# Dynamic Stark shift and multiphoton ionization of sodium by femtosecond laser pulses

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We study the excitation and multiphoton ionization of sodium induced by strong femtosecond laser pulses [1,2]. The resonant dynamic Stark shift (RDSS) of energy levels and momentum distributions of photoelectrons are determined, both using a wave-packet propagation method. This method is used to determine an RDSS data set for transitions $3s \rightarrow nl$ ($n \leq 6$) in sodium induced by the laser pulse with the peak intensities up to $7.9 \times 10^{12}$ W/cm$^2$ and wavelengths in the range from 455.6 to 1139 nm. The data is applied to analyze the photoelectron spectra (electron yield versus excess energy) of the sodium atom interacting with an 800 nm laser radiation. The momentum distributions of photoelectrons are determined from the calculated electrons' outgoing wave by applying a Fourier transform, and energy spectra are extracted from them. Substructures observed in the recent experimentally measured spectra [3] are successfully reproduced and related to the resonantly enhanced multiphoton ionization (REMPI) via specific (P and F) intermediate states.

REFERENCES

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