Diploma thesis abstract

Atomic dynamics in femtosecond dipole optical trap

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The goal of this work was studying the dynamics and interaction of ultracold Rb atoms in optical dipole traps that are formed by pulse and cw laser beams. Optical dipole trap that is formed by femtosecond laser pulses, so called femtotrap, model was built; software to conduct calculations was written. Comparison of trapping effectivity of both type of traps was conducted. Power range that is optimal for atomic trapping was calculated, stochastic effects caused by high power trapping field were studied.

Also the effect of resonant dipole-dipole interaction (RDDI) in optical traps was studied, namely long-range interaction (for two atoms), short-range interaction (cold collisions of closely spaced atoms) and self-interaction (in the case of a single atom).

Femtotrap that was studied in this work is the unique instrument for studying the atomic interaction in absence of trapping high power light fields.

Advisor

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