FADDEEV'S PERTURBATION SERIES FOR IONIZATION AMPLITUDE OF ATOM BY STRONG LASER PULSE

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Time Dependent Schroedinger Equation (TDSE) contains two potentials: electron-atomic (Coulomb) potential and time-dependent dipole potential. The wave function is presented as a sum of two functions following the Faddeev's decomposition. The corresponding perturbation series in each step is compared with the alternative solution of the TDCE. Both calculations are numerical. The special attention was addressed to the problem of gauge-invariance of separate terms [1].

Convergence of the total ionization probabilities were analyzed for different carrier frequencies of the laser field. It was found that the Faddeev's perturbation series converges to the numerical solution of the TDSE up to quite small frequencies. It was also shown numerically that the traditional perturbation series when the Coulomb potential is considered like a perturbation (so called SFA) is divergent.

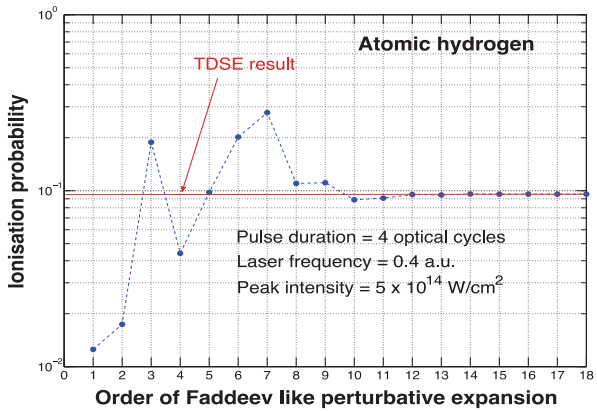

Fig. 1. Ionization probability versus number of perturbation steps. The laser frequency is relatively small.

1. Yu.Popov *et al.* // Eur. Phys. J. D. 2017. V.71. P.93.