subatomic laser field strength and provide the basis for the detailed interpretation of the new specific features of the atomic response in the region of the near-atomic laser field strength.